Eesti Pank

ESTONIAN COMPETITIVENESS REPORT

2014

The Estonian Competitiveness Report written by experts from Eesti Pank assesses Estonia's export strength to give a picture of the competitiveness of the economy, looking at long-term relative productivity growth and short-term deviations from the path of sustainable growth. It also contains a detailed discussion of the indicators for relative competitiveness in prices and costs, which are based on the comparative dynamics of prices and wages in Estonia and in the country's main trading partners. It also describes a number of competitiveness factors other than price.

The Estonian Competitiveness Report is published once a year.

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COMPETITIVENESS INDICATORS 2013

- The euro appreciated by a nominal 1.4% in 2013 against the currencies of Estonia's trading partners in the EA+40. This slowed price growth in Estonia but was restrictive for exports. In conjunction with the strengthening of the real exchange rate there was also a decline in the price advantage in export markets that had arisen following the crisis.

- A statistically significant near unit elasticity has been found between the unit labour cost based REER and the growth in Estonian exports of goods. This means that the faster rise in unit labour costs in relative terms in Estonia restricts the growth in goods exports to almost the same amount.

- The IMF methodology for the equilibrium current account position and the real exchange rate assessment implies that the real exchange rate of the euro could be around 10% undervalued for Estonia. This should continue to favour opportunities for growth for Estonian exports.

- Total weighted import demand from Estonia's foreign partners declined by 1.7% over the first three quarters of 2013 at current prices while exports of goods and services grew by 3.6% during the same period. Growth slowed in Estonian exports in 2013, but market share increased in target markets a little faster than before and was 5.5% bigger over the year.

- The market share of Estonian exports in the global economy increased by an average of 5.4% a year in 1999-2012. Growth in market share was helped by a good composition of Estonia's target markets and the products exported. Even so there were missed opportunities for products or markets where demand was growing rapidly or for expansion in new markets or with new products. Estonia managed to expand its market share for exports even given these factors.

- Value added of exports increased more stably than the total value of exports during the past decade, but their average growth rate was similar. Data for the first three quarters of 2013 show that value added in exports was up 4.0% at current prices over the year, which was 0.5 percentage point more than the growth in the value of non-oil exports.

- Wage costs increased as a share of value added in 2013 and unit labour costs increased as profit growth slowed sharply. In the longer term, if there is an acceleration in growth in prices of commodities and energy and other costs, it will increase the risk of higher inflation stemming from cost pressures or of a slowdown in economic growth.

- The productivity of labour in Estonian companies is higher than in other central and eastern European countries and the differences between companies are smaller. Estonia stands out from other countries in the allocation of resources by having a relatively efficient service sector. More productive companies have taken market share from the less productive since the crisis and their contribution to overall Estonian productivity growth has increased.

1. ASSESSMENT OF COMPETITIVENESS

1.1. Indicators of competitiveness

If a country's competitiveness is measured as the general capacity to ensure long-term improvement in the living standards of its people while maintaining the lowest possible unemployment, then it is important to assess as accurately as possible the indicators that affect that within the framework of the global economy.

The central banks of the countries of the euro area have jointly set up CompNet, the Competitiveness Research Network[1], which conducts research to help develop a system of indicators for gauging the competitiveness of economies. New indicators can be added to the framework currently in use once the strength of their empirical relationship and their impact on total productivity, employment, economic growth and the overall public welfare have been assessed.

International competitiveness is often defined quite narrowly and developments in the competitiveness of an economy are mainly described in two ways. The first looks at the international competition of relative prices and costs and the second at the dynamics of export indicators showing a country's ability to cope in international markets. Competition in prices and costs is mostly described in this context using indicators for exchange rates that have been adjusted for price dynamics.

Research in recent years suggests more and more that competitiveness should be considered in a broader sense. The commonly used indicators for competitiveness, such as the real effective exchange rate, unit labour cost, or relative export prices often affect the ability of companies to compete in international markets, especially in the short term. However, the ability of companies and thus also of countries to adapt in a globalised world is dependent on other things too. It is important for exports for a country to be able to use its advantages from specialisation or from innovation in products or technology, and not just to concentrate on having the lowest costs. This means that economic competitiveness is in a broader sweep defined by the productivity of companies, which in turn depends on factors like innovation, high levels of education and research, good quality infrastructure, and favourable investment, legal and tax climates.

Attention is increasingly focused on non-price factors that affect competitiveness, such as reputation and quality, a valuable position in global production chains, and niche products and markets. In this way the wider concept of competitiveness takes in many more factors that can affect the ability of an economy to compete in international markets, and economic productivity in its broadest sense.

1.2. Indicators of Estonian competitiveness, REER and HCIs

The relative competitiveness of a country is generally defined in comparison to other countries and focuses on the dynamics of the indicators related to competitiveness. This assessment doesn't consider so much the capacity to ensure long-term general economic growth, as the results of that capacity in a globalised economic environment amongst other countries. In this case, competitiveness is considered to be strengthened when domestic prices and costs rise more slowly than those in other countries. This, if other factors remain constant, should lead to an increasing market share for exports and thus improve the country's ability to earn profits in global markets or to increase GDP per capita in the long term faster

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1 http://www.ecb.int/home/html/researcher_compnet.en.html

than it increases in other countries. There is always a slight contradiction in defining external competitiveness through real exchange rates, because the focus of the analysis is not on productivity-led long-term growth, but on short-term deviations from the trajectory of sustainable growth, which are then linked with the differences in price dynamics compared to those of other countries.

Changes in relative price competitiveness are most commonly described using Real Effective Exchange Rates, REERs, which are calculated using various price and cost indicators. The REER is the weighted geometric average of the nominal exchange rates of a country's main trading partners, adjusted for relative price indicators. The REER index is a synthetic indicator which reflects the aggregate of fluctuations in individual prices and exchange rates in relation to those of a country's principal trading partners. The real exchange rate moves in reaction to both prices and nominal rates. The effective exchange rate index is generally taken as a weighted average of bilateral exchange rate indexes.

Real exchange rates are not able to measure such features of competitiveness as reputation, quality, reliability or technological innovation, and nor do they show structural changes particularly well. However, they show the movement of prices of the goods produced in a country relative to those of its trading partners. The focus is not on explaining the causes of differences between price and cost levels, but on capturing the differences in the price dynamics between countries. For transition economies like Estonia's, appreciation of the real exchange rate is often connected to restructuring and integration of the economy through convergence of productivity and prices with those of more developed countries.

The European Central Bank publishes REERs calculated using a single unified methodology under the name Harmonised Competitiveness Indicators or HCIs[2]. HCIs give indicators of price and cost competitiveness that are meaningful and comparable and that are consistent between the euro area countries and with the euro REER[3].

HCIs are calculated for Estonia using several price and cost indicators for different groups of partner countries[4]. The country's trading partners are grouped as the other euro area countries, those countries plus twenty others, and in some cases the euro area countries plus forty trading partners[5].

The nominal exchange rate of the Estonian currency was stable against the other members of the euro area[6] (Nominal Harmonised Competitiveness Indicator, NHCI, against the euro area, EA) but it changed against other partner countries. Aggregate indicators for nominal rates, which include 20 or 40 other countries as well as the EA, saw larger changes as a consequence. The depreciation in the nominal exchange rate in 2012 put pressure on prices in Estonia to rise more quickly, while at the same time

2 The method for calculating HCIs is described in the Estonian Competitiveness Report 2013.

3 HCIs are calculated from the weighted average of changes in the bilateral exchange rate for the selected base period. The weights are based on bilateral data for exports and imports of manufactured goods. Import weights are the share of each partner country in total imports. Exports are double-weighted in order to account for "third-market effects", i.e. to capture the competition faced in foreign markets from both domestic producers and exporters from third countries. Weights are updated every three years to reflect developments in the structure of international trade.

4 http://www.ecb.int/stats/exchange/hci/html/index.en.html.

5 The ten European Union member states that were not in the euro area at the start of 2013 plus ten other countries – Australia, Canada, China, Hong Kong, Japan, Norway, Singapore, South Korea, Switzerland and the USA – or that group of twenty plus twenty more countries – Algeria, Argentina, Brazil, Chile, Croatia, Iceland, India, Indonesia, Israel, Malaysia, Mexico, Morocco, New Zealand, the Philippines, Russia, South Africa, Taiwan, Thailand, Turkey and Venezuela.

6 Composition of the euro area as in 2013.

allowing exporters to gain a short-term price advantage in foreign markets, but in 2013 this was reversed. The euro appreciated by an average of 1.4% in 2013 against the currencies of Estonia's trading partners in the EA+40, which slowed price growth in Estonia but was restrictive for exports (see Figure 1.1).

Changes in the real exchange rate reflect the relative price levels in Estonia and foreign markets and show how the real rate of the Estonian currency has moved in relation to trading partners. It is arrived at by adjusting the nominal exchange rate with the weighted inflation of Estonia's trading partners.

Monthly HCIs based on the consumer price index, CPI, are published most frequently. Given that the nominal exchange rate of the Estonian currency has been stable against the currencies of the other euro area countries, the real exchange rate of the Estonian currency appreciated against those currencies because of faster growth in consumer prices. The Estonian CPI rose by 1.35 times as much as the weighted indicator for trading partners in the euro area over the past 15 years, meaning that consumer price inflation in Estonia during that time was on average 2 percentage points higher than in those countries. This difference is quite close to, though slightly larger than, where estimates suggest it should be as Estonia's price and income levels converge towards those of countries with higher prices and incomes.

The difference in the inflation rates in Estonia and the euro area has been somewhat smaller in the past two years however, meaning that Estonian consumer prices have been converging with the euro area average slightly more slowly. Estonian consumer price inflation for the year was 1.5 percentage points higher in 2012 than the average for the euro area, and was 1.4 points higher in 2013 (see Figure 1.2).

The comparisons with larger groups of countries (EA+20 and EA+40) also cover many developing countries, where price levels are closer to that of Estonia. In this case the real exchange rate of the Estonian currency is affected by both changes in

Figure 1.1. Annual change in aggregate indicators for the Nominal HCI of the Estonian currency
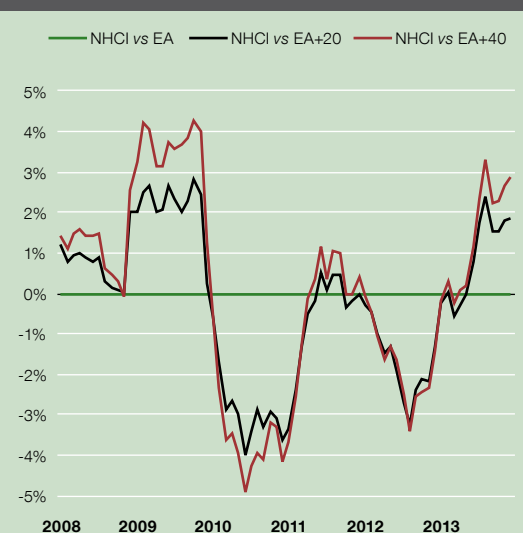
Source: European Central Bank

Figure 1.2. Annual change in Estonian HCIs deflated by CPI
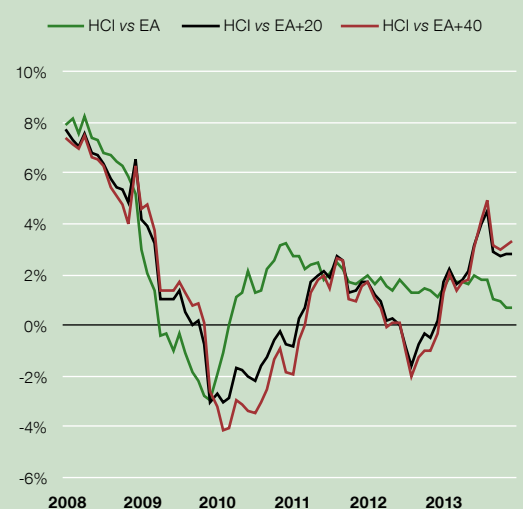
Source: European Central Bank

relative prices and the nominal exchange rate. The real exchange rate of the Estonian currency depreciated in relation to the widest group of trading partners (EA+40) by 0.3% on average in 2012, which means that the consumer prices in euros in Estonia's external trading partners rose slightly more than those in Estonia did. This came about mainly because the euro fell in nominal terms against the currencies of trading partners, and this offset, and even slightly exceeded the differences in inflation. In contrast the real exchange rate of the Estonian currency appreciated by 2.7% on average in 2013, 52% of which stemmed from the relative nominal appreciation of the euro, and a slightly smaller share from the relatively quick rise in Estonian consumer prices. Th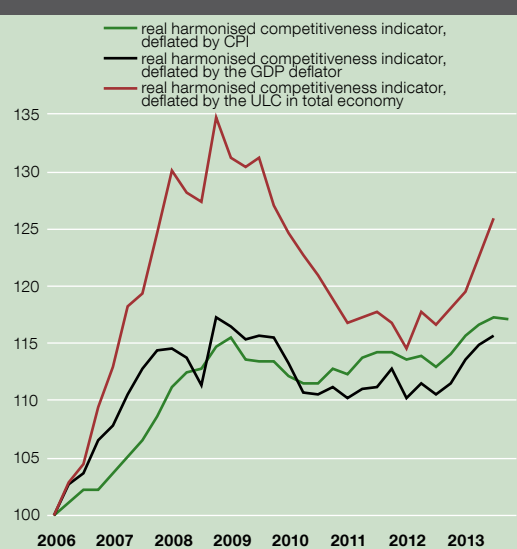is meant that Estonian consumer prices rose during the past year more than those in our external trading partners expressed in euros. Other things being equal, this should mean that Estonian competitiveness has on average slightly worsened in relation to these countries in the last year.

There are certain theoretical drawbacks to using CPIs as a base for comparison however. The components of the consumer price index also include imported goods, prices of which are not directly linked to domestic production costs, and products in the non-tradable sector, such as domestic transport, accommodation, construction and various services, that are not open to foreign competition and do not compete in export markets. The structure of the CPI excludes many industrial products that are very important for exports, such as oil shale; wood, metal and chemical products; electronic equipment; and unprocessed agricultural produce. Furthermore, the weighting structure of the CPI can vary greatly between countries, both in the components used and in their individual weights.

As a result, the indicators for price and cost competitiveness cover more than just consumer prices. The other indicators most commonly used are unit labour costs, ULC; the GDP deflator; and industrial producer prices. The Estonian real exchange rate indexes are based on the GDP deflator, ULC, and the CPI. The ULC-based and GDP deflator-based indicators come out less frequently, only quarterly or annually, and cover fewer external trading partners as only 20 non-euro area trading partner countries are considered alongside the countries of the euro area. The lack of comparable data means that this list does not include some foreign partners that are important to Estonia, such as Russia. In the period before the crisis, the real exchange rate for the Estonian currency based on the GDP deflator strengthened slightly more than the rate based on consumer prices, but the subsequent correction was also larger (see Figure 1.3).

The GDP deflator-based rate slid by a total of 4.2% in 2010-2012 to below its average of 2007, but the CPI-based indicator declined by only 0.8% during the same period. Estonian HCIs based on the GDP deflator appreciated, however, during the first three quarters of 2013 by 3.6%. Estonian GDP prices rose during the past six years by about the same amount as those in our trading partners, and there were no great gains or losses in price competition.

Figure 1.3. Indicators for the Estonian real exchange rate against EA+20 trading partners, Q1 2006 = 100

— real harmonised competitiveness indicator, deflated by CPI
— real harmonised competitiveness indicator, deflated by the GDP deflator
— real harmonised competitiveness indicator, deflated by the ULC in total economy

Source: European Central Bank

The comparability of indicators based on the GDP deflator is affected by differences in the tax and subsidy systems of different countries and by the structure of their GDP. The comparability of the data can also be affected by different shares in different countries for non-traded goods and services, as the price of such products affects the price competitiveness of the exporting sector only indirectly.

The Estonian index based on unit labour costs proved the most volatile and after rising rapidly during the boom, it fell for four consecutive years in 2009-2012 by a total of 10.2%. However, the indicator for Estonia based on ULC strengthened in the first three quarters of 2013 by 5.5%, ending the third quarter very close to its level of 2007 and halving as it did so the advantage that had been created in the meantime by the relative fall in the cost of labour.

1.3. Connections between changes in the real exchange rate and the dynamics of exports

Although relative price movements are important factors for competitiveness, there is no agreement in academic or public discussion as to which HCI or REER better describes the export capability of a country. As was partly explained in section 1.2, there are advantages and disadvantages to the indicators based on the various price indexes.

The Consumer Price Index has the advantages of monthly data, a comparatively harmonised methodological basis, a wide comparison base across trading partners, and the inclusion of services. The disadvantages are its exclusive focus on consumption goods and services, which do not reflect price competition for capital goods or business services; its sensitivity to market distortions from taxes and subsidies; and its inclusion of imports.

Producer Price Indexes are also published monthly. They are less sensitive to market distortions and cover the most important manufactured goods. However, this information is available for a smaller number of trading partners; the index doesn't cover services, raw materials or unprocessed agricultural produce; and comparability between countries is affected very much by the selection of components covered.

The GDP deflator has the advantage of covering all the sectors of the economy and both goods and services. Its disadvantages are that it comes out only quarterly; it is frequently revised; it is affected by specificities of how it measures services; the composition of the public and private sectors can have an impact; and it is sensitive to tax policy.

ULC also cover all the sectors of the economy and are less sensitive to tax measures but on top of the drawbacks of the GDP deflator, ULC have the disadvantage that the only production cost they cover is labour and they can be affected a great deal by changes in the structure of the economy or by the substitutability of inputs.

Unit Labour Costs in Manufacturing Industry, ULCM, are more directly related to exports of goods, but on top of the drawbacks of ULC, they suffer the disadvantages of only being available for advanced economies and of covering only the manufacturing sector.

Export Prices give the most direct description of the prices of exported goods, but do not cover

services. They have the worst comparability across countries and suffer from the very strong impact of the selection of goods used and from difficulties in measuring the price of a unit of exports.

Expert assessments of how appropriate indicators of relative prices and costs are for describing the export strength of countries have become sharply critical in recent years. Earlier there was almost unanimous agreement that relative labour costs could be a good indirect indicator of a country's price competitiveness in the medium term, even though they may be distorted by changes in profit margins in the short term. However, research on the euro area in recent years has highlighted that the globalisation of production processes and the reorganisation of global supply chains has had differing impacts on national indicators. Giordano and Zollino (2013) emphasised that specialisation shifts affected the share of labour costs in total costs in different ways in different countries, and indicators based on ULC or ULCM overestimated the price competitiveness of countries most.

Figure 1.4. Dynamics of Estonian REERs based on different price and cost indicators, 2005=100

Source: Eurostat

ULC-based indicators can be strongly influenced not only by relative changes in labour costs, but also by structural changes in the economy, which lead to a change in the shares of GDP of sectors with different labour and capital content, in the shares of different companies within a sector, or in the shares of various elements in the value-added of a firm. If relative wage costs rise, it becomes very important how much of the faster wage growth is passed through to export prices and how much is absorbed by profit, favourable money market conditions, prices of raw materials and other costs.

Estonian data tend to confirm the rather critical view that changes in the real exchange rate do not affect exports directly and should be interpreted only in conjunction with other key processes and indicators. Although price and cost competition is very important, it is still not obvious how to describe or measure it well, especially as the companies of different countries are also competing in different areas such as quality by offering better features, new products, a famous name, fashion, reputation or niche exports. An important feature in developing countries is that prices and wages converge at different rates in different industries, but they often converge faster than productivity does. As wages, prices and productivity all grow faster than in advanced countries, there is no consequent decline in competitiveness.

The Estonian ULC-based REER, which is calculated by Eurostat using 20 trading partners, appreciated by more than 8 percentage points more than the corresponding GDP deflator-based indicator in the seven years from 2005-2012. The gap between the two indicators was even larger for manufacturing, as the REER calculated from Estonian ULCM rose by more than 12 points more than the figure based on the producer price index, PPI, did (see Figure 1.4).
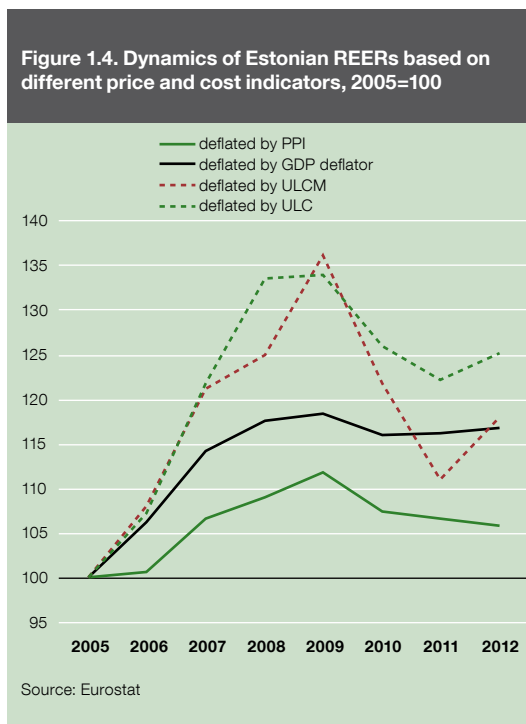
In a market with perfect competition and products with similar properties and the same content and structure, such a development should indicate a fall in profits and thus in competitiveness, and a relative decline in exports through either an outright fall or slower growth than in competitor countries. However, during this period Estonian exports more than doubled in nominal terms, growing by 101.9% from 2005 to 2012, and their share of the global market increased by 16.1% during those years according to calculations by CompNet using Eurostat data (see section 2.2 for more details).

The relation between the export capacity and the dynamics of relative prices can be very different in different countries, and recently these differences have even deepened. As a consequence the need to re-estimate the empirical relationships between indicators of price and cost competition and indicators for foreign trade has become topical. Research for CompNet by Christodoulopoulou and Tkacevs (2013) looked at which real exchange rate indicators are best at explaining changes in imports and exports of goods and services. The research covered quarterly data from 16 countries in the euro area (Belgium was excluded) for the period Q1 1995 – Q1 2013 (73 observations) and used the Eurostat REER indicators for 20 trading partners.

The results showed that the goods exports growth reacted to changes in real exchange rates in less than half of countries covered (see Table 1.1). In most cases sensitivity, or elasticity, was low. Goods

Table 1.1. Elasticity to REER indicators of growth in goods exports and imports at constant prices in euro area countries

| | Long-run elasticity of exports to HCIs | | | | | | | | | | | | | | | |
	Austria	Cyprus	Estonia	Finland	France	Germany	Greece	Ireland	Italy	Luxembourg	Malta	Netherlands	Portugal	Slovakia	Slovenia	Spain
CPI	-0.77	-2.07	-1.46	-1.42	-0.73	-0.54	-0.86	-0.57	-0.30	-0.14	-2.31	-0.45	-0.65	-0.32	-0.36	-0.80
PPI	-0.36	-1.37	-0.12	-1.85	-0.97	-0.30	1.00	-0.70	-0.55	-0.12	-2.15	-0.31	0.06	-0.33	-0.40	-0.93
ULCM	0.25	0.37	-0.98	-0.75	-0.76	-0.38	-0.46	-0.03	-0.20	-0.12	-0.65	-0.26	-0.23	-0.25	-0.05	-0.30
ULC	-0.99	-0.66	-1.05	-1.64	-0.89	-0.48	-0.17	-0.67	-0.44	-0.21	-0.82	-0.25	-0.22	-0.32	-0.07	-0.69
GDP deflator	-0.85	-0.03	-0.78	-2.41	-0.79	-0.50	0.55	-0.45	-0.33	0.03	-2.66	-0.39	-1.12	-0.43	0.00	-0.55

| | Long-run elasticity of imports to HCIs | | | | | | | | | | | | | | | |
	Austria	Cyprus	Estonia	Finland	France	Germany	Greece	Ireland	Italy	Luxembourg	Malta	Netherlands	Portugal	Slovakia	Slovenia	Spain
CPI	0.11	-0.83	0.05	0.08	-0.21	0.01	-0.49	-0.40	-0.30	0.55	-0.42	-0.01	0.14	-0.11	0.01	0.15
PPI	0.37	-0.70	0.02	-0.10	-0.20	0.06	-0.01	-0.66	-0.18	0.20	-0.30	0.11	-0.10	-0.15	0.01	0.14
ULCM	0.28	-0.18	0.12	0.07	-0.03	0.10	0.43	0.02	0.13	-0.07	-0.23	-0.06	0.10	-0.13	-0.01	0.21
ULC	0.15	-0.28	-0.06	0.03	-0.23	0.14	0.34	-0.13	0.13	1.49	0.43	0.02	0.18	-0.02	-0.10	0.27
GDP deflator	0.13	-0.93	-0.57	-0.18	-0.08	0.01	-0.42	0.17	-0.28	0.08	0.12	0.11	0.52	-0.34	0.22	0.40

not significant at the 10% level   significant at the 10% level   significant at the 5% level   significant at the 1% level

Source: Christodoulopoulou and Tkacevs (2013), Eurostat data

exports from Finland and Malta showed quite a strong reaction to changes in the real exchange rate, as a 1% increase in the relative GDP deflator reduced growth in exports at constant prices by 2.4 percentage points in Finland and 2.7 points in Malta. Where elasticities of changes in relative prices and costs were statistically significant, the broader indexes for prices and costs, such as the GDP deflator or ULC for the whole economy, generally had a bigger impact on the growth of goods exports. Only the REERs based on ULC or ULCM proved statistically significant for Estonia. Growth in goods exports showed an almost unit-elastic reaction to changes in both of these indicators, meaning that the rapid rise in relative unit labour costs in Estonia has restricted the growth in goods exports by almost the same amount.

Changes in relative prices and costs had much weaker explanatory power for imports of goods or had none at all for most countries. It was however interesting to note that for Estonia and some other countries some indicators showing changes in relative prices had an apparently illogical impact on growth in goods imports. An appreciation of 1% in the REER calculated from the Estonian GDP deflator slowed growth in goods imports by 0.6 percentage point rather than accelerating it. However, this can be explained by the high import content of exported goods because the relatively rapid rise in Estonian prices slowed growth in exports of goods and through this had a restraining effect on goods imports, although to a lesser extent.

Changes in relative prices and costs generally did not have a noticeable effect on growth in exports or imports of services, leading to the conclusion that the impact on services and their explanatory power are limited. The main finding of the research is that the role of changes in relative prices and costs in the export capacity of the countries of the euro area should not be underestimated and that non-price factors can have a very large impact.

Corbo and Osbat (2012) find, in contrast, that the relative price changes for countries and their potentially restrictive impact on exports should not be taken lightly by the use of macro indicators alone. How strong the impact of relative prices is depends largely on the very different, or heterogeneous, price elasticities for demand in export markets for different product categories and countries. This means that it is very important when measures to improve competitiveness are decided to establish whether the low price elasticity of a given product is a reflection of non-price factors like reputation, taste, design or quality, or of high capital or technology content, or of a niche market position. In these cases companies can increase exports despite rises in prices and ULC by focusing on quality, technology or an expansion of the niche. Low price elasticity may alternatively reflect the unimportance of non-price factors if companies are not able to supply products for which there is growing demand in export markets even after cutting costs and prices. If products with low price elasticity dominate the trade of a country, competitiveness might be better improved by other measures and a reduction in relative prices or costs would not necessarily make any significant difference.

The usual indicators based on relative prices or costs are not able to explain fully the relative developments of goods exports in the member states of the European Union. Countries where prices and costs grew faster also increased the market share of their exports significantly, which is the opposite to what should have happened had all else been equal, as rapid price rises should have been followed by a reduction in the market share of exports. The analysis by the European Commission (2010) explained this contradiction through the impact that globalisation had on weakening earlier connections, and it identified non-price competitiveness factors including the content of goods and services; their features; changes in their appearance or quality; the division of labour within industries; and the increasing share of services.

The importance of non-price factors in explaining exports was underlined by the CompNet research. Benkovskis and Wörz (2012) showed how considering non-price factors for European countries would partly explain the contradiction between the appreciation of the real exchange rate and the simultaneous expansion of market share in 2001-2011. The research used trade figures at a very disaggregated level, taking them separately. A non-price factor was defined for this as any property of a good, such as quality, fashion, good marketing or reputation, that affected the choices of the consumer regardless of price. The usual aggregated export price index does not unfortunately consider carefully enough changes in quality, structure or properties and describes them as a change in price rather than in real value. An export price index adjusted with the non-price factors shows that export prices growing faster than normal does not reflect a build-up of imbalances or a threat to competitiveness, but rather the convergence of the quality and features of the exported goods of Europe's developing countries with those of the advanced countries (see Figure 1.5).

Figure 1.5. Changes in export market share and relative prices in European Union member states, averages for 2001–2011

Source: European Central Bank CompNet; Benkovskis and Wörz (2012)
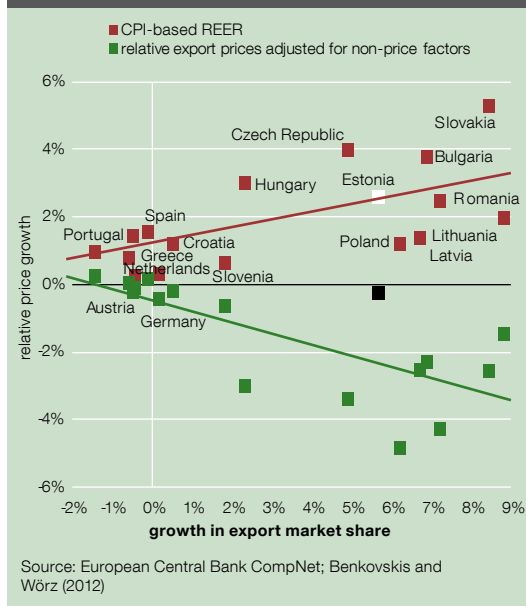
1.4. Exchange rate assessments using the IMF CGER methodologies

A real rate that is close to equilibrium should ensure that an economy develops in line with its external balance through a sustainable current account. If the real exchange rate of a country's currency appreciates, it is very important to assess whether this accords with increases in productivity in the same period or is perhaps indicative instead of an over-valuation that could damage the international competitiveness of the country.

This section provides an assessment of how balanced Estonia's real exchange rate is, using the International Monetary Fund's CGER methodology[7]. The equilibrium current account[8] and underlying current account[9] are first found, and from them the current account gap is calculated, which can in turn be used in obtaining the implied real exchange rate gap. Both the equilibrium current account and the underlying current account can be calculated in two different ways. The methods for finding the equilibrium current account are the macroeconomic balance method and the external sustainability approach, and those for the underlying current account are the elasticities approach and the projection method. This means that there are four different combinations available for calculating the current account gap. The terms, methods and calculations used here are explained in more detail in appendix 1.

7 The methodology is described in more detail in the Estonian Competitiveness Report 2013.

8 The equilibrium current account is the current account balance that is in accordance with the medium-term values for a country's main macro indicators (the macroeconomic balance method) or with changes in the net international investment position (the external sustainability approach).

9 The underlying current account is the theoretical current account balance that would appear at given exchange rates if each economy were operating at its potential with no cyclical effects.

The CGER methodologies do not give precise point-estimates for the misalignment and the results from this analytical framework are used by the IMF as the starting point for further substantive analysis. Since the dispersion of the results is large (see Figure 1.6), the IMF finds that there is a very strong presumption against any conclusion of misalignment if the difference between the equilibrium rate and the current real rate is less than 5%. An average difference of around 10% does not, however, trigger any automatic conclusion of misalignment, but it does give grounds for further more detailed investigation to clarify the situation. Significant differences of over 15% between the medium-term equilibrium rate and the actual exchange rate can give a strong signal of possible exchange rate misalignment.

The current account gap and the implied REER misalignment

The current account is said to be stable if the equilibrium current account and the underlying current

Figure 1.6. Estimates of Estonian REERs misalignment in IMF Article IV reports and Eesti Pank calculations

Sources: IMF; Eesti Pank calculations

account are equal, and the gap between these two indicators is the current account gap. The current account gap can be used for deriving the scope of the REER[10] misalignment using the REER elasticity to current account of 0.45 reported in Isard and Faruqee (1998), where a 1 percentage point gap in the current account-to-GDP ratio corresponds to a misalignment in the REER of 2.2 percent.

Table 1.2 shows that the Estonian underlying current account remains higher than its equilibrium level. The estimates of the equilibrium current account are negative for both methods, with the macroeconomic balance method showing -2.7 percentage points of GDP and the external sustainability approach showing -5.1, but the estimates for the underlying current account are positive, with the elasticities approach showing 1.1 percentage points of GDP and the projection method 0.8 point. This means that the estimates for the current account gap range between -3 and -6 percentage point of GDP. Using the elasticity of the current account to the REER gives us the result that the real exchange rate of the euro for Estonia is undervalued by 8–14%.

The mid-point of this imbalance range is almost the same as it was last year, but the differences between the highest and lowest estimates have narrowed (see Figure 1.6). The figure shows the estimates of the equilibrium real exchange rate for the currency in Estonia in the IMF's Article IV reports, marked IMF on the figure, and the results arrived at by Eesti Pank using the same methodology, marked EP on the figure. Results obtained with the macroeconomic balance method are marked MB and those from the external sustainability approach are marked ES, and the highest and lowest of Eesti Pank's four estimates are shown. The differences between the results of the IMF and Eesti Pank in 2012 are caused by

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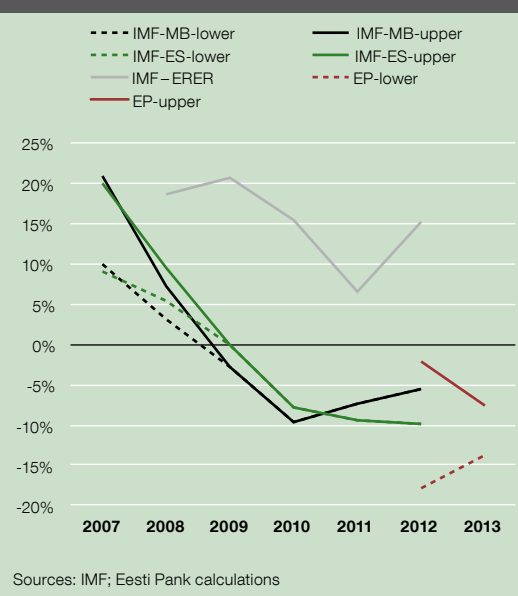
10 This section only uses the REER based on the CPI.

Table 1.2. Summary of current account stability

	Macroeconomic balance method		External sustainability approach	
Equilibrium current account adjusted for capital transfers (A=B–C)	-2.7	-2.7	-5.1	-5.1
Unadjusted current account (B)	-0.6	-0.6	-3.0	-3.0
EU capital transfers (C)	2.1	2.1	2.1	2.1
		WEO 2013 0.8		WEO 2013 0.8
Underlying current account (D=E–F–G–H)	1.1		1.1	
Actual current account (E)	-1.9		-1.9	
Cyclical component (F)	-3.8		-3.8	
Other temporary factors (G)	0.0		0.0	
REER effects (H)	0.8		0.8	
Current account gap (=A–D)	**-3.8**	**-3.4**	**-6.2**	**-5.9**
REER deviation from equilibrium, % /1	**-8.3**	**-7.7**	**-13.7**	**-13.1**

/1 Assuming that the elasticity of the current account to REER is 0.45. Negative values denote undervalutaion.

Source: Eesti Pank calculations

the number of trading partners used in the analysis[11], assessments of the GDP gap, the amount of information available, and similar factors. The figure also shows the results from the ERER method used by the IMF, which Eesti Pank has not attempted to replicate. The method is described in the IMF publication IMF (2006) and Lee et al (2008) among others.

The IMF methodology for the equilibrium current account position and the real exchange rate implies that the real exchange rate of the euro could be undervalued by around 10% for Estonia, which should continue to favour opportunities for growth for Estonian exports. The confidence bounds of this estimate are wide as the differences between the estimates found by different approaches remain large (see the IMF-ERER line in Figure 1.6 for example), and the sensitivity of the estimates to the data used is high.

11 Eesti Pank uses the nine largest trading partners as the comparison base, the size of the IMF's comparison base is unknown.

2. THE ESTONIAN ECONOMY IN THE GLOBALISING ECONOMIC ENVIRONMENT

2.1. Indicators for Estonian exports

The relative dynamics of production costs and prices in international comparison can certainly have an impact on the competitiveness of a nation, but the capacity to export and its success are often not dependent only on the ability of companies to compete against foreign firms by having the lowest production costs. The composition of exports by target countries and product groups, the existence of niche markets, the position of companies in the global production and value chains, structural factors, quality and changes in taste all affect the ability to export. As a result indicators for the capacity to export are also considered important for the competitiveness of a country.

The relative competitiveness of a country can be seen as that country's capacity to earn income on the international market quicker than other countries, and this can be done through export volumes or prices.

In the first three quarters of 2013 Estonia exported 3.14 times as much in goods and services at current prices as it did in 2000. This meant the earnings of Estonian goods exports were 3.3 times higher and earnings from services exports were 2.6 times higher (see Figure 2.1). Exports of goods and services have increased by an average of 10% a year at current prices over the past 13 years, with exports of goods accounting for 75% of the total impact on export growth and services exports for 25%. Export growth was slower in the first three quarters of 2013, with exports of services slowing more. According to the standards used for national accounts, Estonian exports of goods and services increased by 3.6% year on year at current prices, with goods exports increasing by 4.5% and services exports by 1.3%. The contribution of goods exports to total exports growth rose in consequence to 91%.

Earnings from Estonian exports of goods more than tripled from 2000, with increased volumes of exports accounting for 2/3 of the growth, and the remaining 1/3 coming from increased prices for exports.

Figure 2.1. Value of Estonian exports of goods and services at current prices using the standards for national accounts
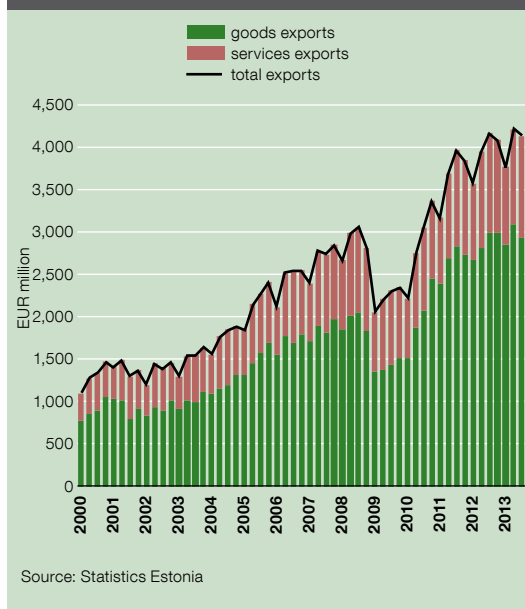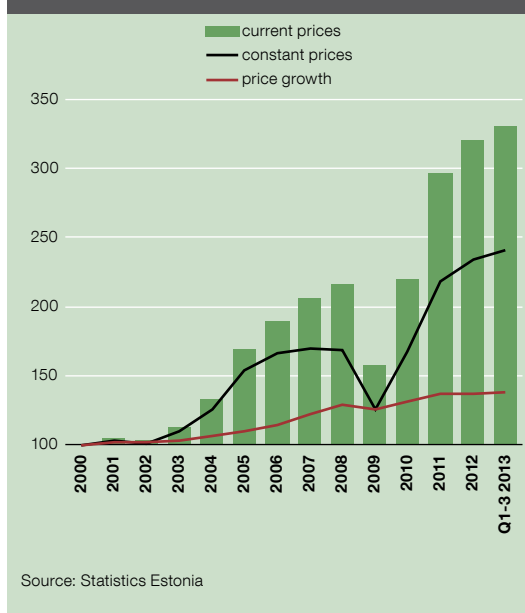

Source: Statistics Estonia

Figure 2.2. Cumulative growth in Estonian goods exports using the standards for national accounts, 2000=100
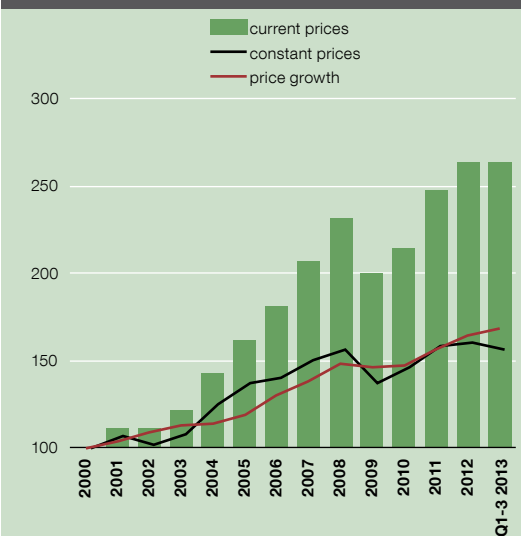

Source: Statistics Estonia

Increased volumes at constant prices contributed slightly more than average for export goods and higher prices contributed more modestly, but for services the contributions of volume and price rises were about equal (see Figures 2.2 and 2.3). The prices of exported services rose notably faster than those of exported goods, by 1.6 percentage points more a year over the 13 years. Annual growth in prices of exported goods almost stopped in the first three quarters of 2013, slowing to 0.1%, while growth in prices for exports of services accelerated to 3.2%. The faster rise in prices for services was driven partly by the rapid growth in unit labour costs and partly by rising prices for services in international markets as several favourable circumstances coincided. One notable factor was a change in the structure of services as the share of more expensive services such as computer and IT services increased.

Statistics Estonia publishes detailed indicators for Estonian goods exports in its statistical database on external trade. The external trade statistics consider Estonian goods exports to be the export of goods produced in Estonia; the export of goods imported from abroad, that is re-exports, but not transit; the temporary export of goods for processing abroad; the re-export of goods after processing in Estonia; and the provision of supplies to foreign boats and aeroplanes. Statistics on the national accounts consider exports of goods to be exports of goods from a resident to a non-resident, which generally also covers a change of ownership. The biggest difference between the two databases is that re-exported motor fuels are not counted as goods exports in the calculation of GDP. Unfortunately the magnitude of these differences cannot be determined precisely from the publicly available external trade statistics. There is a similar mismatch in the detailed data on services exports – Eesti Pank publishes them as part of the balance of payments statistics, but the total value of services exports is not the same as in the data for the GDP statistics.

Foreign trade statistics show Estonian goods exports increasing at a below average rate in 2013 (see Figure 2.4).

Figure 2.3. Cumulative growth in Estonian services exports using the standards for national accounts, 2000=100

current prices
constant prices
price growth

Source: Statistics Estonia

Figure 2.4. Estonian exports of goods shown in foreign trade statistics

food, wood, furniture and other — total exports
chemicals, metal products ---- goods without oil
machinery, equipment and transport vehicles
mineral products

EUR million

Source: Statistics Estonia

The value of goods exports has increased over the past nine years to stand at 2.5 times the value of 2004 at current prices. All the main groups of goods saw exports increase by a large amount, but the rates of growth varied considerably. Growth was faster than the average in exports of mineral goods, food products, chemical products, and machinery and equipment and these components accounted for an increasing share of exports over the years. Exports of clothing and footwear, wood products and furniture grew more slowly than the average, leading to a reduction in their share of the total. Although the value of goods exports as a whole declined by 2.1% during the past year, exports of goods other than mineral goods increased by 3.3%.

A detailed analysis of services exports draws on the data of the Estonian balance of payments issued by Eesti Pank. These data show the value of services exports growing to stand 1.9 times as high in the first three quarters of 2013 as in 2004 at current prices, an increase of 93.4%.

Figure 2.5. Estonian services exports

Legend:
- construction services
- other business services
- services total
- travel services
- transport of passengers and goods, other transport and other services
- communications, insurance, financial services, computer and IT services

EUR million

Source: Eesti Pank

Growth was above average in computer and information services, construction, communications, insurance, finance, and other business services (see Figure 2.5) and these services groups have also accounted for an increasing share of services exports over the years. Exports of transport and travel services grew more slowly than the average, and in consequence their share of total services exports has decreased over the years. The value of total services exports increased by 4.2% during the past year, with growth of more than 9% in exports of computer and information services, travel services, communications, insurance and financial services, while exports of other transport services declined by 7.0% and those of construction services by 3.4%.

2.2. Global market share of Estonian exports

The following analysis of the growth rates of exports of goods and services compares them to the dynamics of Estonia's external demand and looks at changes in the global market share of Estonian exports.

Exports of Estonian goods and services grew faster in 2004-2013 than demand for imports in our main target markets did, meaning that Estonian exports succeeded in gaining market share in foreign target markets during this period (see Figure 2.6). Data for the first three quarters of 2013 show the market share of Estonian goods and services increasing in target markets by a total of 35.2% at current prices over the past nine years, which is an average of 3.4% per year.
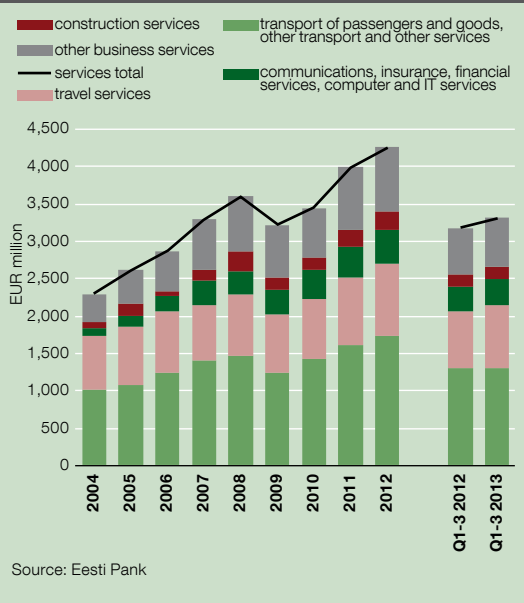
Total weighted import demand from Estonia's foreign partners declined by 1.7% over the first three quarters of the year at current prices while exports of goods and services grew by 3.6% in contrast during the same period. This means that although growth slowed in Estonian exports in 2013, market share increased in target markets a little faster than before, and was 5.5% bigger over the year according to the data from the three quarters.

If Estonia were to export only finished products to markets with perfect competition, the country could only be a price taker in big markets, and the prices of Estonian exports would only be able to rise at the same rate as the import prices of those goods in the target markets. However, the prices of Estonian exports of goods and services have risen much faster than import prices in target markets. In the first three quarters of 2013 Estonian export prices were 34.4% higher than in 2004, which is 15.5 percentage points more than the general rise in prices in Estonia's external partners (see Figure 2.7). Estonia managed to raise the price of exported goods and services by 1.4 percentage points more each year on average than the rate of price rises in target markets. In the first three quarters of 2013 Estonian export prices were 0.9% higher than a year earlier while the weighted prices in foreign demand fell by 1.0%.
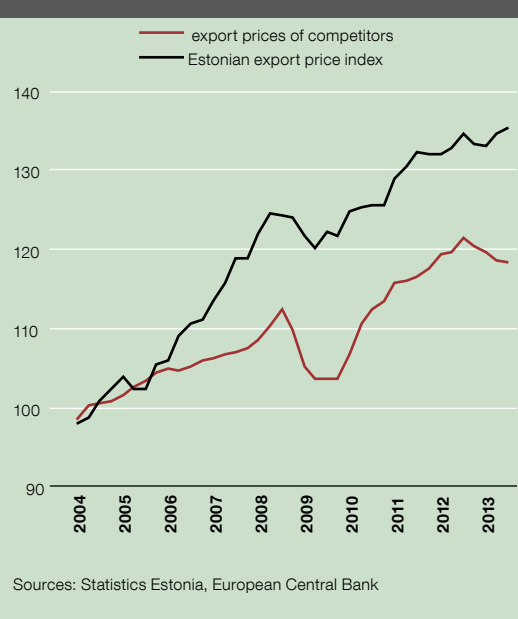
The rapid price growth can be linked to the continually above-average economic positioning of Estonian export items as prices rise for the products exported by Estonia faster than the average in export markets; a shift in the structure of Estonian exports towards goods with higher value added; positive changes in the position in the outsourcing value chain; or the existence of niche products and markets.

The change in market share for exports is a key feature of the country's exports relative to the performance of the world in general. Calculations by CompNet using data from Eurostat also show that Estonian exports have grown faster than the average for the global market with the result that the share of the global market held by Estonian exports doubled in

Figure 2.6. Estonian exports of goods and services, external demand, and growth in market share in target markets at current prices, 2004=100
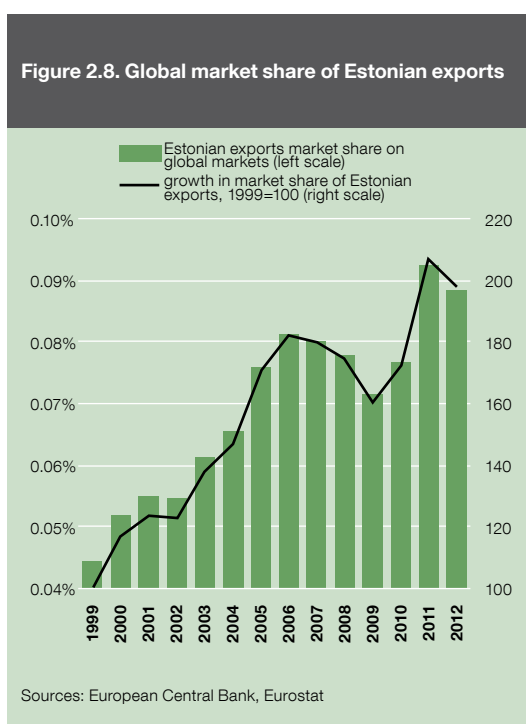
Sources: Statistics Estonia, European Central Bank;
Eesti Pank calculations
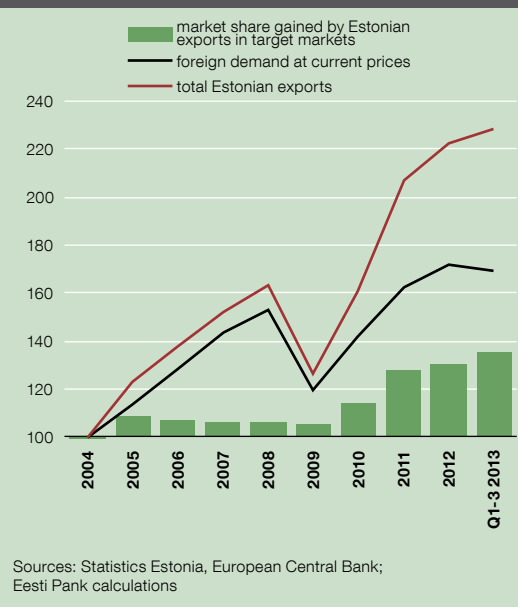
Figure 2.7. Export price index in euros for Estonia and for competitors, 2004=100

Sources: Statistics Estonia, European Central Bank

the 13 years from 1999 to 2012 (see Figure 2.8). This works out as an average annual increase in Estonia's market share of 5.4%. The most positive development coincided with Estonia joining the European Union in 2004 and the euro area in 2011, though the causal impact of those events on the market share of exports has not been studied in detail. The market share of Estonia's exports increased by 16.1% in the seven years from 2005, giving a lower annual average of 2.2%.

Growth in Estonian exports has outstripped the general global indicators and the market share of exports has increased because of improved competitiveness and perhaps also because of structural factors like export specialisation in rapidly growing products or the most dynamic target markets. It is also possible that demand growth in Estonia's target markets has been quite different from the global average. Changes in demand have also been quite unequal across product groups. The market share of exports is affected in this not only by general demand growth in global markets but also by the selection of target markets and exported products and how growth in demand for them differs from the average.

Figure 2.8. Global market share of Estonian exports

Legend: Estonian exports market share on global markets (left scale); growth in market share of Estonian exports, 1999=100 (right scale)
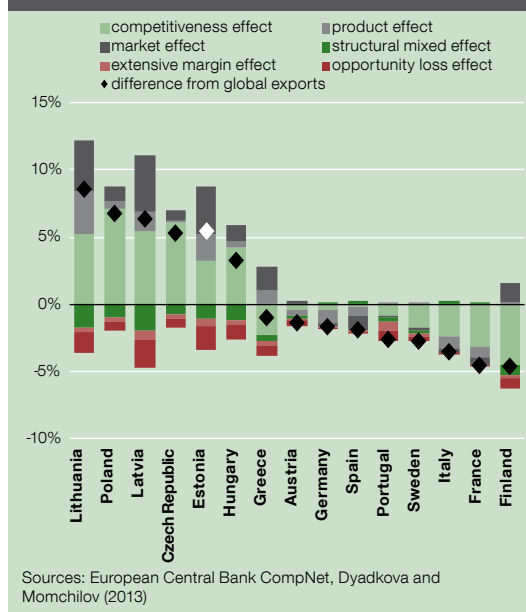
Sources: European Central Bank, Eurostat

One method of decomposing export growth is the constant market share, CMS, analysis (see Mauro and Forster (2008)). This has so far been used for detailed analysis only of data for goods exports as data on services exports are not available in sufficient detail for many countries. The CMS method allows the contributions of target market demand and the structure of exported goods to be differentiated within the growth in export market share. The residual can then be interpreted as the national competitiveness effect, although such a definition is not very informative or helpful for understanding. Several recent studies have attempted to explain the residual in different ways.

A joint project by Banque de France and the World Bank (Gaulier et al, (2013)) decomposed the export market shares of all the members of the European Union for 2005-2011, and estimated the effect of specialisation in their export products and the effect of faster relative growth of target markets. As a result they obtained the pure competitiveness effect that had been cleansed from the structural differences effect. These estimates help in understanding better the specific export patterns of each country and can be used to direct measures to improve competitiveness through redistribution of resources between sectors or by increasing export opportunities in rapidly growing markets. More than half of the member states of the European Union lost market share in global markets during this period. The main causes of this were geographical, with target markets that were growing more slowly than the average, and the pure competitiveness of exports. However the market share of Estonian exports increased during this period. About one quarter of this increase came from a better structure of products, while the relative impact of target markets was small and Estonian target markets grew at the same rate as the global market. The remaining three quarters came from other factors that were not identified precisely in this approach and are taken as pure competitiveness.

A method for decomposing export market shares further was proposed for CompNet by Dyadkova and Momchilov, who analysed the exports of European Union countries using the UN Comtrade database for 1999-2011. Their aim was to explain more clearly the residuals left by the normal decomposition of export market share, which will reduce the contribution of the pure competitiveness effect. They added two further factors to the standard setup for market share analysis. The first was the extensive margin effect, which identified the effect of the addition of new trade channels, either through new products or new markets. The second was opportunity loss, which looks at all the possible combinations of markets and products and identifies those that have remained unused. The competitiveness effect is then the intensive margin that is then left as a residual after structural factors like product, market or mixed effects have been removed, showing how a country can best manage in traditional markets with the same range of products as before.

Figure 2.9. Components of growth in export markets for selected European countries, averages for 1999–2011

competitiveness effect · product effect · market effect · structural mixed effect · extensive margin effect · opportunity loss effect · difference from global exports

Sources: European Central Bank CompNet, Dyadkova and Momchilov (2013)

They found that the market share of Estonian exports increased by an average of 5% a year in 1999-2011 (see Figure 2.9). Estonian exports grew slightly slower than average in terms of expansion into new markets or through new products, and so the net effect of this factor was negative for Estonia's market share. Demand for Estonian exports in target markets is growing faster than the average and the range of products exported made a positive contribution to market share. The total impact of the two structural effects was still somewhat smaller, with a negative structural mixed effect, as the combination of products did not always guarantee the fastest possible growth in each target market. Estonia has not taken advantage of all its opportunities with rapidly growing products and markets and combinations of them. Estonia was one of the ten members of the European Union that also managed to increase its market share through improved competitiveness, which added more than 3 percentage points a year for Estonia.

2.3. Global value chains

The multiplication in value of exports does not necessarily mean that the value added or the income earned by Estonian residents changed by the same amount, as a large amount of the content of exported products may be imported from other countries. If domestic creation of value added is replaced for many products even only partially by content purchased from abroad, it changes the distribution between countries of labour costs, profits and taxes. The total value of exported goods and services and the share of the domestic value added they contain can be different both in value and in dynamics and structure. The resulting differences are the subject of research into global value chains, GVCs. Such research aims to answer the question of why the earnings of countries in the international marketplace depend ever less on what and how much they export and more and more on how and where they produce and how much they contribute to end prices of exported goods.

Research into GVCs focuses on opportunities for accessing the higher value parts of the supply chain and the search for additional factors that affect competitiveness. As value added is created at the company level, rather than at sector or country level, the GVC studies often cover businesses operating in a number of countries as well, giving additional synergies with the micro-level studies.

Experts from the OECD and WTO have been working together with other international organisations in recent years on several studies that have led to interesting results for the structure of Estonian exports too. It is very important for Estonia to be part of the value chains. The increasing cross-border fragmentation of production processes and the different degrees to which countries participate in them have ever more of an impact on trade and investment, and this in turn affects economic growth, employment and general welfare. Being part of global value chains can mean that countries have a very large amount of imported value added in some sectors and industries[12]. Input-output tables from 2009 show that two thirds of the value added in Estonian exports of goods and services was created domestically, and around one third of the content was imported[13] (see Figure 2.10).

Figure 2.10. Share of domestic value added in Estonian goods and services by sector in 2009

Source: OECD TiVA database
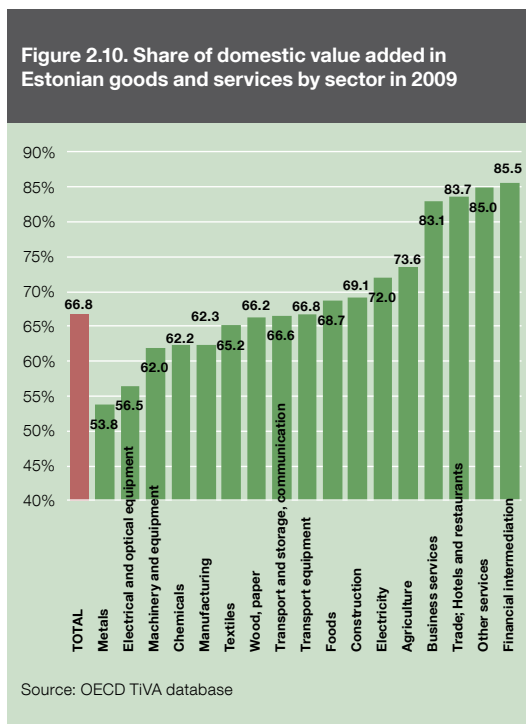
Domestic value added as a share of the value of exports was smallest for metal products at 54% and for electrical equipment at 56%. Other manufacturing sector products had a share of domestic content that was around two thirds, and it was even higher in exported services.

Because the distribution of domestic and imported value added is different for different products, there may be significant differences in which products are most important in the structure of Estonian exports if they are measured by value added. To find this we should weight the known components of Estonia's exports of goods and services (see Chapter 2.1) with the OECD 2009 data on the domestic value added shares in different product groups. The resulting estimate of the value added of Estonian goods and services differs from the total value of exports above all in nominal terms, though the differences in growth rates are not very large (see Figure 2.11).

The growth rate of value added in exports has been much less volatile than that of total exports, but the general and average growth rates have been similar. Data for the first three quarters of 2013 show that value added in exports was up 4.0% over the year, which was 0.5 percentage point more than the growth in the value of non-oil exports.

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12 See also Eesti Pank. Estonian Economy and Monetary Policy (2/2013). http://www.eestipank.ee/en/publication/estonian-economy-and-monetary-policy/2013/estonian-economy-and-monetary-policy-22013.

13 http://www.oecd.org/sti/ind/TiVA_ESTONIA_MAY_2013.pdf

2.4. Long-term competitiveness indicators

The globalisation of economies as national economies become more deeply connected and interdependent through trade, production, and money markets creates new challenges for strengthening competitiveness. Countries need more than ever to focus on the content of their exports and make full use of the advantages of international division of labour in both relative and absolute terms. Market shares are redistributed between countries all the time. Some competitors try to reach ever higher levels in the value chain, while other countries aim primarily to develop constantly and produce new, more diverse and higher value added products and services, staying ahead of the rest while making effective use of economies of scale.

If competitiveness is defined as the capacity of a country to ensure long-term improvement in the standard of living of its population, then it can be said that the competitiveness of the Estonian economy has strengthened significantly in recent years. This can be seen in Eurostat figures that show Estonia's GDP per capita at current prices was 6.5 times higher in 2012 than in 1995. For the European Union as a whole, including Finland and Sweden, and for the USA, the increase was in the range of 1.7-1.9 times (see Figure 2.12).

Output per capita in Estonia in 1995 was 14% of the European Union average at current prices, but by 2012 it had risen to 51%. Estonia's GDP per capita at current prices was 13,000 euros in 2012, while the European Union average was 25,600 euros. To account for differences in price levels and make the comparison meaningful, the GDP figures are also compiled in purchasing power parity, PPP, terms. If the Estonian price level was the same as the European Union average, GDP per capita in 2012 would have been 18,000 euros, or 70% of the European Union average (see Figure 2.13). The figures for Latvia and Lithuania are similar.
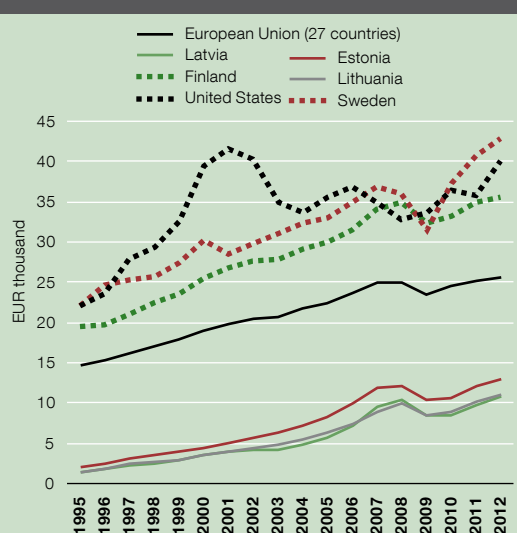
In discussing competitiveness, it is not only the continuation of growth in general welfare that matters, but

Figure 2.11. Value added in Estonian exports of goods and services
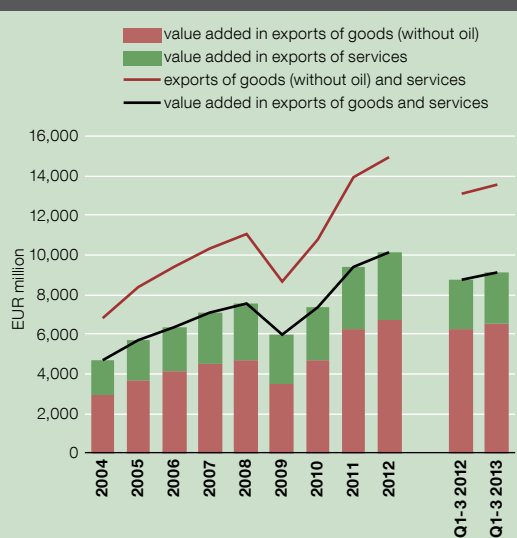
Sources: OECD, Statistics Estonia, Eesti Pank

Figure 2.12. GDP per capita of different countries at current prices

Source: Eurostat

also the sustainability and balance of that growth, as these are extremely important. In the past two years there has been a lot of discussion in Estonia about the rapid rise in unit labour costs. The December 2013 economic forecast by Eesti Pank described this rise as the main threat to the balance of the Estonian economy. From the point of view of competitiveness, the growth in unit labour costs should primarily be looked at against company profits and in comparison to other countries.

The financial statistics for Estonian enterprises show that the labour costs of companies grew by 9.0% in the first three quarters of 2013, which was faster than the growth of 5.9% in value added. This also means that unit labour costs continued to increase. All else being equal, this generally leads to either faster price growth as higher costs put upward pressure on prices, or a reduction in company profits if prices cannot be raised and faster growth in costs is absorbed by profits.

However, a reduction in profits could slow growth in production and incomes in the long term through either lower production levels or companies abandoning markets. The faster growth in 2013 in labour costs than in value added has not yet had such negative consequences for Estonian companies. The total profit of companies in the first three quarters of 2013 actually increased, though much more slowly than labour costs at 0.9% year on year (see Figure 2.14), and price rises have not accelerated.

However faster growth in labour costs that does not threaten the balance of the economy as a whole is only possible in the short run. Prices for other production inputs grew much more slowly in 2013 than in previous years. Commodities, energy and other costs not including purchased and resold goods and services increased by only 6.6% in the three quarters, which was slower than the average of 14.1% for the preceding three years and than the growth of 10.5% in sales revenues in 2013. This relatively slow growth in other costs in 2013 meant that companies were able to allocate a larger share than before of value added to personnel costs. In

Figure 2.13. GDP per capita of different countries at purchasing power parity, EU 27 =100

Source: Eurostat
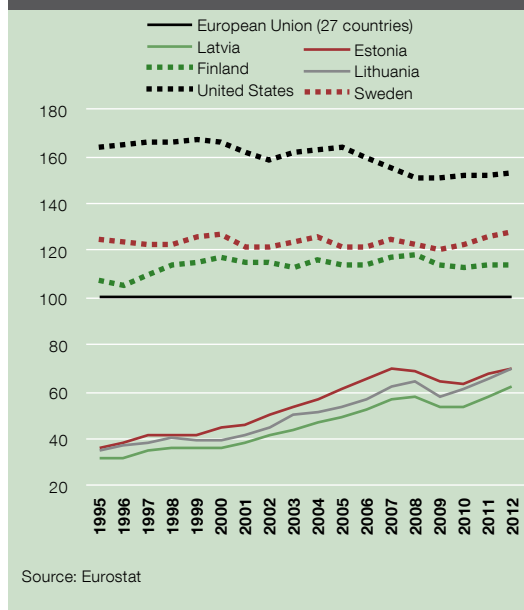
Figure 2.14. Labour costs and total profit of Estonian companies from enterprise statistics at current prices, 2004=100

Source: Statistics Estonia
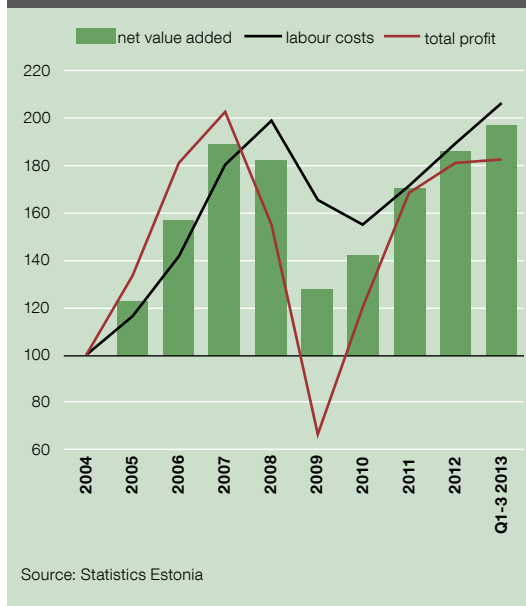
the longer term, if there is an acceleration in the growth of prices for energy and other costs, or if loan interest rates rise, the risks already described for companies could materialise. The risk that the wage growth expectations of employees could have risen as unit labour costs rise rapidly is also present, and managing these expectations in future could prove challenging.

3. THE COMPETITIVENESS INDICATORS FOR ESTONIAN COMPANIES IN INTERNATIONAL COMPARISON

3.1. The first company-level analysis by the CompNet research network of the European Central Bank[14]

The competitiveness research network of the European Central Bank assesses the competitiveness of European countries in international comparison and analyses how competitiveness indicators like labour productivity, total factor productivity and unit labour costs are related to exports and economic development. The network takes a unique approach to analysing competitiveness by looking at the company level. Company data are usually confidential, which makes international comparative research impossible, or at least restricts it to a couple of countries at a time. CompNet processes the confidential company-level data for each member state separately, and although the data are not shared, the principles for calculating the competitiveness indicators are coordinated and are the same for all countries. This approach allows comparative indicators to be calculated in such a way that confidential data don't need to be shared outside of their country of origin but the results from them can be compared.

This review is based on the first CompNet report analysing company-level data. The focus of the report is on methodology and it describes how the competitiveness indicators are arrived at and how the data are validated, but an overview of the first results is also given. This review focuses on these first results by looking at the differences between countries in company productivity, the distribution of productivity across firms, and the allocative efficiency of resources. The following summary covers these points.

3.2. Competitiveness indicators and distribution of productivity across firms

Analysis of the competitiveness of companies looks mainly at three indicators: labour productivity, total factor productivity[15] and unit labour costs. Unit labour costs are found as the ratio of value added at constant prices and the number of workers employed. Value added is found at company level as the gap between turnover and intermediate consumption, where turnover does not include value added tax, and intermediate consumption covers goods, raw materials, other materials and services. Value added is converted into constant prices using the GDP deflator for the industry. Unit labour costs are calculated as a ratio of nominal labour costs and value added at constant prices.
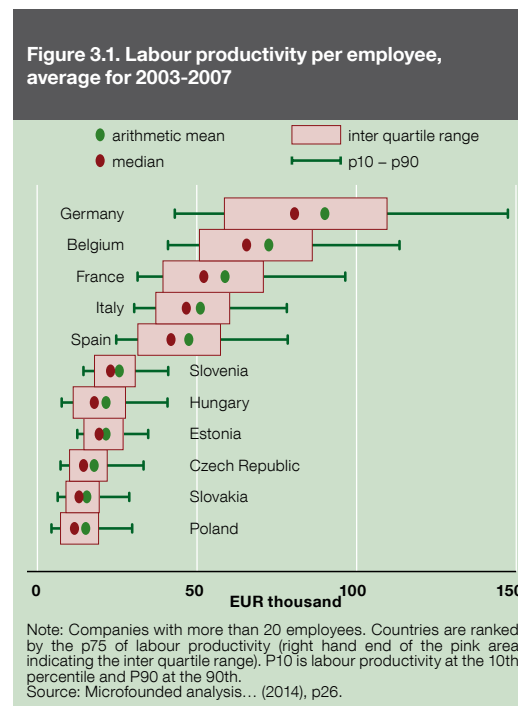
All the central banks that participated in the project used data from the balance sheets and profit and loss statements of companies in calculating these indicators. In Belgium, Estonia and Poland, data on the whole population of companies were used from the commercial register or from a database of businesses set up by the central bank. The whole population was also used in several other cases where a subgroup of the population was then left out: companies with 20 or more employees were used in the Czech Republic, exporting and importing countries in Hungary, and companies with at least ten employees in Italy. A random sample of companies was used for the calculations in Germany, France, Slovenia, Slovakia and Spain. As large companies and manufacturing companies were over-represented

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14 The summary is based on the ECB working paper "Micro-based evidence of EU competitiveness: The CompNet database", 2014 [https://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp1634.pdf]

15 This summary does not present results for total factor productivity, TFP, because the ECB report it is based on does not focus on this indicator and only used it to represent productivity in the regression analysis. More on the method for calculating TFP and on the results of the regression can be found in the report. Total Factor Productivity is estimated as the residual of an estimated production function. The production function is estimated for each country and industry separately, with the assumption that productivity limits on capital and labour are the same for all the companies in a given industry in a given country. The report estimates TFP using the method of Wooldridge (2009), which is based on Levinshon and Petrin (2003), and which estimates the endogeneity of production inputs and estimates the production function using the generalised method of moments.

in some countries, weights calculated from the shares of different industries were applied to make the samples more representative. All the industries in the whole business sector are covered, except the agricultural sector, financial intermediation, and activities that are usually related to the public sector like education, health, art and leisure and other service activities[16]. The industries and activities are defined for this research by their two-digit EMTAK codes.

A comparison of the labour productivity of the eleven countries that participated in the project is shown in Figure 3.1. The figure shows the calculation for companies with at least 20 employees. As the distribution of small firms varies from country to country, companies with more than 20 employees are more representative for comparison across countries. Although companies with 20 or more employees are only a very small share of Estonian companies, accounting for 6% of the total, they still provide 60% of total employment[17].

Figure 3.1. Labour productivity per employee, average for 2003-2007

Note: Companies with more than 20 employees. Countries are ranked by the p75 of labour productivity (right hand end of the pink area indicating the inter quartile range). P10 is labour productivity at the 10th percentile and P90 at the 90th.
Source: Microfounded analysis… (2014), p26.

The calculations at company level match the macro-level calculations, showing the most productive countries to be Germany, Belgium and France, with Italy and Spain in the middle, and productivity lowest in the countries of Central and Eastern Europe (CEE). The highest productivity among the CEE countries covered was seen in Slovenia, and the lowest was in Poland. Estonia's productivity puts it amongst the CEE countries, and the average productivity of Estonian companies puts the country in third place in that group behind Slovenia and Hungary.

Figure 3.1[18] also shows the distribution of productivity for the countries analysed. The productivity of companies is very heterogeneous, which is seen particularly clearly in rich countries and those with high productivity. The productivity of the German companies in the lowest ten percent for productivity is similar to that of companies in the top ten percent in CEE countries. The productivity of the top German companies is far removed from the other selected countries and exceeds that of the most productive companies in Belgium, the second-placed country, by one third. The median for productivity is lower than the mean in all the selected countries, reflecting the left-side skewness of the distribution, with a large group of companies with low productivity and few companies with very high productivity.
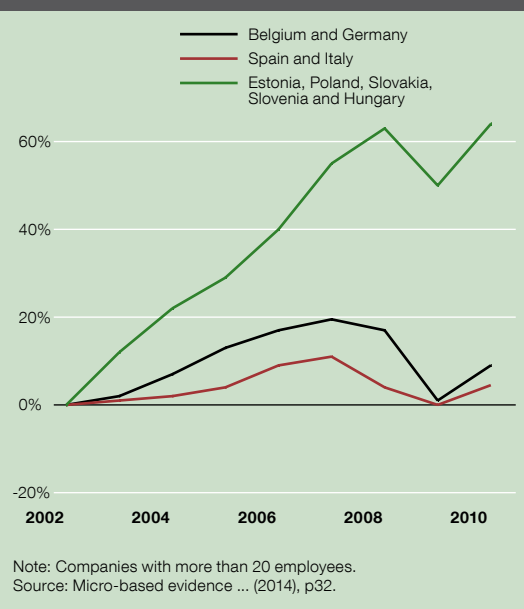
The differences between productivity levels of Estonian companies are relatively small. The difference between the tenth and ninetieth percentiles and between quartiles is smaller than in other countries. The gap between the mean and the median for productivity is also relatively small in the Estonian

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16 Before the indicators were calculated, the data were cleaned from outliers and the highest and lowest one percent of changes for each characteristic were removed for each year. The analysis also excluded all companies where value added for the year was negative.

17 Statistics of corporate economic indicators by industry by Statistics Estonia 2010.

18 Percentiles are calculated for each activity and each year for a given country and the national average is calculated using weights for activities and then an average across years. A similar weighting is used for finding country averages for all the figures in this chapter.

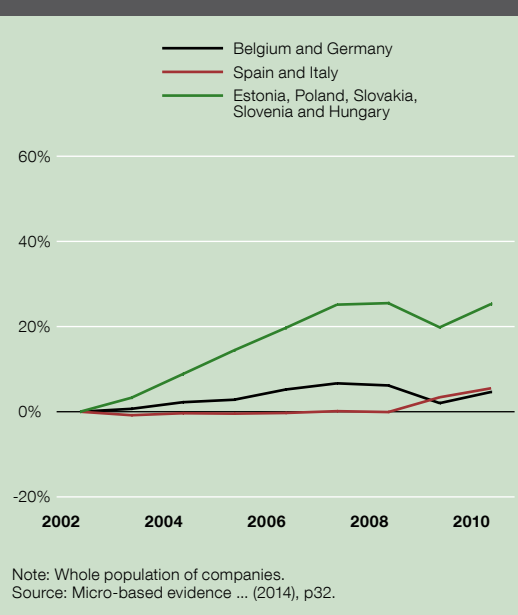**Figure 3.2. Growth in labour productivity from 2002 at the 10th percentile**

- Belgium and Germany
- Spain and Italy
- Estonia, Poland, Slovakia, Slovenia and Hungary

Note: Companies with more than 20 employees.
Source: Micro-based evidence ... (2014), p32.

Figure 3.3. Growth in labour productivity from 2002 at the 90th percentile

- Belgium and Germany
- Spain and Italy
- Estonia, Poland, Slovakia, Slovenia and Hungary

Note: Companies with more than 20 employees.
Source: Micro-based evidence ... (2014), p32.

sample. This means that Estonia has relatively few super companies that lead productivity, while the large group of companies with low productivity is still relatively productive compared to those of other CEE countries. The productivity of the tenth percentile is similar to that in the richest CEE country, Slovenia, while Estonia lags behind Slovenia in the super companies group[19].

Developments in productivity across groups of countries and separately for companies with high and low productivity are shown in Figures 3.2-3.4. Countries are divided into three groups for the figures: the European core of Germany and Belgium, the periphery of Spain and Italy, and the CEE countries of Estonia, Hungary, Poland, Slovenia and Slovakia. Figures present cross-country averages of these country groups, meaning each country has the same weight to the group size regardless of its size. The productivity dynamics of more and less productive companies are compared using aggregated productivity dynamics from the

Figure 3.4. Labour productivity at the macro level

- Belgium and Germany
- Spain and Italy
- Estonia, Poland, Slovakia, Slovenia and Hungary

Note: Whole population of companies.
Source: Micro-based evidence ... (2014), p32.

19 The report of the ECB research network examines the connections between the productivity dispersion and average TFP using a simple regression (see Box 3 Microfounded analysis... (2014)). The characteristics of the dispersion of productivity at industry level for all 11 countries showed that industries with high dispersion in terms of productivity (standard deviation or the coefficient of variation) have higher productivity than the country average

Figure 3.5. Growth in unit labour costs from 2002 at the 10th percentile for ULC
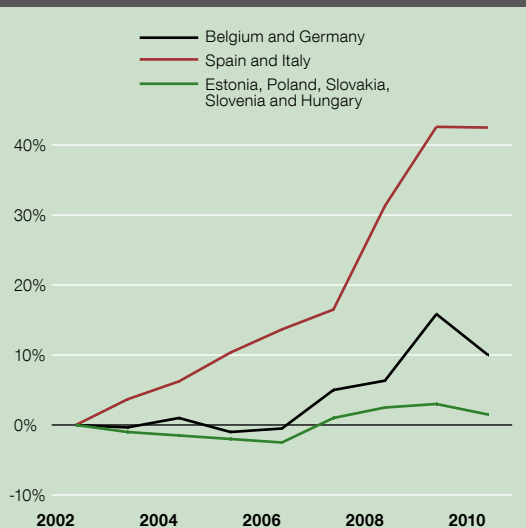
Note: Companies with more than 20 employees.
Source: Micro-based evidence ... (2014), p33.

Figure 3.6. Growth in unit labour costs from 2002 at the 90th percentile for ULC
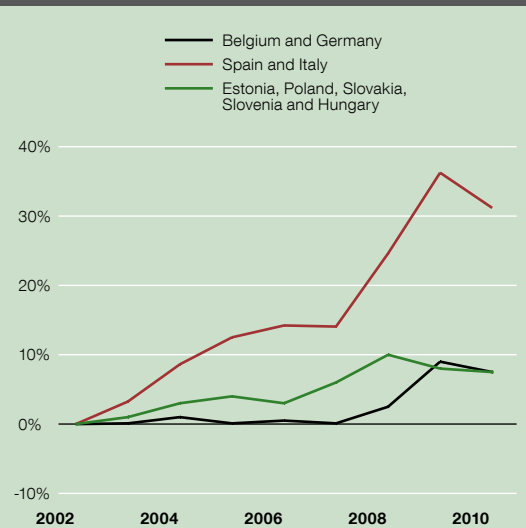

Note: Companies with more than 20 employees.
Source: Micro-based evidence ... (2014), p33.

AMECO (ESA 95) database. Whereas the aggregated productivity figures are based on all the companies in a country, the figures in the ECB report use companies with more than 20 employees. It is clear from the figures that productivity rose faster in the CEE countries and that those countries converged with core Europe and the periphery during this period. Productivity rose in this case fastest among the CEE companies with the lowest productivity levels. The productivity of companies in the core Europe countries rose faster than that of companies in the periphery.

The dynamics of unit labour costs for the same groups of countries is shown in Figures 3.5-3.7. The periphery countries stand out clearly for very fast growth in unit labour costs, especially among companies with the lowest productivity. It could be seen from Figures 3.2-3.4 that the productivity of labour in the group of companies with low productivity in the periphery countries was relatively modest. Strong growth at the same time in unit labour costs could thus be considered problematic, as labour costs for each unit of value added rose significantly faster than could have been afforded by labour productivity.

Figure 3.7. Unit labour costs at the macro level
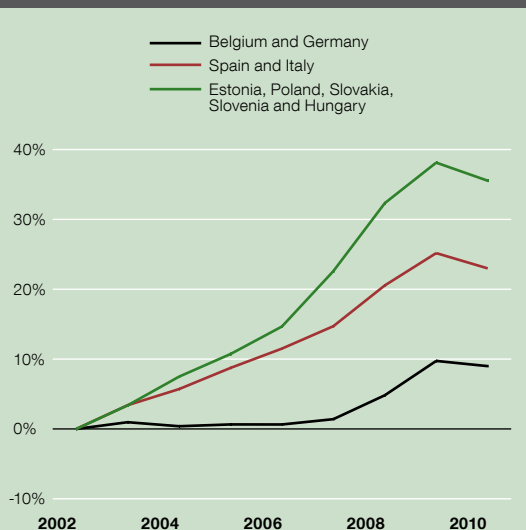
Note: Whole population of companies
Source: Micro-based evidence ... (2014), p33.

Company data for the CEE countries show unit labour costs grew relatively modestly in comparison to macro-level estimates. This may be due to the difference in the size of companies in the calculations at the company level and the macro level, and the indicators at the two levels should only be compared with care. Macro data show that unit labour costs rose by around one third more than productivity in CEE countries, but calculations based on micro-level company data show that the balance between productivity growth and unit labour cost growth was much better, and that unit labour costs grew markedly slower than productivity. Productivity grew faster in the group of CEE companies with low productivity than amongst those with high productivity, while growth in unit labour costs was more modest.

3.3. The allocative efficiency of resources

The European Central Bank report defines allocative efficiency as "a situation where available resources are put to their best use" (Micro-based evidence… (2014), p 18). This analysis uses the assumption that resources in a well-functioning market should move to companies with higher productivity, meaning there should be a positive correlation at company level between productivity and company size in a given industry. Allocative efficiency is measured using the method of Olley and Pakes (1996) and distinction is made between static and dynamic efficiency. Static efficiency considers a cross-section of companies at a given moment and compares whether the market share of companies with above-average productivity is larger than the average for the industry. Dynamic efficiency considers the efficiency of the allocation of resources between companies with low productivity and companies with high productivity. If the companies with the fastest productivity growth have grown faster than their whole industry, we can say that the allocative efficiency of resources has improved dynamically.

Static allocative efficiency is found by (see Olley and Pakes (1996) and Micro-based evidence… (2014), appendix 7):

$$y_{st} = \sum_{i \in s} \theta_{it}\, \omega_{it} = \overline{\omega_{st}} + \sum_{i \in s} (\theta_{it} - \overline{\theta_{st}})(\omega_{it} - \overline{\omega_{st}}) \qquad (1)$$

where y_{st} is the weighted average productivity of industry s at time t, θ_{it} is the size of company i at time t and ω_{it} is the productivity of company i at time t. $\overline{\theta_{st}}$ represents the unweighted mean company size in industry s at time t, and $\overline{\omega_{st}}$ is the unweighted mean productivity of a company in industry s at time t. The term on the right hand side shows static allocative efficiency and indicates the covariance between company size and productivity. If company size were distributed randomly within an industry, this covariance figure would be close to zero. The larger the covariance, the better the allocation of resources within the industry and the larger the contribution of that allocation to the productivity of the industry.

Figure 3.8. Allocative efficiency, static comparison, average for 2003-2007

Note: Companies with more than 20 employees.
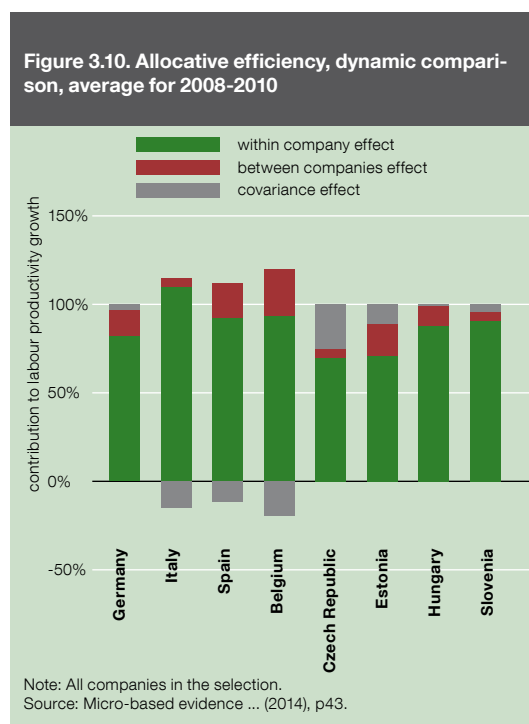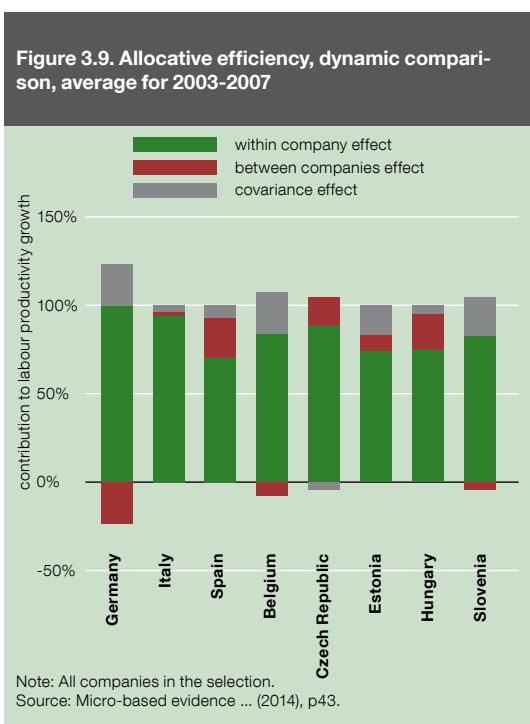Source: Micro-based evidence … (2014), p37.
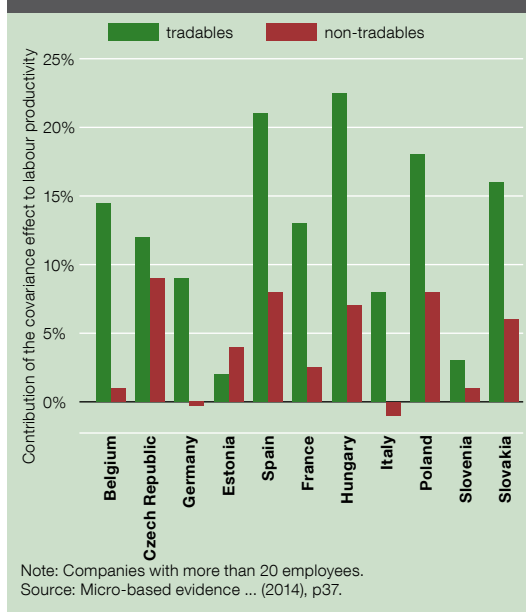
The mean static allocative efficiency for 2003-2007 for the countries analysed is shown in Figure 3.8. The contribution of allocative efficiency to productivity has been smaller in Estonia than in other countries, though Estonia is the only country among those analysed where the allocative efficiency of the non-tradable sector (services) is higher than that of the tradable sector (manufacturing). The contribution of the covariance effect to the productivity of Estonian companies is around the average for the selected countries in the non tradable sector.

Dynamic allocative efficiency enhances the static picture. This analysis does not consider the effect of the closure of companies or the arrival of new ones on the development of productivity. Two-year productivity growth rates are calculated and the contribution of three components to productivity are considered: internal productivity growth within a company (first term in equation (2)), the re-allocation of resources between companies (second term in equation (2)) and the covariance effect (simultaneous increase in productivity and market share; third term in equation (2)). The total effect can be calculated using the following equation (Micro-based evidence… (2014), p 41):

$$\Delta y_{st} = \sum_{i \in C} \theta_{it-k} \Delta\omega_{it} + \sum_{i \in C} (\omega_{i,t-k} - \widehat{\omega_{st-k}}) \Delta\theta_{it} + \sum_{i \in C} \Delta\theta_{it} \, \Delta\omega_{it} \qquad (2)$$

where Δy_{st} shows the change in productivity of the industry over two years, meaning that currently $k=2$. θ_{it} represents the size of company i in the period t in the industry, ω_{it} is the productivity of company i in the period t in the industry and $\widehat{\omega_{st-k}}$ is the weighted mean productivity of a company in the industry. C denotes continuing companies, i.e. companies that were at least two years old in period t.

Dynamic allocative efficiency before and after the crisis is shown in Figures 3.9 and 3.10. The productivity of companies has grown in all countries particularly because of growth in productivity within companies,

Figure 3.9. Allocative efficiency, dynamic comparison, average for 2003-2007

within company effect
between companies effect
covariance effect

contribution to labour productivity growth

Note: All companies in the selection.
Source: Micro-based evidence ... (2014), p43.

Figure 3.10. Allocative efficiency, dynamic comparison, average for 2008-2010

within company effect
between companies effect
covariance effect

contribution to labour productivity growth

Note: All companies in the selection.
Source: Micro-based evidence ... (2014), p43.

which accounts for the majority of productivity growth. The contribution of the other two components varies between countries and through time. The importance of the allocative efficiency component has fallen since the crisis for almost all countries except the Czech Republic. Estonia stands apart because the effect of the re-allocation of resources between companies has increased since the crisis, meaning that companies with higher productivity have gained market share in Estonia since the crisis and the contribution of this effect to total factor productivity has increased.

In summary, we can see that the productivity of labour in Estonian companies is among the highest in central and eastern European countries. Differences in productivity between companies are also smaller than those in other countries. That these differences are small is in one sense good, as the bulk of companies are in the lower ranges of productivity, and these companies are relatively competitive in Estonia. In another sense it is not so good as the highest productivity levels in the top Estonian companies are relatively close to the average. The ECB report illustrates that it is countries where productivity is highly heterogeneous that have the highest aggregate productivity. The challenge for Estonian economic policy is how to promote top companies as leaders of productivity.

Estonia stands out from other countries in its allocative efficiency by having a relatively efficient service sector. The movement of resources within industries from less productive companies to more productive ones is an important source for increasing labour productivity, especially in manufacturing. Although there should be a connection between company size and productivity, it does not have to be a one-to-one connection, as the high productivity of some smaller companies could be due to their small size and flexibility, and in addition, company size is not necessarily a good proxy for market share in a small and open economy. More productive companies have grown faster than the less productive since the crisis and the contribution of this component to Estonian productivity growth has increased. This shows that the allocative efficiency of resources between companies has improved over time.

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APPENDIX 1. DETAILS OF THE CALCULATIONS OF THE REAL EXCHANGE RATE MISALIGNMENT

The current account gap is the difference between the assessments of the equilibrium current account and the underlying current account. Both the equilibrium and the underlying current accounts can be derived in two ways. The equilibrium current account can be determined using the macroeconomic balance (MB) approach or by the external sustainability (ES) method. The underlying current account is either taken to be the current account projection with a five-year horizon from the latest WEO, or determined using the elasticities approach. This means that there are four different combinations available for calculating the current account gap: MB+WEO, MB+elasticities, ES+WEO and ES+elasticities.

Calculation of the equilibrium current account (ECA)

The macroeconomic balance method defines the equilibrium current account as a current account that accords with the key indicators of the country over the medium term. In practice the equilibrium

Table A1. Medium-term estimation of the equilibrium current account, macroeconomic balance method

| Variables | Value | Parameters | | | | Contribution to the equilibrium current account | | | |
| | | Pooled estimation | | | | Pooled estimation | | | |
		IMF 2006	Rahman 2008	Hybrid pooled estimation (IMF 2008)	FE estimation	IMF 2006	Rahman 2008	Hybrid pooled estimation (IMF 2008)	FE estimation (IMF 2008)
Fiscal balance, % of GDP /1	1.1	0.20	0.22	0.19	0.32	0.2	0.2	0.2	0.3
Old-age dependency /2	-2.8	-0.14	-0.04	-0.12	-0.23	0.4	0.1	0.3	0.6
Population growth /3	-0.1	-1.21	-0.63	-1.03	-0.47	0.1	0.0	0.1	0.0
Initial NFA, % of GDP /4	-50.9	0.02	0.03			-1.0	-1.4		
Lagged CA balance, % of GDP /5	-0.2			0.37				-0.1	
Oil balance, % of GDP /6	0.6	0.23	0.44	0.17	0.31	0.1	0.3	0.1	0.2
Output growth /7	1.1	-0.21	-0.18	-0.16	-0.27	-0.2	-0.2	-0.2	-0.3
Relative income /8	44.7	0.02	-0.01	0.02		0.9	-0.3	0.9	
Investment climate /9	406.0		-0.01				-4.1		
Fixed effect	100				-0.08				-8.0
Constant	100	0.00	0.02	0.00		0.00	2.00	-0.30	
Equilibrium Current Account, or current account norm	(A)					**0.5**	**-3.3**	**1.1**	**-7.1**
Expected capital transfers, % of GDP	(B)					2.1	2.1	2.1	2.1
Adjusted equilibrium current account	(C=A–B)					**-1.6**	**-5.4**	**-1.0**	**-9.2**

/1 WEO, October 2013, forecast for 2018. Figure for Estonia is 0.06% and the weighted average of its trading partners is –1.0%.

/2 UN forecast to 2018. Estonian indicator is 39.8%, that of trading partners is 42.6%.

/3 WEO, October 2013, forecast for 2018. Figure for Estonia is 0%, that for trading partners is 0.08%.

/4 2013 Q3 NFA (Eesti Pank), ratio to GDP, GDP forecast for 2013 (Eesti Pank, December forecast 2013).

/5 Average for 2011–2014 (1.8; –1.8; –0.7; –0.2 WEO, October 2013).

Eesti Pank December forecast for 2013-2014 (-1.0 and -1.9) implies an average for four years of -0.9 and a related contribution of -0.3.

/6 WEO, April 2013, forecast for 2018 (indicators TMGO, TCGO). From WEO October 2013 these variables have been removed from the database.

/7 WEO October 2013 forecast of real per-capita GDP growth for 2018; value for Estonia 3.7%; average for trading partners 2.6%.

/8 WEO, October 2013, forecast for 2018.

/9 The average of six EBRD transition indexes*100.

current account is calculated from the empirical relationships between the current account and key economic indicators. The main macro indicators[20] and their values used in the present analysis, the corresponding regression coefficients[21], and the contributions to the equilibrium current account found from them are all shown in Table A1.

Some macro indicators have changed a lot from a year earlier, while others have remained more or less the same. The estimated outlooks for long-term population growth and the investment climate have stayed the same, as has the difference between the GDP growth rate and the weighted average of those of the major trading partners. Although initial net foreign assets have declined from -54.1% of GDP last time to around -51% now, the contribution to the equilibrium current account has not changed because the regression coefficient is small. The difference between fiscal balance projections for Estonia and those for trading partners has decreased from 1.8% of GDP before to 1.1% now, due to both a weakening of the outlook for Estonia and an improvement in the fiscal balance of partners. Relative income has fallen from 46.1% of the figure for the USA last year to only 44.7% this[22]. The current account as a ratio of GDP has the opposite sign to that which it had in the previous report as a surplus that had reached beyond one percentage point turned into a deficit of 0.2 percentage point, with the result that its contribution to the equilibrium current account this time is -0.1 percentage point of GDP rather than 0.5. The projection for the oil balance has declined slightly, but the latest figures are taken from the WEO data of April 2013 because from October 2013 the WEO forecast for exports and imports of oil are no longer shown in the database. The old-age dependency ratio, which shows the population aged 65 and over as a proportion of the prime working age population aged 30-64[23], has improved slightly against the weighted average of ratios for Estonia's trading partners. The old-age dependency ratio is increasing everywhere, but slightly more slowly in Estonia than in our main partners, and the positive contribution of this variable to the equilibrium current account is almost twice what it was a year ago.

The estimate of the equilibrium current account has not changed much overall from last year, mostly only by plus or minus 0.1 percentage point. The biggest difference is found with the hybrid pooled method, where the lagged value for the current account reduces the result by 0.5 percentage point. This means that the estimates of the equilibrium current account range from +1.1% to -7.1%. The lower bound is clearly dependent on the fixed-effect estimate from 2008, which was strongly affected by the large current account deficit in the years before the crisis and is no longer appropriate. If this ECA estimate is left out, the average of the other three numbers is -0.6%. If we continue as we did in the previous report and leave out the upper estimate as well, then the average of the remaining two methods is -1.4% of GDP. If we adjust this to take account of European Union capital transfers of 2.1% of GDP, we get an equilibrium current account estimate of **-2.7%** or **-3.5%** of GDP.

The external sustainability approach doesn't use econometric models, but gives an indirect assessment of the current account that is necessary to maintain the country's net foreign assets (NFA) position. The current account that would stabilise the NFA as a share of GDP (cab^s), can be calculated from equation (3), where g is real GDP growth, π is the rise in prices (GDP deflator), nfa is the country's NFA position as a share of GDP and kt is the capital transfers received from abroad

20 More precise definitions and explanations can be found in the Competitiveness Report 2013.

21 Calculated by the IMF at different times and using different data, see the articles cited in the table header.

22 The IMF has revised the whole time series downwards by two percentage points from the WEO October 2012 data used in the last year's Competitiveness Report, not just the projection for 2017–2018.

23 Eesti Pank calculations based on the medium scenario suggested by the UN.

$$cab^s = \frac{(g+\pi)}{(1+g)(1+\pi)}nfa - kt \qquad (3)$$

The most recent WEO database from October 2013 expects GDP growth of 3.74% for 2018 and price rises of 2.54%. The calculations assume that capital transfers will continue to be around 2.1% of GDP. To maintain the Estonian NFA position at -50.9% of GDP, which was the actual level in the third quarter of 2013, the country could run a current account deficit of **-5.1%** of GDP.

Determining the underlying current account balance

The elasticities method finds the underlying current account balance from the actual current account by removing the temporary effects stemming from the economic cycle and adding the effects of real exchange rate changes in the recent past. It is assumed that export and import volumes depend on the real exchange rate, the domestic output gap, and the weighted output gap with our main trading partners. The IMF has estimated the elasticity of exports to the real exchange rate to be 0.71, and that of imports to be 0.92.

The most recent five-year horizon WEO forecast for the Estonian current account balance can be seen as yet another alternative estimate of the underlying current account. The estimates of the underlying current account obtained using these two methods are shown in Table A2.

Table A2. Derivation of the underlying current account balance				
	Elasticity	**Data**	**Adjusted, IMF**	**WEO 2013 /5**
2013 Current account balance (A) /1		-1.9	-1.9	
Temporary factors (B)			3.0	
One-off factors			0.0	
Estonain business cycle /2	1.5	1.2	1.5	
Export partners' business cycle /2	1.5	-1.9	2.3	
Changes in REER /3			-0.8	
2013	0.6	1.9	-1.0	
2012	0.25	-0.4	0.2	
2011	0.15	0.3	-0.1	
Estimate of the underlying current account balance (A+B)			**1.1**	**0.8**
Memorandum items:				
Exports elasticity to the REER	0.71			
Imports elasticity to the REER	0.92			
Exports to GDP /4		82.4		
Imports to GDP /4		81.3		

/1 Eesti Pank December forecast for 2013.

/2 European Commission 2013 autumn forecast for the output gap in 2013.

/3 Eesti Pank data.

/4 2007–2012 average from current account.

/5 WEO, October 2013, forecast for 2018.

Unlike last year, when the adjusted estimate and the WEO estimate had opposite signs at 2.7% and -2.6% of GDP, the current estimates have the same sign and similar values at **1.1%** and **0.8%** of GDP. A significant contribution to this comes from the REER appreciation in 2013 and from the change of more than 3 percentage points in the current account medium term forecast.