EESTI PANK

# ESTONIAN COMPETITIVENESS REPORT

2019

**The Estonian Competitiveness Report** has been published once a year by Eesti Pank since 2013. Competitiveness can be analysed in various ways and so each report considers multiple competitiveness indicators.

The Estonian Competitiveness Report can be downloaded from the Eesti Pank website: http://www.eestipank.ee/en/publications/estonian-competitiveness-report.

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# SUMMARY

The Competitiveness Report has been published by Eesti Pank since 2013 and has appeared in different formats. This edition of the report predominantly uses the same indicators and methodology as in 2018[1]. In addition the European Commission's macroeconomic imbalance criteria have been used to provide a clearer framework for general assessments, and more emphasis has been placed on the real exchange rate of the euro. More attention has been paid to macroeconomic balance and real exchange rates have regained their popularity since the global financial crisis, having been largely overlooked in the previous decade.

The report has three parts. The first part covers current competitiveness indicators. As there are many of these, choosing between them is quite complex. Part one covers a wide selection of indicators, while parts two and three focus on competitiveness in terms of external balance and real exchange rates.

The first part uses international competitiveness indicators from the World Economic Forum index and the World Bank's Ease of Doing Business index, then looks at business surveys of foreign demand and price trends in foreign markets, and the growth indicators for exports and the market share of Estonian exports. The main results are:

- Estonia's rating in international competitiveness indexes has fallen in recent years from its earlier high positions, but not by much. The fall appears due more to effective performance by competitors than to any deterioration in Estonia's figures.

- Businesses have reduced their assessments of competitiveness in foreign markets and the number of export orders is declining. The reduction perceived in competitiveness coincides with the economic cycle passing its peak. Growth has slowed in global demand, which is in line with the phase of the global economic cycle, but so far the change has been moderate. Price conditions have not notably changed over the past year.

- Unit labour costs have risen rapidly together with continuing rapid wage rises, increasing by a cumulative 14% over three years and passing the 9% threshold set by the European Commission as the macroeconomic imbalance criterion for euro area member states, and the 12% threshold for non-euro area states. Relative productivity growth, which can be used to measure the rate of convergence of the economy and as a core indicator of long-term competitiveness, has been moderate.

- The growth rate of total exports is volatile and partly diverges from the dynamics of foreign demand, and the fluctuations are mainly caused by the variable growth in goods exports. The market share of goods exports has fallen a little over the past five years on average. The value of exports at current prices has fallen by 1.2% and the ratio of exports to import demand in the main target markets at constant prices is down 0.5%. Although the profile is quite volatile, the market share of exports has not substantially declined.

The second part of the review focuses on price competitiveness, which is covered through real effective exchange rates and external balance. The real exchange rate of the national currency also gives information on the internal development of the economy, reflecting the relative speed of price and wage rises in international comparison. After a gap of some time, the review also considers the current account norm, which shows the expected external balance that is consistent with the level of development of the economy. The main results from the second part of the review are:

1 Estonian Competitiveness Report 2018.

- Effective exchange rates rose rapidly in 2018 with the nominal effective exchange rate for the euro up 2%, and the real effective exchange rates up by between 3.5% for the GDP-based real effective exchange rate and 4.7% for the unit labour cost-based real effective exchange rate. This appreciation has come from the rise in the euro against the currencies of most non-euro area trading partners, and from faster growth in prices and wages than in foreign partners.

- The cumulative rise over the past five years in the real exchange rate of 7-9% exceeds the Commission's criterion for the macroeconomic imbalance procedure of 5%. It is however still within the EU criterion for the non-euro area countries of 11%. The strengthening in the real exchange rate has accelerated notably in the past two years.

- The current account norm is higher than before, mainly because of the expected reduction in funding from European Union structural funds and a substantial improvement in the net international investment position. The current net position of -27% of GDP is within the limit of -35% of GDP in the Commission's framework. The current account gap is close to zero, which in general terms means the real exchange rate is in balance, but which also indicates that the earlier competitive advantage from an undervalued real exchange rate has now faded away.

- There were no changes in the developments of price and non-price competitiveness. The balance of goods and services remains in surplus because of the surplus in exports of knowledge-intensive services. A weakening in price competitiveness for a part of goods exports has been offset by a strengthening in less price-sensitive exports in other sectors, and so the trade deficit is relatively stable overall.

The third part of the report looks further at real exchange rates. It starts with a review of the changes in the equilibrium real exchange rates in selected Central and Eastern European (CEE) countries in 1994–2013, and then looks at the impact of real exchange rate misalignments on economic growth. The main conclusion is that misalignments in the real exchange rate in both directions are bad for economic growth, but the effect is asymmetrical as overvaluation of the real exchange rate has much more impact.

In summary, a higher current account norm, a reduced negative international investment position, and a balanced real exchange rate do not indicate substantial imbalances in the economy even though some price competitiveness has been lost because the earlier competitive advantage from an undervalued exchange rate has gone. Continuing pressure on labour costs and prices will remain a problem in future, and it will start to put on upwards pressure towards an overvaluation of the real exchange rate. If the small fall in the market share of exports in foreign markets is added in, extrapolation of the trends points to a real risk of a further decline in price competitiveness in the future.

# I. THE DYNAMICS OF INDICATORS OF GENERAL COMPETITIVENESS

## INTERNATIONAL COMPETITIVENESS INDEXES

As previously, this report looks at two indicators, which are the Global Competitiveness Report of the World Economic Forum, and the Ease of Doing Business Index of the World Bank for 2018.

**The WEF competitiveness index.** Estonia has fallen in the rankings of this index[2] from 29th place in 2017 to 32nd place between Italy and Chile. The highest placed CEE country is now Czechia in 29th, which has taken over from Estonia as the leader among that group. There has been no change in the assessment of the Estonian economy, but those of some competitors have started to do a bit better. Like a year ago, there were no major changes for Estonia in any of the sub-indexes[3]. The only more notable change was a decline in the size of the market, which is a relative variable for a small country because the indicator covers the absolute size of GDP at purchasing power parity, and the ratio of imports to GDP. The best results were in the sub-index for macroeconomic stability, which is based on indicators for the inflation and debt dynamics and scored 100, putting Estonia among the best in the world, and in the sub-index for health, which is based on healthy life years and for which Estonia scored 85. The weakest results were of 42 points for market size and 53 points for innovation capability, which covers development of clusters, trademarks, spending on R&D, and international cooperation. The other indicators scored between 65 and 78 points out of a possible 100.

**The World Bank Ease of Doing Business index.** Estonia has also lost ground in this index[4], falling from a notably high 12th place in 2017 to 16th place. This result puts Estonia third among CEE countries behind North Macedonia in 10th and Lithuania in 14th. There have been some changes in the sub-indexes[5] in the past year, though nothing very substantial. The best results were again for registration of real estate, which climbed two places to 6th, and enforcement of contracts which fell two places to 13th. The weakest area remains protection of minority investors, which fell seven places to 83rd. Other problematic areas are resolving insolvency, for which Estonia is in 47th place, getting electricity in 46th, and credit availability in 44th.

Considering the components of the competitiveness indexes in thematic groups, there have been no major changes in recent years, and what stands out most from looking back over a longer time is the absence of any clear dynamic. Estonia was last in 32nd place in the overall WEF index in 2013, since when it has spent four years in either 29th or 30th place. Estonia held its current place of 16th in the World Bank index in 2014 and 2015, and in 2016 and 2017 it was in 12th. This suggests that the fall in the past year probably reflects the success of competitors rather than any deterioration in Estonia.

## THE STATE OF EXTERNAL DEMAND

This section considers the state of export markets in terms of demand for exports. Figure 1 shows the opinion that exporting businesses have about their competitiveness in the preceding three months. This makes it a backward-looking indicator.

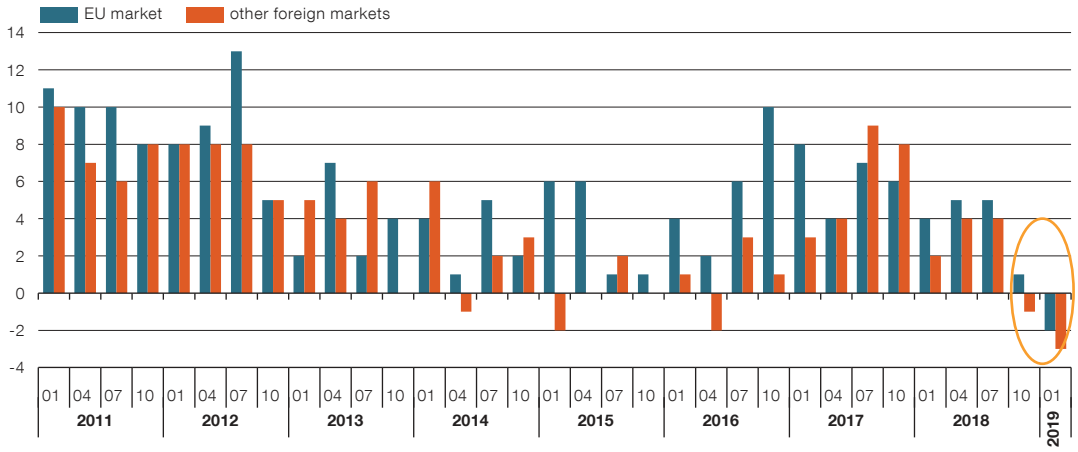
2 The Global Competitiveness Report 2018, Word Economic Forum.

3 The rating scale for the World Economic Forum has changed so that the earlier scale of 0-7 has been replaced by one from 0-100, and there have been some changes in the structure of the index, but the main indicators are essentially the same. The main sub-indexes are institutions, infrastructure, ICT adoption, macroeconomic stability, health, skills, product market, labour market, financial system, market size, business dynamism, and innovation capability.

4 The World Bank: Doing Business: Estonia, 2018.

5 The ease of doing business index of the World Bank assesses the categories of: starting a business, dealing with construction permits, getting electricity, registering property, getting credit, protecting minority investors, paying taxes, trading across borders, enforcing contracts and resolving insolvency. The ranking positions are published for the components in this list, or the gap to the category leader.

**Figure 1. Competitiveness in foreign markets, industrial sentiment survey not seasonally adjusted**

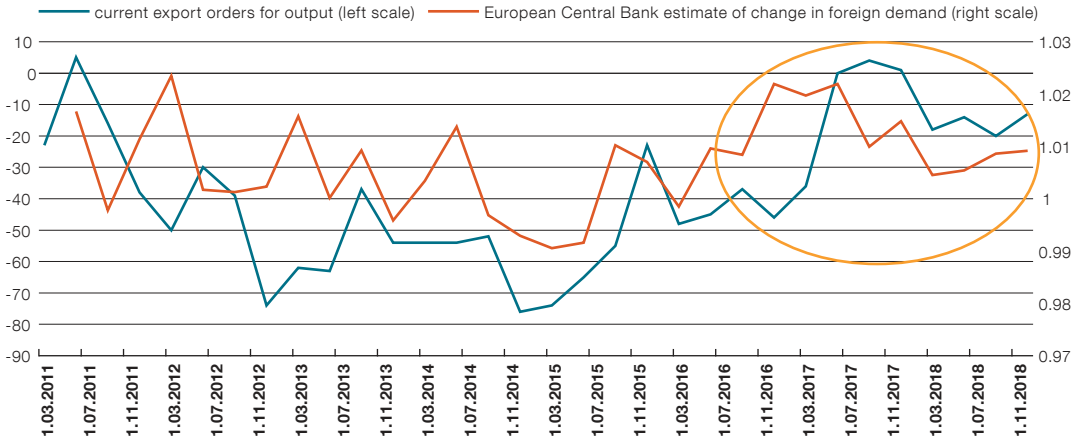



Source: Estonian Institute of Economic Research

Changes in the opinion of businesses reflect the dynamics of the past economic cycle with the dip in 2014 and 2015 and the subsequent recovery. It is a little surprising to see that opinions about competitiveness started to fall in 2018, while foreign demand was still relatively strong. The index shows opinions of competitiveness to have turned negative at the start of this year.

Foreign demand should also be considered, because a small and open economy is very dependent on the performance of exports. Two indicators for foreign demand are used here, the weighted import demand of Estonia's foreign partners and export orders from companies. Unlike the index of opinions about competitiveness, this is a current and forward-looking indicator (see Figure 2).

**Figure 2. Estimates of foreign demand as weighted import demand and export orders**



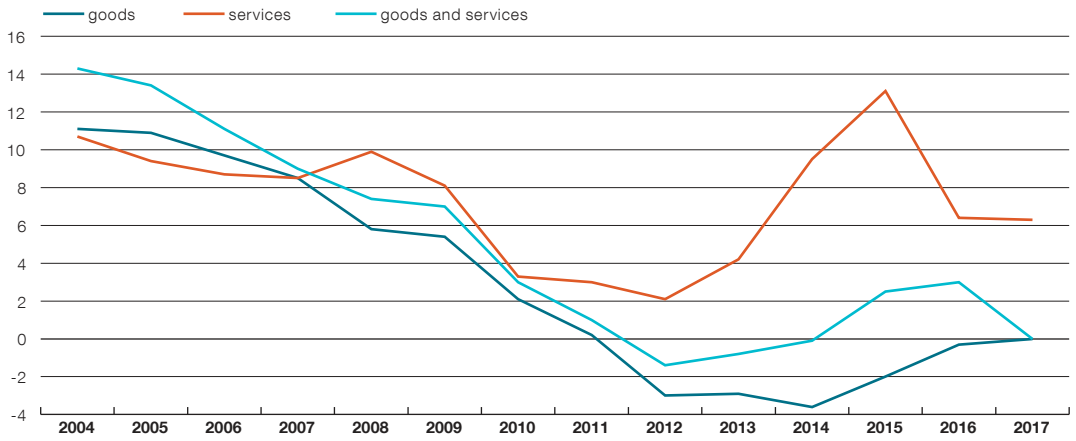

Sources: European Central Bank, Estonian Institute of Economic Research

Figure 2 shows that changes in the weighted import demand of trading partners, which is used as a proxy for export demand, are quite similar to the dynamics of export orders for Estonian companies, with average lags of 1-2 quarters. Figure 2 also gives a picture of how sensitive the reaction of the export orders portfolio is to changes in foreign demand. It shows the state of export orders by volume meaning it does not include the price component, as foreign demand is shown in constant prices in European Central Bank data and export orders is a general volume indicator as it is a change in the balance of orders. The fall in competitiveness observed by businesses coincides with the decline in growth in foreign demand, meaning the dynamics of Figures 1 and 2 for 2017-2018 are complementary.

## PRICE CONDITIONS OR TERMS OF TRADE

The next indicator is the price dynamics in foreign markets seen as terms of trade. Terms of trade is taken here to mean the ratio of export prices to import prices. This indicator can be used as an independent measure of competitiveness, but for a small country that is a price taker for most exports of goods and services and not a price maker, the terms of trade reflect more the state of foreign markets, as export prices are mostly set abroad. Figure 3 takes a long retrospective view that covers the changes in the past economic cycle following the global financial crisis.

**Figure 3. Terms of trade 2004-2017, change in per cent**




Source: Eurostat

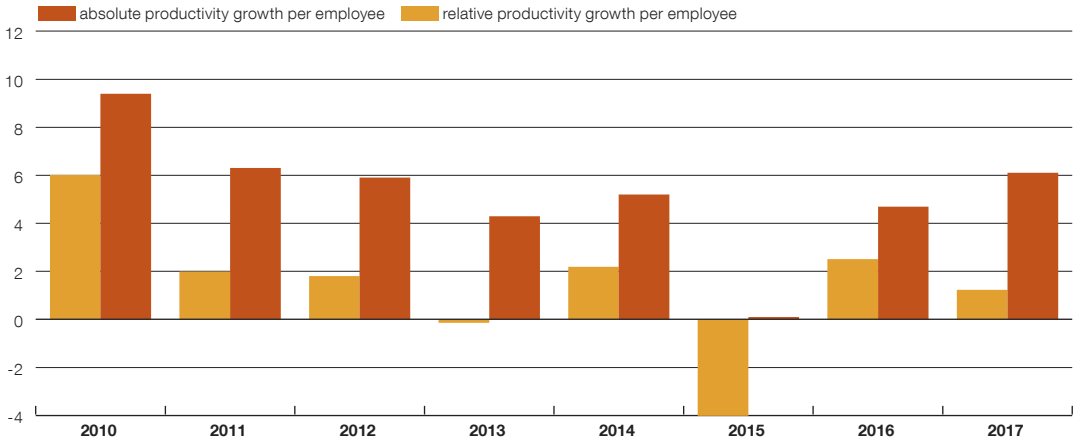
It also covers the economic cycle already discussed with a dip in prices in 2013-2014 and a subsequent cyclical recovery. The Eurostat treatment uses annual frequency and a long retrospective view because the aggregate indicator is calculated for exports and imports of goods and services as a ratio of their deflators for the years t and t-5, which has a lag of five years. As competitiveness generally changes slowly, it is quite reasonable to use long lags. The annual frequency means that Figure 3 does not contain any information on the most recent changes. The price indexes for exports and imports of goods as proxies for deflators have been co-moving in different directions in 2018. This matches the fluctuations in the terms of trade, which ranged between 1 in January and 0.97 in December, meaning that overall the terms of trade in 2018 were a little worse at 0.98 than they were in 2017, when they averaged 0.99 for the year. In general a value of one in the terms of trade index indicates stability, while values below one indicate a deteriorating price environment and values above one an improving one. This means that the price environment for goods exports did not notably change in 2018, though information on the full year 2018 will only be received from the Eurostat data used in the figure sometime later this year.

In summary it appears to be slower growth in foreign demand that above all gave an indication that the economic cycle had passed its peak in 2018. The price environment in export markets has not changed significantly.

## UNIT LABOUR COSTS AND RELATIVE PRODUCTIVITY

The indicator often used for measuring competitiveness is unit labour costs, and more specifically nominal unit labour costs. Nominal unit labour costs have risen fastest in the Baltic states in the European Union, with average annual growth of 3.7% in 2011-2017. Growth in 2017 was 1.8% in the CEE countries, 0.8% in the European Union overall and 3.6% in Estonia. The thresholds in the mac-

**Figure 4. Absolute and relative productivity, change in per cent (EU28 = 100)**




Source: Eurostat

roeconomic imbalance procedure scoreboard[6] used in the European Union are 9% calculated cumulatively over the previous three years for euro area countries, and 12% for non-euro area countries. This means that the cumulative growth in nominal unit labour costs of 13.8% in 2016-2018 exceeds even the threshold for non-euro area countries. The average cumulative growth over the previous three years in the euro area was 1.8% in 2017. The rapid rise in unit costs reflects the strong growth in wages in recent years, which has reduced Estonia's price competitiveness.

As the longer term change in competitiveness is closely linked to the development of productivity, Figure 4 shows the dynamics of absolute and relative productivity.

The indicator used is the percentage change in productivity, which also clearly shows the path of the recent economic cycle, where absolute productivity exceeds relative productivity. Relative productivity can also be used as an indicator of convergence as changes are calculated as the differences from the European Union average. As a member of the euro area in 2011-2017, Estonia saw relative productivity growth of only 0.8% a year above the European Union average, which is a moderate or even weak figure for a converging economy.

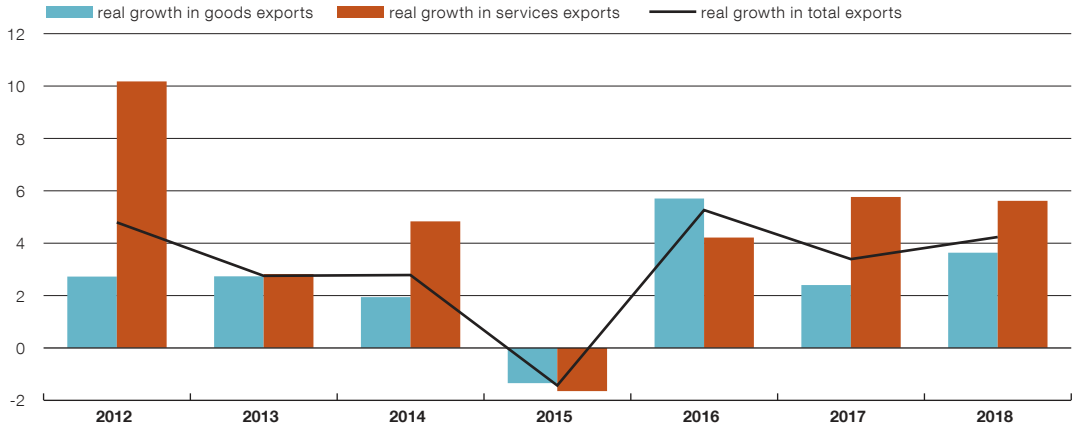
## EXPORT GROWTH AND MARKET SHARE IN INTERNATIONAL MARKETS

Despite various factors that harmed price competitiveness in 2017 and 2018, the current account surplus has been quite large, reaching between 1.8% and 3.3% of GDP in 2015-2017. The main contribution to the current account surplus has come from exports of services, which shows the high quality of exported services, as around 86% of them are knowledge-intensive services (see the Estonian Competitiveness Report 2018). The growth in goods exports has been more variable though and does not clearly follow changes in foreign demand. The rate of growth of goods exports started to slow before the economic cycle peaked and then it bounced back in 2018, though such variations are quite normal for a small economy. Figure 5 shows the growth in exports of goods and services at constant prices.

The last point to consider in this section is the change in the market share of Estonian exports of goods. Two methods are used to measure the market share of goods exports, and these are Estonian exports as a ratio to European Union exports at current prices, and Estonian exports as a ratio to weighted demand for imports at constant prices. The macroeconomic imbalance procedure scoreboard of the

6 See https://ec.europa.eu/info/business-economy-euro/economic-and-fiscal-policy-coordination/eu-economic-governance-monitoring-prevention-correction/macroeconomic-imbalance-procedure/scoreboard_en

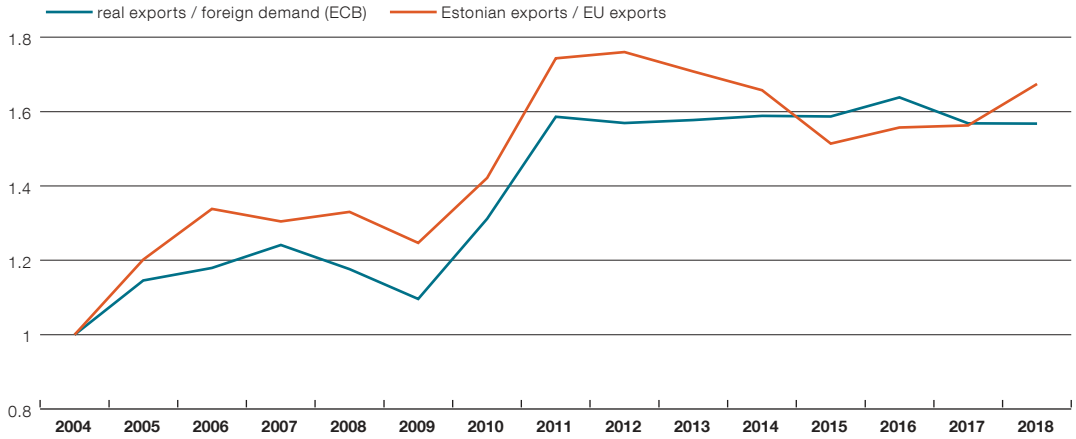
**Figure 5. Real growth in exports of goods and services in per cent**




Source: Statistics Estonia

European Commission[7] indicates some imbalance if the market share of exports falls by more than 6% over five years measured as the value of exports. The dynamics of market share for Estonian exports have been quite volatile in recent years, depending on the method used (see Figure 6).

**Figure 6. Market share indexes for Estonian exports**




Sources: Eurostat, European Central Bank, Statistics Estonia, Eesti Pank calculations

The fluctuations in the market share of goods exports come from the use of different prices in the calculation, whether current prices or constant prices, and partly from the different data that are used. One source of difference is the difference between foreign trade statistics and GDP statistics, because the foreign trade statistics include re-exports of fuel imported from the East and sold to the rest of the world, which bounced back in 2018 but are only partly included in the calculation of GDP statistics. If the ratio of Estonian goods exports to European Union goods exports is calculated at current prices, the total change in market share over five years has been -1.2%. If the ratio of real exports to the weighted import demand of foreign partners is used, the change in market share over the past five years is -0.5%[8].

7 European Commission, Macroeconomic Imbalance Procedure Scoreboard.

8 The change has been -1.1% over the past three years, -4.3% over two years, and 0% last year alone. The calculation at current prices is based on foreign trade statistics and the one at constant prices on GDP statistics.

**Summary of the dynamics of the general indicators of competitiveness for 2018.**

- Estonia's rating in international competitiveness indexes fell in 2018 from its stable position of recent years, but not by much. The fall appears due to the success of competitors more than to any deterioration in Estonia's figures.

- Businesses have reduced their assessments of competitiveness in foreign markets and export orders are falling. The reduction in perceived competitiveness coincides with the economic cycle passing its peak. Growth has slowed in global demand, which is in line with the phase of the global economic cycle, but it has done so only moderately. There has been no major change in the past year in price conditions.

- As wages have continued to rise rapidly, so have unit labour costs, reaching 14% and passing the 9% threshold in the macroeconomic imbalance procedure scoreboard of the European Commission. Growth in relative productivity, which is a measure of long-term competitiveness, has been moderate.

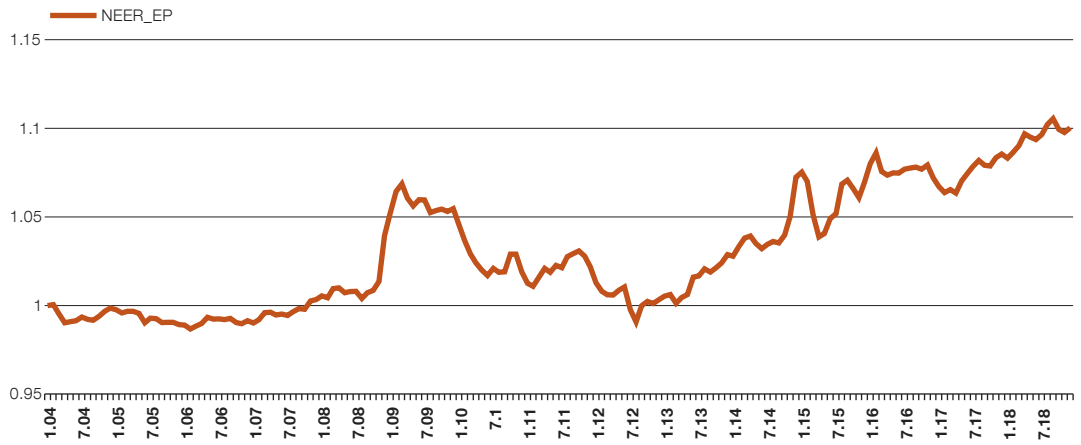
- The growth rate of total exports has been volatile mainly because of goods exports, and it is not well aligned with the trajectory of changes in foreign demand. The market share of goods exports has fallen a little over the past five years in total according to both indicators. Measured by the value of exports at current prices, market share has fallen by 1.2% and the ratio of exports to import demand in the main target markets at constant prices is down 0.5%. Although the profile is quite volatile, there has been no major change in the market share of exports.

# II. ANALYSIS OF COMPETITIVENESS

## EFFECTIVE EXCHANGE RATES

Although Estonia's trade is relatively centred on the euro area, some 40% of foreign trade in the data for 2018 went to partners whose currencies float against the euro[9]. This means that movements in the euro exchange rate are an important indicator of price competitiveness alongside export and import prices. Without analysing currency exchange rates in detail, the dynamics of the exchange rate can be described using the nominal effective exchange rate or NEER (see Figure 7).

**Figure 7. Nominal effective exchange rate of the euro**




Source: Eesti Pank

Figure 7 describes the trade-weighted nominal effective exchange rate of the euro for Estonia (NEER_EP), which covers both intra-EU and extra-EU trade. This is different from the country-specific NEERs of the European Central Bank, but it is very similar to the NEER broad index of the BIS, which covers the group of larger trading partners, as the average difference in that dynamic is -0.02%[10].

Figure 7 describes the strengthening of the nominal exchange rate of the euro, which is unfavourable for a small country that is dependent on exports, as a more expensive currency means that exports are more expensive and imports cheaper. The rise of 2% in the nominal effective exchange rate in 2018 was caused by the currencies of several of Estonia's main trading partners weakening against the euro. The currencies of major trading partners that weakened most over the year on average were the Swedish krona, which was down 6.5%, and the Russian rouble, which was down 12%. In general terms the euro strengthened against all the currencies that make up the basket for the effective exchange rate except the Czech krona.

Real effective exchange rates are used alongside the nominal exchange rate in the treatment of price competitiveness to take account of differences in prices and wages. Indicators of cost and price competitiveness are more important as factors in setting external balance for a small and open economy that is a member of a currency union[11] than they are for an economy with a floating exchange rate, see Harkmann and Staehr 2018.[12]

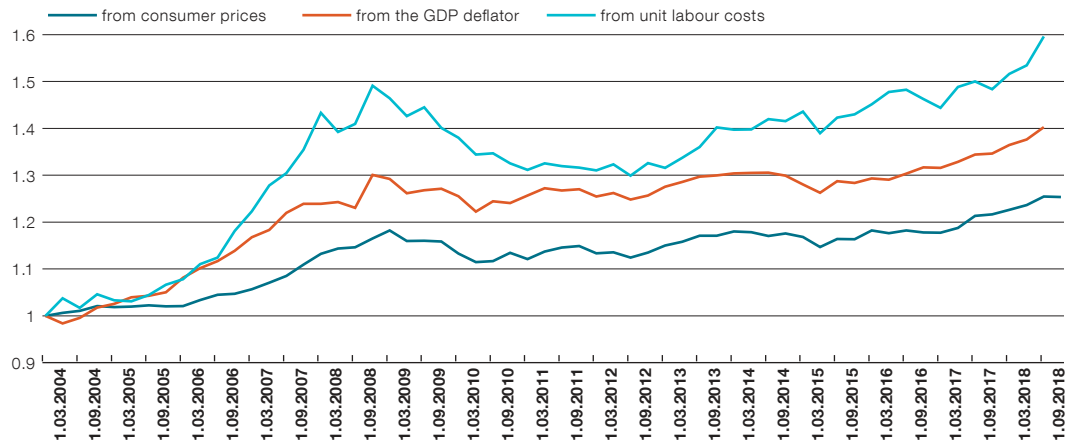
9 Unadjusted figure with a coverage ratio of the basket of foreign partners of 0.87. The adjusted or broadened indicator finds a weighting of 46% for countries with a floating exchange rate. This assumes that the other 13% of partners are divided between floating and fixed exchange rates in the same 60:40 proportions as the main partners.

10 The differences come from the basket of partner countries and the weighting system. The weighting system of the European Central Bank and the BIS uses a fixed three-year average of the doubled share of the industrial output of foreign partners, while Eesti Pank uses a 12-month moving average of weighted foreign partners in foreign trade turnover.

11 This equals membership of the currency union with a fixed exchange rate regime.

12 Kersti Harkmann and Karsten Staehr, Current Account Dynamics and Exchange Rate Regimes in Central and Eastern Europe, Eesti Pank Working Paper Series 8/2018

**Figure 8. Dynamics of real effective exchange rates**




Source: European Central Bank

The indicators used in Figure 8 are real effective exchange rates from consumer prices (HCI_CPI), the GDP deflator (HCI_GDP) and unit labour costs (HCI_ULC) since accession to the European Union. The figure shows that all the real effective exchange rates (REER) have now passed their levels of before the global financial crisis. This also means that the effect of the internal devaluation in 2009 had probably faded away by 2017. The faster rise than in the nominal effective exchange rate shows that on top of the change in the exchange rate, prices and wages rose more quickly than those in foreign partners.

The macro imbalance scoreboard of the European Commission sets the critical limit so that the three-year change in the real effective exchange rate against 41 industrialised countries found from consumer prices may not pass 5% for euro area countries or 11% for non-euro area countries in either direction. The change in the real exchange rate over three years using the Commission's criteria is of 6.9% using consumer prices, 7.8% with the GDP deflator and 8.9% for unit labour costs[13]. The increase for all these real exchange rates passes the fluctuation limit of 5% for euro area countries, but is within the fluctuation bound of up to 11% for non-euro area countries. It should be noted that the different reference bases mean that the real exchange rates are not exactly comparable with the criteria of European Commission.

The monitoring and analysis so far show that the Estonian economy passes the limits for the euro area as defined in the macro imbalance criteria of the Commission for growth in nominal unit labour costs and the rise in real exchange rates. These results indicate a possible loss of price competitiveness and raise the question of which branches of exporters would be most affected.

## THE CURRENT ACCOUNT NORM AND THE EQUILIBRIUM REAL EXCHANGE RATE

Competitiveness will from now on be treated mainly in terms of the performance of exports and the external balance of the state. The current account norm is the natural level of current account surplus or deficit for a country given its level of socioeconomic and technological development. The basis of the theoretical approach was first developed by the International Monetary Fund, the IMF, (IMF 1998[14], IMF 2006[15], IMF 2007[16]) and developed further by the European Commission (2018[17]).

13 The data on indicators based on the GDP deflator and unit labour costs for 2018 were available up to the third quarter.

14 Peter Isard and Hamid Faruqee – Exchange Rate Assessment: Extension of the Macroeconomic Balance Approach, Occasional Paper No 167, IMF 1998.

15 Methodology for CGER Exchange Rate Assessments, Prepared by the IMF Research Department, November 2006.

16 Peter Isard – Equilibrium Exchange Rates: Assessment Methodologies, IMF Working Paper WP/07/296, IMF 2007.

17 Leonor Coutinho, Alessandro Turrini and Stefan Zeugner – Methodologies for the Assessment of Current Account Benchmarks, European Commission discussion paper 086, September 2018.

The methodology for the current account norm is easily connected to the real exchange rate by using the elasticity of the current account to the real exchange rate. Generally the current account norm is found first, then the underlying current account, which is the cyclically adjusted actual current account, and finally the current account gap, which is the difference between the current account norm and the underlying current account. The elasticity of the current account to the real exchange rate shows how large a correction is needed in the real exchange rate for the gap to close. There are several ways to find the current account norm. The static version of the macroeconomic balance method and the external sustainability approach are used here. Another way to find the balanced real exchange rate is to use the purchasing power method (see the Special Topic at the end of this report), and these three methods together are known as the CGER-methods[18] group (IMF 2006).

The following calculations have been made earlier for the Estonian economy in the competitiveness reports for 2013–2015. The current account norm was not calculated in the intervening years, partly because the fundamental indicators it uses only change slowly, but mainly because of the major uncertainty and consequent variation in the results that arose in the years following the global crisis. This report compares the assessments from the first year, using data from 2012, with the position in 2018.

The first step is to look at the current account norm using the macroeconomic balance approach in 2012 and 2018.

**Table 1. Finding the current account norm in 2012 and 2018**

| The current account norm from the macroeconomic balance approach | value 2012 | elasticity IMF 2006 | contribution 2012 | value 2018 | elasticity IMF 2006 | contribution 2018 |
|---|---|---|---|---|---|---|
| budget balance as % of GDP | 1.8 | 0.19 | 0.3 | 0.15 | 0.19 | 0.03 |
| old-age dependency rate | -1.2 | -0.14 | 0.2 | 3.18 | -0.14 | -0.45 |
| population growth | -0.1 | -1.22 | 0.1 | -0.18 | -1.22 | 0.22 |
| initial NIIP as % of GDP | -54.1 | 0.02 | -1.1 | -28.3 | 0.02 | -0.57 |
| oil balance as % of GDP | 0.8 | 0.23 | 0.2 | 1.30 | 0.23 | 0.30 |
| GDP growth | 1.2 | -0.21 | -0.25 | 1.59 | -0.21 | -0.33 |
| relative income | 46.1 | 0.02 | 0.9 | 58.6 | 0.02 | 1.17 |
| primary current account norm without EU capital transfers as % of GDP | | 0.4 | | | 0.4 | |
| capital transfers from the EU as % of GDP | | | 2.1 | | | 1.35 |
| current account norm from the macroeconomic balance approach as % of GDP | | | -1.7 | | | -1.0 |

The factors used in defining the current account norm are chosen so that they reflect the logic of savings and investment for the whole economy, because the current account balance is defined by the gap between savings and investment. Factors that increase saving reduce the current account deficit or increase the surplus, and the opposite effect also applies.

The results of the comparison are a little surprising. The overall picture is more or less unchanged as the primary current account norm without European Union capital transfers remains at +0.4% of GDP. This means that without European Union funds the norm would expect a small surplus in the current account. The factors that help define the norm have changed substantially though. The main factors that reduce saving are now the disappearance of the budget surplus and the increased share of older people[19], as increased old-age dependency reduces savings. Equally though, there has been a substantial improvement in the net international investment position (NIIP), which has improved substantially and now meets the macro stability requirements of the Commission of not more than -35% of GDP, and secondly, relative income is now higher[20]. These factors increase saving. Changes have

18 CGER – Consultation Group on Exchange Rate Issues.

19 The difference in the number for the elderly population aged 65 and over as a proportion of the prime working age population aged 30-64 from the weighted average of the same indicator for major trading partners.

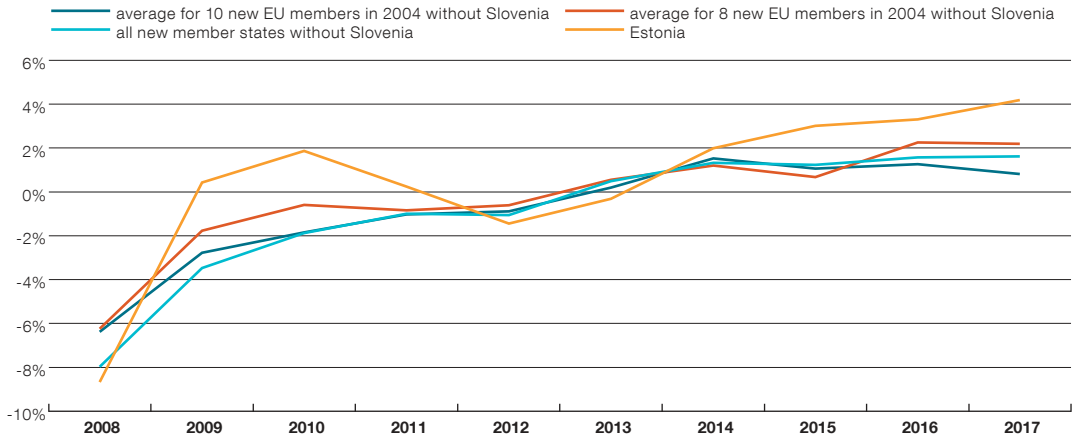
20 Relative income is income per capita corrected for purchasing power parity as a proportion of the average level of the USA (in 2010 US dollars).

been smaller in the other factors, which are population growth, economic growth, and the oil balance[21]. All the factors except NIIP and the oil balance are five-year forecasts that are compared with the weighted average of forecasts of trading partners. The methodology for such a forecast needs the effect of the economic cycle to be removed and the lagged impact of changes in the real exchange rate to be fully included. It is assumed that European Union capital transfers other than agricultural subsidies will be about two thirds of their current level in the next financial perspective.

Various methods can be used to estimate the current account norm. The current account norm found using the external sustainability approach estimates the value of the current account that would stabilise the net investment position, adapting the current net investment position for the economic growth and inflation expected for five years minus current capital transfers. This indicator shows large changes over the six years, as it was -5.3% of GDP in 2012 but -2.7% of GDP in 2018. The cause of this difference is the large current account surpluses of 2-3% of GDP in the intervening years, which reduced the negative net investment position by about half.

The IMF methodology uses data from practically the whole world to find the elasticities of fundamental factors, meaning elasticities are not Europe-specific, and so this analysis also uses a reference base for the Central and Eastern European countries that is found as the difference between the savings and investment in Estonia (S - I) and the average for the CEE countries. It is assumed that this will give an idea of how the Estonian economy stands against competitors of a similar technological level (see Figure 9).

**Figure 9. The difference between savings and investment in Estonia and in the CEE countries as % of GDP**

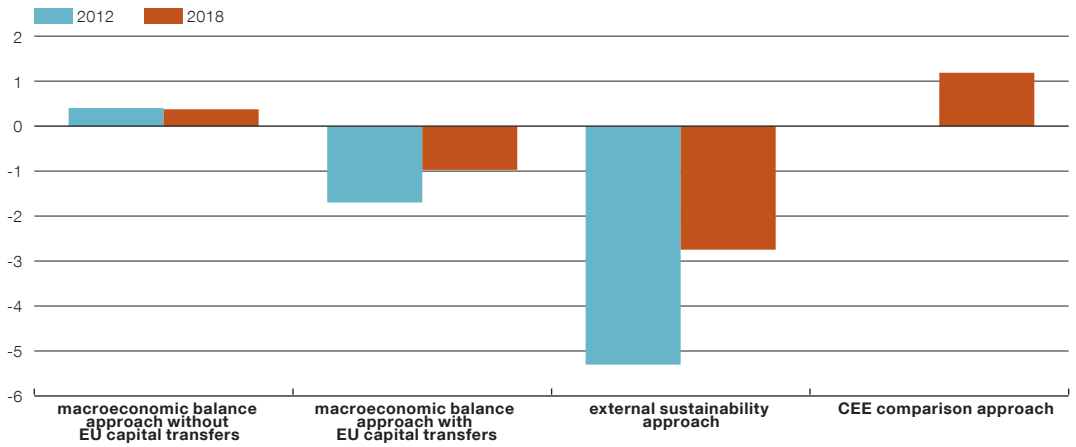



Source: Eurostat

The reference base for CEE countries contains 12 countries, taking in all the new European Union member states except Slovenia. Figure 9 shows a sharp improvement in the Estonian current account, which is the gap between savings and investment, both after the global financial crisis and after 2014. The data described in the figure are used to calculate a three-year moving average trend and the Estonian difference from that average. The most adequate version appears to be the difference between Estonia and the other eight CEE countries not including Slovenia that joined the European Union in 2004, which is calculated at 1.1% of GDP. This suggests that the Estonian current account balance found from current fundamental indicators should be one percentage point better than the average for the CEE countries. Following the logic of the macroeconomic balance approach and using five-year forecasts shows the norm can be constructed as the average of the five-year forecasts for the ratio of current accounts to GDP of the CEE countries plus 1.1 percentage points.

21 The oil balance is the difference between imports and exports of fuels as a proportion of GDP. This can increase or decrease the current account balance depending on whether the country is a net oil exporter or importer.

**Figure 10. Current account norms in 2012 and 2018 as % of GDP**




Sources: IMF, UN, Eurostat, Eesti Pank calculations

This report calculates the current account norms using the macroeconomic balance approach with and without European Union capital transfers, the external sustainability approach, and the CEE countries reference base. The change in the current account norms in 2012-2018 is described in Figure 10. The current account norm has also been calculated by the European Commission (2018). This is fundamentally the same methodology, but it uses only data from the 28 European Union countries and so it may be assumed that the results reflect the reality of the European Union more accurately. The norm calculated from the Commission's EU28 panel is about -2% of GDP for Estonia using the macroeconomic balance method, and about -3.5% of GDP using the external sustainability approach.

The second step is to find the underlying current account. The underlying current account is the assessment of the current account without the impact of the economic cycle, assuming full employment in Estonia and trading partners, an output gap of zero, and a real exchange rate that is stable over the long term. Essentially this is the hypothetical case of simultaneous internal and external balance in Estonia and in trading partner economies. The differences over time are quite notable as the underlying current account was +2.7% of GDP in 2012 and -0.2% in 2018. The difference comes mainly from the dynamics of the real exchange rate because the cyclically adjusted current account was +2.2% of GDP in 2012 and +2.0% in 2018. The dynamics of the real exchange rate have been very different though, as the depreciating rate added +0.5% of GDP in 2012, but the appreciation in the real rate meant the figure for 2018 was -2.2% of GDP.

The third step is to find the current account gap, which is the difference between the current account norm and the underlying current account. An alternative value for the underlying current account can be taken from the IMF forecast five years ahead for the ratio of the Estonian current account to GDP. All in all, this means that a choice of four current account norms and two underlying current accounts can be used for finding the current account gap. The results of the estimates are presented in Table 2.

**Table 2. The current account gap between the current account norm and the underlying current account**

| | current account gap 2012 | REER deviation in % 2012 | current account gap 2018 | REER deviation in % 2018 |
|---|---|---|---|---|
| (1) macroeconomic balance approach minus the IMF forecast | -0.9 | -2.0 | 1.5 | 3.3 |
| (2) macroeconomic balance approach minus the underlying current account | -6.2 | -13.8 | -0.8 | -1.8 |
| (3) external sustainability approach minus the IMF forecast | -2.7 | -6.0 | -0.3 | -0.7 |
| (4) external sustainability approach minus the underlying current account | -8 | -17.8 | -2.6 | -5.7 |
| average | -4.5 | -9.9 | -0.6 | -1.2 |

The comparison of 2012 and 2018 shows that the average current account gap from multiple methods is close to zero, meaning it is close to balance. This means that the real exchange rate of the euro is neither undervalued nor overvalued. It can also be seen from Table 2 that the rise in the real exchange rate in 2012-2018 wiped out its earlier undervaluation, meaning there is no more space for the real rate of the euro to appreciate any further.

The results of the European Commission calculations (2018) are quite similar to those in Table 2. The main results for the current account gap can be seen as (2) and (4), which give a current account gap of -0.8% of GDP with the macroeconomic balance method and -2.6% of GDP with the external sustainability approach. This is close to the figures of the Commission for 1997-2016 of around 0% and -2% of GDP. Taking the stricter comparison base of the CEE countries finds a current account gap of +1.4% of GDP with an REER deviation of +3.0%[22]. The IMF's CGER methodology considers a real exchange rate is not under or overvalued if its misalignment is between -5% and +5%, so it can be concluded that the real exchange rate is in balance, but the competitive advantage from the earlier undervaluation of the real exchange rate has been lost.

The results for the panel of CEE countries estimated using a methodology based on purchasing power parity is presented in the third part of this review and is a summary of the main points of the research by Cuestas et al. (2018)[23]. The research finds that the Estonian real exchange rate was earlier mainly in balance or slightly undervalued, except immediately before the global financial crisis when it was overvalued. The dataset for the research ends in 2013, and so later developments are not reflected. The main finding is that the misalignment of the real exchange rate affects economic growth asymmetrically, as the negative effect of an overvalued rate is stronger than the effect of an undervalued rate.

22 The calculation of the REER deviation assumes that the elasticity of the real exchange rate to the current account is 0.45, meaning that a one percentage point change in the current account reflects a change of 2.2% in the real exchange rate.

23 Juan Carlos Cuestas, Estefania Mourelle and Paulo Jose Regis – Real Exchange Rate Misalignments in CEECs: Have They Hindered Growth? Eesti Pank Working Paper Series 5/2018.

### Box 1. The sensitivity of the exporting sectors to competitiveness indicators

This report has so far considered the impact of the appreciation of the real exchange rate on the economy as a whole without breaking the economy down into different sectors. It is generally logical to assume that rapidly rising unit labour costs or an appreciating real exchange rate for the euro will not affect the whole economy equally, but will affect different sectors differently. This box uses different real effective exchange rates to consider the sensitivity of goods exports to a weakening in the indicators for price competitiveness.

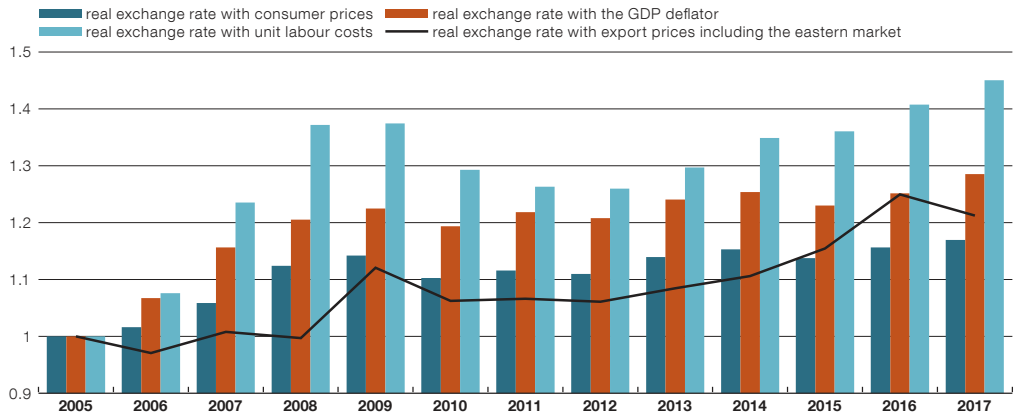
The methodology is the one used in the competitiveness report for 2018 to test the price sensitivity of services. This method is used to test the reaction of different branches of goods exports to a change in the competitiveness indicators. Technically, the relation between export turnover at constant prices and a change in the real exchange rate is tested[24], where the control variable is foreign demand at constant prices. If there is dependence then the competitiveness indicator in the regression is expected to have a negative sign.

One drawback of this methodology is the use of general indicators for competitiveness, which are based on changes in consumer prices (CPI), the general price level (GDP deflator) or wage costs (ULC) relative to foreign partners. As this analysis tests goods exports, the real exchange

24 More precisely the dependence of export turnover on changes in the real exchange rate is tested against a rising trend for the real exchange rate. This is because Estonia is still a converging economy where it is to be expected that the real exchange rate will strengthen steadily because of ongoing price and wage convergence.

rates used so far will be accompanied by a real exchange rate calculated from export prices. This additional competitiveness indicator is based on the Eesti Pank database of nominal effective exchange rates with export weights that use export prices rather than consumer prices (see Figure 11).

**Figure 11. Real effective exchange rates with export prices against the ECB effective real rates**




Sources: European Central Bank, Eesti Pank

Figure 11 shows that the dynamics of the real exchange rate calculated from export prices are not significantly different from the others. As this is an Eesti Pank index, the indicator can be constructed to give different indexes including and excluding the eastern market. The final result is five different indicators of competitiveness, which are the real exchange rate with consumer prices HCI_CPI, the real exchange rate with the GDP deflator HCI_GDP, the real exchange rate with unit labour costs HCI_ULC, the real exchange rate with export prices and without the eastern market REER_X, and the real exchange rate with export prices including the eastern market REER_XR.

The data used cover 96% of the turnover of goods exports and 79% of manufacturing exports for 2017 using an observation period of 2004-2017. Production of electronics is excluded as a branch of manufacturing as it is dominated by Ericsson Eesti, where exports are made within a group with transfer pricing. The confidence bounds are wide for the coefficients because the time series is short, but they still give a useful picture. The statistically best results (P>90%) are shown in bold in Table 3.

Overall it is apparent that total goods exports and manufacturing goods exports are price sensitive to almost all the competitiveness indicators. The branches of manufacturing that are most sensitive to changes in price competitiveness are wood production excluding prefabricated buildings, and textile production. Exports of prefabricated wooden houses come under furniture, where weak price sensitivity is only seen in the REER_X indicator for price competitiveness to the rest of the world.

Table 3 shows that the price competitiveness indicators with and without the eastern market give the expected results, since without the important eastern market, exporting branches react to the real exchange rate REER_X calculated for export prices for the rest of the world. The exporting branches most oriented to the rest of the world are textile, wood and furniture production, while chemical production, wholesale and retail, and transportation and storage are oriented more to the eastern market. It should be noted here that the division into eastern and

**Table 3. The sensitivity of branches of the exporting sector to competitiveness indicators**

| goods | shares in turnover | HCI_CPI | HCI_GDP | HCI_ULC | REER_X | REER_XR |
|---|---|---|---|---|---|---|
| total exports | | **-2.69*** | **-1.3*** | **-1.19*** | - | -1.76** |
| mining | 0.00 | - | - | - | - | -1.92*** |
| energy | 0.01 | - | - | - | - | - |
| manufacturing | 0.53 | **-3.49*** | **-2.39**** | **-1.47*** | - | -1.66** |
| food | 0.04 | - | - | - | - | - |
| textiles | 0.02 | **-3.87***** | **-2.78***** | - | **-4.21**** | - |
| wood | 0.09 | **-4.65*** | **-3.55*** | **-1.56*** | **-2.51*** | - |
| chemicals | 0.02 | - | - | - | - | **-4.95***** |
| metals | 0.04 | - | - | - | - | - |
| electronics | 0.10 | | | | | |
| electronic equipment | 0.06 | - | - | - | - | - |
| machinery and equipment | 0.02 | - | - | - | - | - |
| furniture | 0.02 | - | - | - | -1.67*** | - |
| wholesale and retail | 0.24 | -1.48** | - | -0.69* | - | **-1.53*** |
| transportation and storage | 0.06 | - | - | - | - | **-6.32***** |
| non-specified sector | 0.11 | **-6.31**** | **-5.64*** | **-2.72*** | - | - |

* P>80%, R(adj)>80%,
** P>80%, R(adj)>60%
*** P>80%, weaker R(adj)

western markets is simplified and the eastern market here refers only to Russia. This division is made because of the basket of 19 foreign trading partners used by Eesti Pank to calculate the effective exchange rate, where Russia, and possible further trade links through Russia, is the only eastern market, as China is counted under the rest of the world.

In summary it is not possible to distinguish exporting sectors that are particularly dependent on price competitiveness, though there are sectors that depend to a greater or lesser extent on developments in prices and wages. The wood sector covers the two extremes, where exports of prefabricated wooden houses as furniture are more of a price setter and evidently depend little on price competitiveness indicators, while exports of timber are probably price takers. Some branches of exports did not react to the tests that were used.

## PRICE AND NON-PRICE COMPETITIVENESS

Competitiveness is divided into price based and non-price parts in this report because the generally used price based indicators of competitiveness such as nominal unit labour costs and effective exchange rates do not fully explain Estonia's position in foreign markets and the currently favourable external balance, despite weakening indicators for price competitiveness. International assessments have essentially reached the same conclusion about Estonia, like for example OECD 2017[25].

Non-price competitiveness covers many factors, including product quality, specialisation, sales efficiency, the business environment, after-sales service and the characteristics of exporting companies (ECB 2012). For small countries this list can also include the position in global value chains and the niche market effect, because small countries are not represented by all products in all markets to the same extent as large countries are. Success in niche markets and an improving position in global value chains can depend on non-price factors.

In the macroeconomic context, income and price convergence should be added to this, as they imply some natural strengthening of the real exchange rate of the currency, which is not necessarily harmful if it is an equilibrium appreciation. Price and income convergence should be accompanied

25 OECD: 2017 OECD Economic Survey of Estonia.

by advances in non-price competitiveness, which should be seen in an improvement in the quality of goods and services in export markets, because if quality does not rise then constant rises in unit labour costs are unsustainable, and that threatens the internal and external balance of the economy.

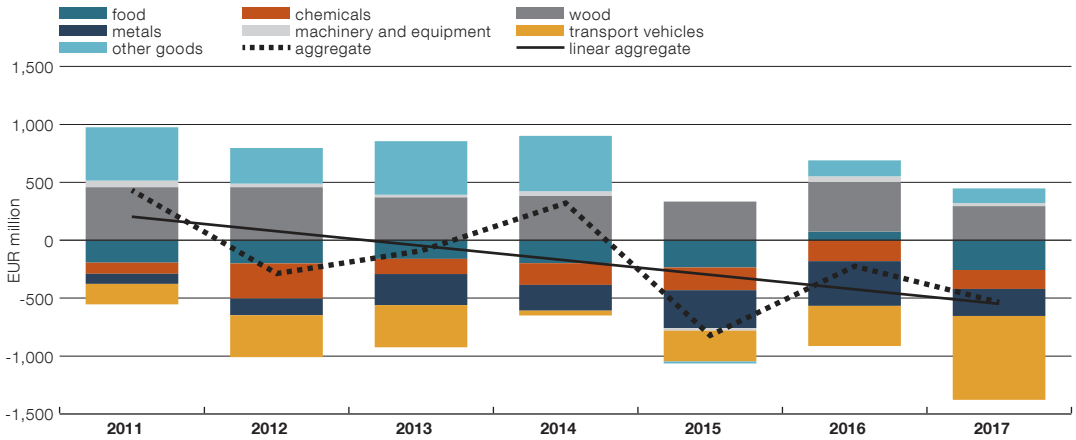
The source and the methodology used in this analysis, based on (ECB 2012)[26], are described in the Competitiveness Report 2018. The net balances of price and non-price data aggregates, as used in the analysis, are found by adding up the exports and imports of groups of goods using the four-digit harmonised codes for goods taking the unit values of exports and imports, which is the value-to-volume ratio of exports and imports. Exports from each group of goods are classified as non-price if the unit value is larger than the unit value for imports in the same group. As an additional condition, groups of goods are only considered if both exports and imports are represented, and fuels are excluded to ensure equal conditions for importers and exporters of oil products. Non-price exports defined in this way are generally higher quality products and often feature local trademarks, in contrast to exports of raw commodities or subcontracting, which are mainly price-based exports. There is also a higher probability, though no guarantee, that exporters of non-price exports will be price makers rather than price takers.

As there is no generally accepted international core theory for price and non-price competitiveness, the following analysis, which is numerically based on the UN Comtrade database, can help to interpret the results of the previous sections. The data are in the general trading regime of the Comtrade database, not the special trade regime used for Eurostat's foreign trade statistics, and they have a lag of about a year.

The main value of this dataset is that it contains information on the content and dynamics of groups of goods, showing which groups of goods have higher quality non-price products and which are low quality price-based goods[27], and how those proportions have changed over time.

Using the methodology from the 2018 competitiveness report, it is possible to divide the balance of goods and services into price based and non-price components. The division used for services is an approximate model estimate because a unit value cannot be defined for services (see Competitiveness Report 2018 for the methodology).

**Figure 12. Dynamics of the balances of the price-based components of the main groups of goods**




Source: Comtrade

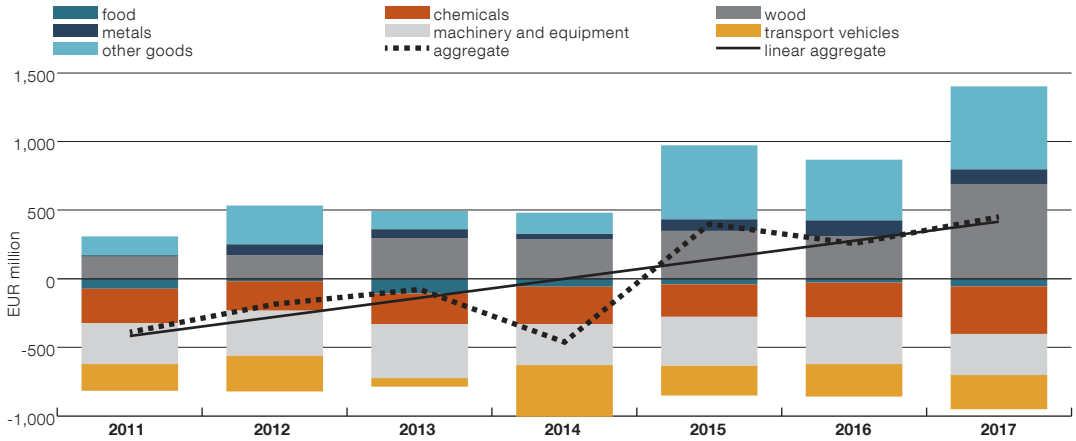
26 ECB (2012) Competitiveness and External Imbalance within the Euro Area (occasional paper series No 139).

27 The data on groups of goods can be connected to the exporting sectors of the economy using the Comtrade tools.

The price and non-price competitiveness parts of major groups of goods are analysed, distinguishing between their price based and non-price components. Seven major groups of goods are analysed in both categories, covering 64% of the total turnover of goods exports[28].

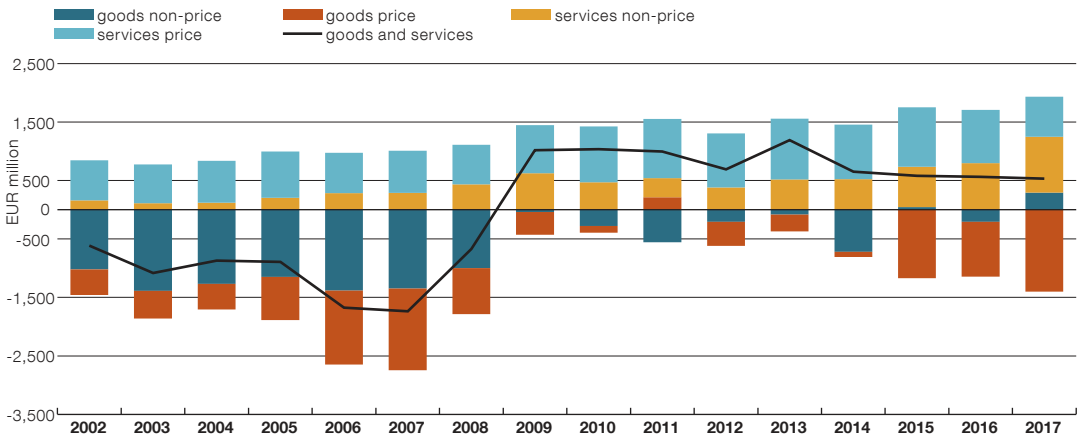
Figures 12 and 13 explain why the goods balance has not substantially deteriorated even though the indicators for price competitiveness have weakened in recent years. While the aggregate deficit for the price based part of exports from the main groups of goods has increased, the total surplus in the non-price part of the same groups of goods has increased. The increase in the non-price component of goods exports has so far at least partly offset the decline in the price-based part. Finally there is the aggregate view of the balance of goods and services (see Figure 14).

**Figure 13. Dynamics of the balances of the non-price components of the main groups of goods**




Source: Comtrade

**Figure 14. Decomposed balance of goods and services**




Source: Comtrade

Figure 14 confirms that the balance of goods and services is positive only because of the surplus in services. An increase in the non-price component is also evident for services, meaning there is no problem with exports of services. This is natural given that some 86% of services exports are knowl-

28 Initially 76%, but group 85 for electricity and communications equipment is excluded because some 70% of the exports and imports in this group are of Ericsson Eesti. As the prices of these are set within the Ericsson Group, it affects the whole picture for the group of goods.

edge-intensive services. The trade deficit in recent years has come from price based goods exports, and this reflects some fall in the price competitiveness of a part of goods exports.

**Summary of the analysis of competitiveness:**

- Effective exchange rates appreciated rapidly in 2018 as the nominal effective exchange rate was up 2% and the real effective exchange rate up by between 3.5% for the GDP deflator based REER and 4.7% for the ULC based REER, meaning the appreciation came from changes in current exchange rates and from faster rises in prices and wages than those in foreign trading partners.

- The cumulative rise over the past five years in the real exchange rate of 7-9% exceeds the European Commission's criterion for macroeconomic imbalance of a rise of 5%. It is however still within the EU criterion for the non-euro area countries of 11%. The strengthening in the real effective exchange rate has accelerated notably in the past two years.

- The current account norm is higher than it was in 2012 and the current account gap is now close to zero. In general terms this means the real exchange rate is in balance, but also that the competitive advantage from an earlier undervalued real exchange rate has now faded away.

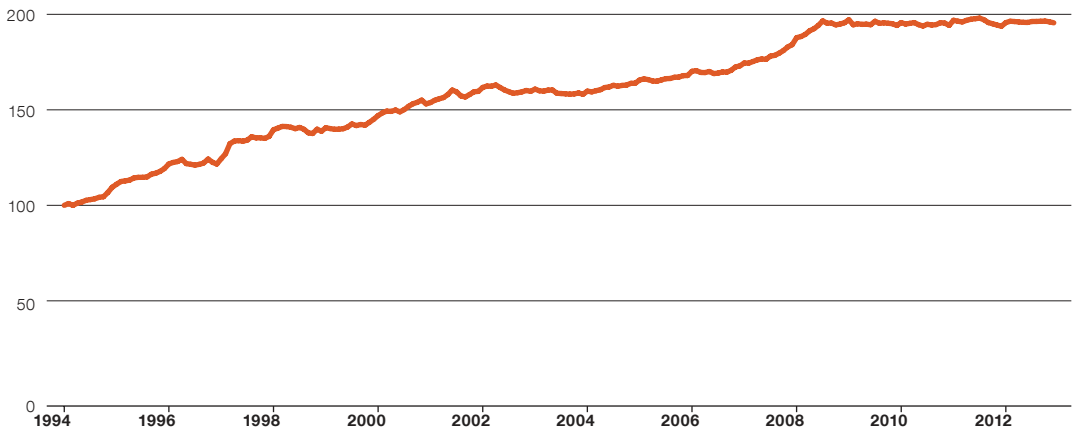
- There have been no major changes in price based competitiveness and non-price competitiveness since the end of 2017, and earlier trends have continued. This means that the price component of services has continued to grow in the surplus on the services balance, and the price component of goods exports has continued to weaken in the deficit on the goods balance.

# III. SPECIAL TOPIC: HAVE REAL EXCHANGE RATE MISALIGNMMENTS HINDERED GROWTH?

## Introduction

The dynamics of real exchange rates have become a key macroeconomic concern in the European Union. The euro area, which is the ultimate symbol of the economic integration of the EU, has always had a central place in maintaining stability in the EU, and most EU members have to join it eventually. Some of the countries in our study have joined the euro area, these being Estonia, Latvia, Lithuania, Slovakia and Slovenia, but the remaining countries, Bulgaria, Czechia, Hungary and Poland, are not in the ERM II and this is relevant as it gives them more flexibility for adjustment. A simple average of the real effective exchange rates of these nine CEE countries is shown in Figure 15, and it represents the dynamics of the real effective exchange rates of these countries against the euro. It shows that the real exchange rate experienced a real appreciation of around 100% on average from the beginning of 1994 to the end of 2012. A growing literature has attributed this vigorous appreciation to the Balassa-Samuelson effect and the productivity gains of the open sector. In the following, exchange rate misalignments are treated as country specific and their impact on economic growth is treated as homogeneous in all countries. Misalignment of the real exchange rate from its equilibrium values has a nonlinear effect on growth. It is reasonable to use a panel regression to estimate the relationship between growth and RER misalignment if it is assumed that the countries have the same technology. We also estimate nonlinear models to account for any possible asymmetric effects in the misalignment. The key findings are that currency overvaluation is negatively correlated with economic activity and the effect of overvaluation is much stronger than that of undervaluation.

**Figure 15. Average real effective exchange rate based on CPIs, 27 trading partners**




Notes: Data from Eurostat. Simple average of the real effective exchange rate, monthly observations (base: January 1994).

## Analysis

Since there is ample evidence in the literature that Purchasing Power Parity does not hold even in the long run, the equilibrium exchange rate is defined as country specific. Therefore a country-specific cointegrating relationship is proposed where the real exchange rate depends on productivity, government consumption ($gov_t$), investment ($inv_t$), openness defined as exports plus imports over GDP ($open_t$), terms of trade ($tot_t$), and real interest rate differentials ($i_t - i_t^*$):

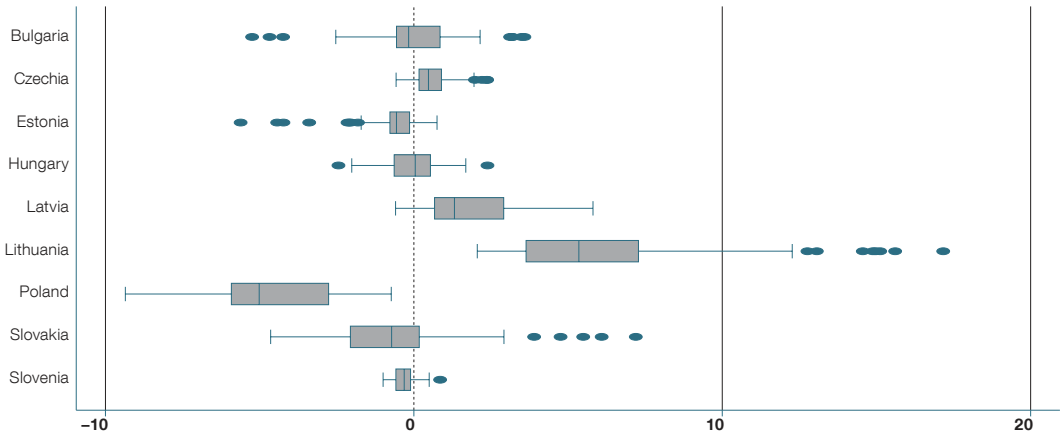
$$q_t^e = \alpha_0 + \alpha_1 y_t + \alpha_2\, open_t + \alpha_3 tot_t + \alpha_4 inv_t + \alpha_5 gov_t + \alpha_6 (i_t - i_t^*) \qquad (1)$$

where all the variables are expressed in logarithms except for the interest rate. The Johansen cointegrated VAR (CVAR) method is applied to test whether there is a long-run relationship between these variables.

For the long-run exchange rate to be calculated, the long-run values of the fundamentals must first be separated from their short-run fluctuations. We use the Hodrick-Prescott filter for this. The box plots in Figure 16 show which countries have an overvalued or undervalued currency. It seems countries with overvalued or undervalued exchange rates also face a large amount of variability. Lithuania and Latvia both have overvalued currencies and large variability, while Poland and Slovakia also show large variability, though their currencies are mostly undervalued. On the other side, Bulgaria, Czechia, Estonia, Hungary and Slovenia have currencies with low variability that do not appear to be persistently overvalued or undervalued. The magnitude of misalignments is not large for these countries as it is always below 5% in either direction, especially in Slovenia, Hungary and Czechia, where misalignments are below 2%. Figure 17 displays the original time series and its long run equilibrium counterpart. Once it has been found, the measure of the misalignments (mis) is used for looking at the relationship between misalignments and economic activity. The empirical strategy this time pools all the countries together to obtain a panel estimator where all the variables are in first differences:

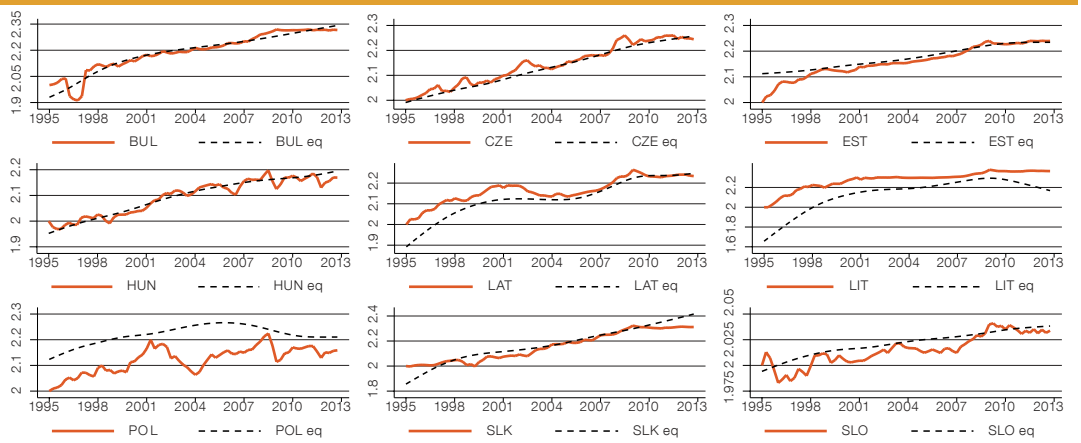
$$\Delta y_{it} = \beta_0 + \beta_1 \Delta y_{it-1} + \beta_2 \Delta m\hat{\imath}s_{it} + \Gamma' \Delta X_{it} + \Phi' \Delta Z_{it} + u_{it} \qquad (2)$$

**Figure 16. Real Exchange Rate misalignments by country (%)**




Note: the misalignments are computed in percentage points of the equilibrium exchange rate using the cointegrating relationships in Table A1 in the Appendix.

**Figure 17. Long-run real exchange rates**




Notes: The equilibrium exchange rates are computed using the cointegrating coefficients in Table 4 and the permanent component of the exchange rate fundamentals found with the Hodrick-Prescott filter.

Vector $X$ groups openness, investment and the long-run exchange rate ($q^e$), all variables that were also included in the cointegrating relationship (1), while vector $Z$ contains a new set of variables that may affect economic activity, such as education, financial development measured as domestic credit from the financial sector, and other institutional factors like the perception of corruption, the rule of law and

regulatory quality. Table 4 shows the results of the panel estimations where the dependent variable is our proxy of economic activity, which is per capita output in first differences. This is a common measure of growth in the literature since the variable is measured in logarithms. Column (10) is the estimation of equation (2). Our measure of RER misalignment is included in the regression together with the long-run real exchange rate, and openness and investment, which were among the variables included as fundamentals in equation (1). The coefficient for the misalignment is negative and significant, as is the long-run real exchange rate, which would suggest that it is harmful for economic growth if the exchange rate appreciates.

Next, a nonlinear specification is proposed where the exchange rate may be affected in different ways by overvaluation and undervaluation. The introduction of the dummy variable $I_{POS}$ (1 if $m\hat{i}s > 0$ and 0 otherwise) and the interaction terms $\Delta m\hat{i}s_{it} \times I_{POS}$ and $\Delta m\hat{i}s_{it} \times I_{NEG}$ (where $I_{NEG}$ is the complement of $I_{POS}$) allows positive and negative misalignments to have different effects:

$$\Delta y_{it} = \beta_0 + \beta_1 \Delta y_{it-1} + \beta_2(\Delta m\hat{i}s_{it} \times I_{NEG}) + \beta_3 I_{POS} + \beta_2(\Delta m\hat{i}s_{it} \times I_{POS}) + \Gamma' \Delta X_{it} + \Phi' \Delta Z_{it} + u_{it} \quad (3)$$

The estimates of equation (3) can be found in columns (11) to (20) with alternative determinants of economic activity. We find evidence that misalignments affect economic activity in a nonlinear fashion. The interaction terms are both significant at 1% and negative, and the difference between the two coefficients is also statistically significant, with overvaluation of the currency having a larger effect on economic activity. The negative effect of the lagged values of $\Delta y_t$ is consistent with our expectations.

Within the framework of growth regressions, this result may be interpreted as favouring conditional convergence. However, this result may be interpreted in different ways, as the negative sign would be consistent with the effect of the business cycle, which would also imply that past values for output should have a negative sign. Periods of fast growth may be followed by a slowing down, while periods of low growth may be followed by speeding up. The positive sign for investment is also in line with the production function approach. Investment is the control variable that is used most commonly in the literature, indicating the positive effect that capital accumulation has on output. This effect is statistically significant with a positive coefficient in all the regressions, and the sign is as expected. A number of variables with annual frequency are considered,[29] including enrolment in secondary school and years of schooling of the labour force as two proxies for human capital, and R&D spending and exports of high technology as proxies for technological development. Human capital is usually regarded as another important control variable in the production function tradition. Exports of high technology is the only one of these which is statistically significant and which has the expected sign, positive in this case. Another factor that is usually included in the literature is institutions. Although many proxies have been explored, they are mostly non-significant in our results. Only the two proxies for financial development, M2 and domestic credit provided by the financial sector as a percentage of GDP, are statistically significant. Other institutional factors, such as control of corruption, the rule of law and regulatory quality, were not statistically significant. Given the important changes in the institutions in these transitional economies in the last 25 years, we would have expected to find some type of association with economic activity. It may be that the period analysed is too short at 12 years to allow any effect from these institutions to be observed.

## Conclusion

We have analysed the degree of RER misalignments, and we use these misalignments in a growth regression set up for a group of CEE countries. The empirical strategy was successful in identifying the long-run relationship for individual countries between the exchange rate and a group of fundamentals from open macroeconomic models (see Appendix) and from the results of previous empirical studies. Most of the signs for the cointegration relationship are as expected. The misalignment shows

29 These variables have been transformed into quarterly observations.

a clear pattern of shrinking in magnitude and disappearing until 2008, after which the trend is partially reversed. However, if Lithuania were to be excluded, there would be no clear increase in the dissipation of the misalignment.

The misalignments are negatively associated with growth. There is evidence of asymmetry in the effect of these misalignments. It is harmful for economic activity if the exchange rate is overvalued as was found in most of the previous literature. The results obtained emphasise that CEE countries, which were transitional economies during most of the period analysed, need a combination of factors if they are to develop further. They must pay particular attention to their foreign exchange relationships and public policies in general, and to how they consolidate their economies.

**Table 4. Economic Activity – Growth regressions**

| | (10) | (11) | (12) | (13) | (14) | (15) | (16) | (17) | (18) | (19) | (20) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lagged dependent var. | -0.183*** | -0.204*** | -0.201*** | -0.205*** | -0.208*** | -0.206*** | -0.214*** | -0.214*** | -0.219*** | -0.220*** | -0.218*** |
| | (0.032) | (0.026) | (0.027) | (0.027) | (0.028) | (0.029) | (0.027) | (0.027) | (0.028) | (0.028) | (0.028) |
| Investment | 0.129*** | 0.137*** | 0.137*** | 0.136*** | 0.136*** | 0.134*** | 0.138*** | 0.137*** | 0.136*** | 0.136*** | 0.137*** |
| | (0.021) | (0.018) | (0.018) | (0.018) | (0.016) | (0.017) | (0.014) | (0.015) | (0.015) | (0.015) | (0.015) |
| Openness | -0.437*** | -0.436*** | -0.435*** | -0.445*** | -0.421*** | -0.445*** | -0.437*** | -0.432*** | -0.445*** | -0.445*** | -0.444*** |
| | (0.072) | (0.071) | (0.071) | (0.071) | (0.072) | (0.075) | (0.068) | (0.069) | (0.068) | (0.069) | (0.068) |
| Exch. Rate (long run) | -0.458** | -0.487** | -0.512** | -0.623*** | -0.552** | -0.744** | -0.706*** | -0.728*** | -0.952*** | -0.958*** | -0.831*** |
| | (0.224) | (0.228) | (0.230) | (0.237) | (0.215) | (0.291) | (0.249) | (0.260) | (0.262) | (0.267) | (0.248) |
| Misalignment | -1.674*** | | | | | | | | | | |
| | (0.370) | | | | | | | | | | |
| $I_{NEG}$ × misalignment | | -0.854*** | -0.849*** | -0.884*** | -0.699*** | -0.747*** | -0.711*** | -0.707*** | -0.730*** | -0.737*** | -0.733*** |
| | | (0.240) | (0.241) | (0.247) | (0.235) | (0.246) | (0.238) | (0.239) | (0.245) | (0.243) | (0.243) |
| $I_{POS}$ × misalignment | | -2.772*** | -2.767*** | -2.777*** | -2.871*** | -2.846*** | -3.191*** | -3.075*** | -3.172*** | -3.175*** | -3.173*** |
| | | (0.406) | (0.404) | (0.401) | (0.363) | (0.389) | (0.526) | (0.502) | (0.533) | (0.533) | (0.535) |
| Education (enrolment) | | | 0.002 | | | | | | | | |
| | | | (0.002) | | | | | | | | |
| Schooling years | | | | 0.013 | | | | | | | |
| | | | | (0.013) | | | | | | | |
| High Tech. Exports | | | | | 0.003** | | 0.002** | 0.003** | 0.003** | 0.003** | 0.003** |
| | | | | | (0.001) | | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| R&D expenditure | | | | | | -0.035 | | | | | |
| | | | | | | (0.035) | | | | | |
| Financial development | | | | | | | -0.002** | | -0.001** | -0.001** | -0.002** |
| | | | | | | | (0.001) | | (0.001) | (0.001) | (0.001) |
| M2 (% of GDP) | | | | | | | | -0.002* | | | |
| | | | | | | | | (0.001) | | | |
| Corruption | | | | | | | | | -0.004 | | |
| | | | | | | | | | (0.003) | | |
| Rule of Law | | | | | | | | | | -0.004 | |
| | | | | | | | | | | (0.003) | |
| Regulatory quality | | | | | | | | | | | 0.003 |
| | | | | | | | | | | | (0.004) |
| Constant | 0.008*** | 0.010*** | 0.010*** | 0.010*** | 0.010*** | 0.011*** | 0.011*** | 0.011*** | 0.013*** | 0.014*** | 0.008** |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.002) | (0.001) | (0.001) | (0.002) | (0.003) | (0.004) |
| $I_{POS}$ | | -0.004* | -0.004* | -0.004* | -0.004* | -0.004* | -0.003 | -0.003 | -0.004* | -0.003 | -0.003 |
| | | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) |
| Observations | 630 | 630 | 610 | 624 | 620 | 568 | 604 | 604 | 592 | 592 | 592 |
| Adjusted R-squared | 0.440 | 0.458 | 0.458 | 0.458 | 0.471 | 0.469 | 0.485 | 0.482 | 0.487 | 0.487 | 0.486 |

Notes: The dependent variable is per capita output (logs). Heteroscedasticity and Autocorrelation Consistent (HAC) standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Coefficients in bold indicate their difference is statistically significant at the 5% level. Regressions (10) and (11) are based on equation (5). Regressions (12) to (19) are based on equation (6). All the variables are in first differences. $I_{NEG}$ and $I_{POS}$ are dummy variables for negative and positive values of the misalignments.

## APPENDIX: EQUILIBRIUM RELATIONS

The cointegrating vectors for each country can be found in Table A1, where the coefficients of the real exchange rate have been normalised to 1. The negative sign of per capita income for all countries is consistent with the Balassa-Samuelson effect, whereby more developed countries should have a more highly valued currency because of productivity differentials in the non-tradable sector. The Balassa-Samuelson effect is the real appreciation generated by the increase in the relative price of non-tradable goods that follows an increase in productivity in the more competitive tradable market. This is driven by the upward pressure on wages in the non-tradable sector that arises because wages in the tradable sector are higher since productivity growth is faster in that sector than in the non-tradable sector. Most of the international literature that looks at the empirical fulfilment of this relationship has shown evidence in support of the Balassa-Samuelson effect.

All the other variables may either show some change in sign, which is not always surprising since different hypotheses predict different signs, or may become non-significant in some specifications. Openness is not significant in five countries but it has a positive sign in the remaining four, which is as expected. Openness is expected to cause the real exchange rate to depreciate since trade liberalisation reduces the domestic prices of tradable goods, shifting demand away from non-tradables. This should make prices in the non-tradable sector fall, producing a real depreciation. The results for the Terms of Trade are mixed since the coefficient is always significant, but it is negative, as expected, in five countries and positive in the other four countries. The expected sign is negative because an improvement in the terms of trade should lead the currency to appreciate.

The interest rate differential to the international interest rate is significant in seven countries and we would expect to find a negative coefficient. If the interest rate of a small economy is higher than the international interest rate, creating the potential for capital inflows, we should observe an upwards trend in the exchange rate. This is the case in four of the countries, but the sign is the opposite in the other three economies. A possible explanation for this may be expectations. Our proxy for the interest rate differential is computed assuming forward-looking expectations for one period ahead, but it may be that it should use expectations for more than a year in some cases. Moreover, if for any reason there are expectations that monetary policy will cause the currency to appreciate or depreciate further than one period into the future, we may find the opposite sign when we consider the exchange rate observed rather than the expected exchange rate.

The expected signs for government consumption and investment are ambiguous, and they depend on the shares of spending on tradable and non-tradable goods. If the government spends relatively more on non-tradable goods, the sign should be negative, and it should be positive if relatively less is spent. Likewise, the sign should be negative if investment depends more on non-tradable goods. Investment spending seems to be more important since it is non-significant in only three countries, while government spending is non-significant in five countries. The dominant sign of both coefficients is positive, with only two exceptions among the nine countries, which implies that both government spending and government investment are relatively higher on tradable goods. It is surprising to find this sign for government spending, though perhaps not so much for investment, as it would imply that the productive sectors in these countries rely on imported goods.

## Table A1. Equilibrium Real Exchange Rate – cointegration relationship

| | (1) Bulgaria | (2) Czechia | (3) Estonia | (4) Hungary | (5) Latvia | (6) Lithuania | (7) Poland | (8) Slovakia | (9) Slovenia |
|---|---|---|---|---|---|---|---|---|---|
| Real exch rate | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Income per cap | -0.812*** | -1.078*** | -0.359*** | -1.143*** | -0.587*** | -1.308*** | -1.375** | -1.430*** | -0.274*** |
| | (0.031) | (0.0429) | (0.0225) | (0.106) | (0.182) | (0.214) | (0.657) | (0.146) | (0.0637) |
| Openness | | | | 0.317*** | 2.939*** | 1.740*** | 1.267** | -1.270*** | 0.138** |
| | | | | (0.0850) | (0.493) | (0.413) | (0.600) | (0.273) | (0.0653) |
| Term of Trade | 1.258*** | -3.081*** | -0.768*** | -8.980*** | -14.01*** | 23.09*** | -5.809*** | -15.92*** | 3.861*** |
| | (0.458) | (0.909) | (0.0353) | (1.255) | (1.169) | (2.046) | (0.874) | (2.031) | (0.332) |
| Investment | 0.212*** | | 0.280*** | | | | 1.168*** | | 0.174** |
| | (0.021) | | (0.0351) | | | | (0.384) | | (0.0760) |
| Gov Expenditure | | 0.474** | | 1.177*** | 2.438*** | | 7.687*** | -2.474*** | 0.395* |
| | | (0.212) | | (0.248) | (0.661) | | (1.337) | (0.500) | (0.213) |
| Interest rate diff | -0.001*** | -0.011*** | 0.0016** | -0.005*** | -0.015*** | -0.0102** | 0.0241*** | 0.0127*** | |
| | (0.000) | (0.00119) | (0.0006) | (0.001) | (0.0032) | (0.0049) | (0.0053) | (0.0025) | |
| Constant | -2.907*** | 6.736*** | | 17.07*** | 18.56*** | -48.36*** | | 39.90*** | -9.839*** |
| | (0.940) | (1.991) | | (2.525) | (2.869) | (4.216) | | (4.428) | (0.732) |
| | | | | | | | | | |
| Logl | 712.6 | 1262 | 1138 | 1221 | 1014 | 971.6 | 1071 | 1075 | 1305 |
| Lags | 4 | 3 | 2 | 3 | 2 | 2 | 2 | 3 | 2 |
| Obs | 66 | 67 | 68 | 67 | 68 | 68 | 68 | 67 | 68 |

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The coefficients of the variables that were not significant at the 10% level have been omitted

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