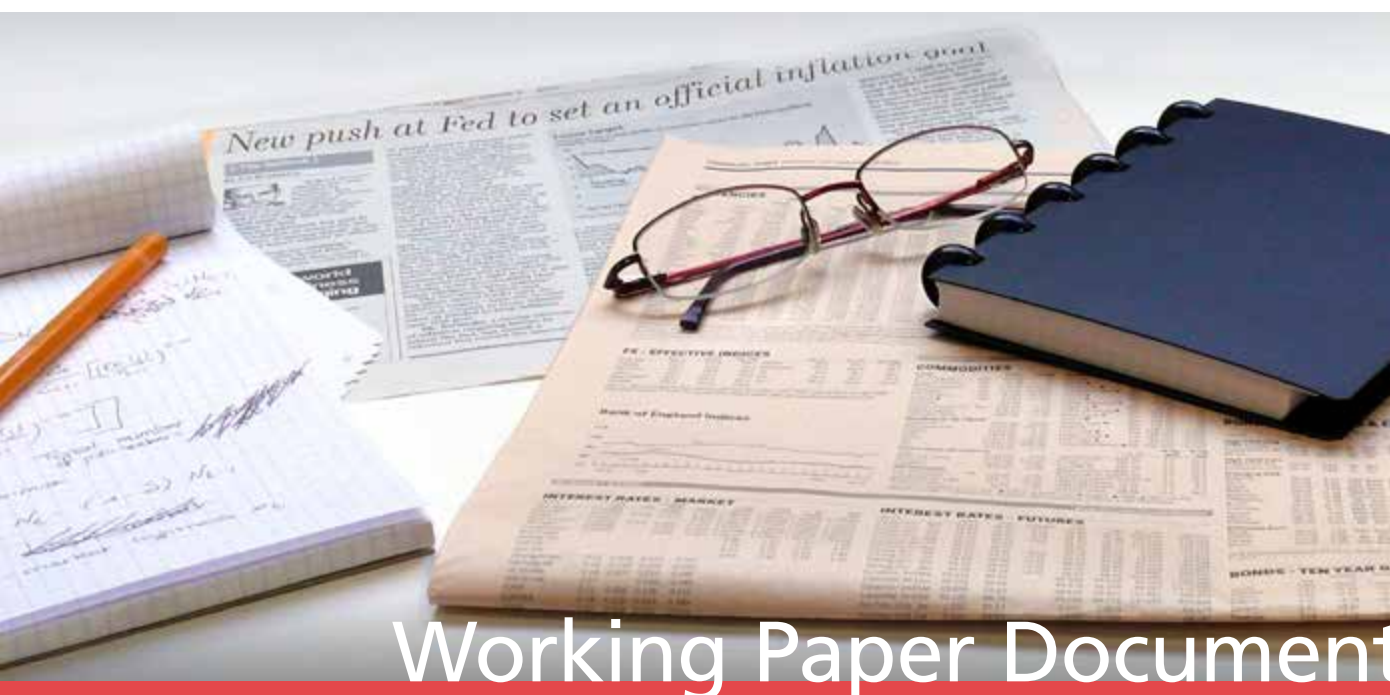# The economic importance of the Belgian ports: Flemish maritime ports, Liège port complex and the port of Brussels – Report 2017

Working Paper Document

by Elena Gueli, Pascal Ringoot and Marc Van Kerckhoven

March 2019   No 368

National Bank
OF BELGIUM

Eurosystem

Statement of purpose:

The purpose of these working papers is to promote the circulation of research results (Research Series) and analytical studies (Documents Series) made within the National Bank of Belgium or presented by external economists in seminars, conferences and conventions organised by the Bank. The aim is therefore to provide a platform for discussion. The opinions expressed are strictly those of the authors and do not necessarily reflect the views of the National Bank of Belgium.

Orders

For orders and information on subscriptions and reductions: National Bank of Belgium,
Documentation - Publications service, boulevard de Berlaimont 14, 1000 Brussels

Tel +32 2 221 20 33 - Fax +32 2 21 30 42

The Working Papers are available on the website of the Bank: http://www.nbb.be

Abstract

This Working Paper analyses the economic importance of the Belgian ports largely based on annual accounts data for the year 2017. As the years prior to 2017 have been described in earlier papers in the same series, the emphasis lies on the figures for 2017 and the developments between 2016 and 2017[1].

After the stagnation in 2016, direct value added at the Belgian ports rose by 7.3% from € 18 052 million to € 19 368 million (current prices) or roughly 4.4% of Belgium's GDP. All ports, with the exception of the Liège port complex, contributed to value added growth at the Belgian ports. The ports of Antwerp and Ghent were the most important players. The biggest contributing sectors to value added growth were the chemical industry, and to a lesser extent cargo handling and the metalworking industry. In 2017, indirect value added was around 82% of direct value added.

Direct value added increased significantly at the ports of Ghent, Brussels and Antwerp, by 13.4%, 16.0% and 6.1% respectively. The increase by more than 3% of direct value added at the ports of Zeebrugge and Ostend was also substantial. Direct value added fell by 2.4% at the Liège port complex.

After the decline between 2012 and 2015, direct employment at the Belgian ports was up for the second year in a row. Between 2016 and 2017, the number of direct full-time equivalent jobs rose by 0.8%, from 115 401 to 116 311 or approximately 2.8% of Belgium's total domestic employment. All ports, with the exception of Ostend and Brussels, contributed to employment growth at the Belgian ports. The ports of Antwerp and Ghent were the most important players. The biggest contributing sectors to employment growth were cargo handling, and to a lesser extent the chemical industry. In 2017, indirect employment was around 120% of direct employment.

Direct employment increased by around 1% at the ports of Antwerp, Ghent and Zeebrugge. Growth at the Liège port complex was more modest at 0.4%. The number of direct full-time equivalent jobs fell at the ports of Ostend and Brussels, by 1.2% and 4.2% respectively.

The pattern of investment is closely linked to projects and is therefore highly volatile. After the decline between 2012 and 2014, direct investment at the Belgian ports was up for the third year in a row. Between 2016 and 2017, investment was up by 2.4%, from € 4 711 million to € 4 825 million. The port of Ghent, and to a lesser extent the Liège port complex contributed to investment growth at the Belgian ports. The biggest contributing sectors to investment growth were the 'port construction and dredging' sector and to a lesser extent cargo handling, and the energy and chemical industries.

Based on the figures of the traffic, the Flemish ports can be considered as real bridgeheads for trade with the UK. Developments regarding the modalities and consequences of the Brexit therefor should be followed with the greatest attention. Given the existing import and export volumes in terms of tonnage, it seems it will mostly be a challenge in Zeebrugge and to some extent for Antwerp.

As a supplier to both China and the United States, Belgium is indirectly involved in trade between the two countries. If protectionism would close the United States off to exports from abroad, Belgian economy might get impacted one of the most in Europe.

Key words: Belgian ports, microeconomic data, direct effects, indirect effects, input-output table.

JEL classification: C13, C43, C67, C81, J21, J49, L91, L92, R11, R15, and R41.

---

[1] Users can download all series from the website http://stat.nbb.be/Index.aspx?DataSetCode=AMPORTS and incorporate them in their own analyses.

Authors:

Elena Gueli, National Bank of Belgium, Boulevard de Berlaimont 14, 1000 Brussels, Belgium, e-mail: elena.gueli@nbb.be.

Corresponding author: Pascal Ringoot, National Bank of Belgium, Boulevard de Berlaimont 14, 1000 Brussels, Belgium, e-mail: pascal.ringoot@nbb.be.

Corresponding author: Marc Van Kerckhoven, National Bank of Belgium, Boulevard de Berlaimont 14, 1000 Brussels, Belgium, e-mail: marc.vankerckhoven@nbb.be.

TABLE OF CONTENTS

1 Economic importance of the Belgian ports

1.1 Value added at the Belgian ports

Table 1.1 gives an overview of direct and indirect value added at Belgium's ports between 2012 and 2017. Table 1.2 breaks down value added into its principal sectoral components.

The last column in the table shows the contribution of each component to total growth in value added over the 2016-2017 period. The maritime and non-maritime contributions together add up to the total growth, and the same holds for the various individual components. Note that these percentages differ from each sector's own growth[1].

Table 1.1: Overview of value added (million €)

ports	2012	2013	2014	2015	2016	2017	Contr.gr (%)[*]
Antwerp	10 055.9	9 800.7	10 009.2	10 998.2	10 790.9	11 452.7	3.7
Ghent	3 194.0	3 398.3	3 617.6	3 792.2	3 856.3	4 374.2	2.9
Zeebrugge	951.0	988.5	954.9	979.4	1 006.3	1 038.2	0.2
Ostend	487.4	488.3	499.5	510.8	511.4	528.5	0.1
Flemish ports	14 688.3	14 675.9	15 081.2	16 280.6	16 165.0	17 393.6	6.8
Liege	1 219.2	1 235.1	1 165.5	1 059.1	1 168.0	1 140.4	-0.2
Brussels	548.3	490.4	487.9	771.9	718.7	833.6	0.6
Inland ports	1 767.5	1 725.5	1 653.4	1 831.0	1 886.7	1 973.9	0.5
Direct	16 455.8	16 401.4	16 734.6	18 111.5	18 051.7	19 367.6	7.3
Indirect	13 491.7	13 314.0	13 228.3	14 862.3	14 312.9	15 934.9	
Total	29 947.5	29 715.4	29 962.9	32 973.8	32 364.6	35 302.4	

(*) *For details, see Annex A.1*
Source: NBB

Table 1.2: Sectoral overview of value added (million €)

	2012	2013	2014	2015	2016	2017	Contr.gr (%)[*]
Cargo handling	1 953.3	2 025.4	2 080.5	2 131.9	2 202.8	2 321.8	0.7
Shipping agents and forwarders	712.1	755.5	714.7	773.1	722.7	735.4	0.1
Shipping companies	613.3	427.9	501.7	794.3	722.9	508.7	-1.2
Other Maritime	1 133.5	1 155.0	1 120.7	1 213.3	1 174.9	1 200.8	0.1
Maritime	4 412.1	4 363.8	4 417.6	4 912.5	4 823.3	4 766.8	-0.3
Chemical industry	3 435.9	3 464.0	3 718.4	4 060.3	3 773.6	4 383.5	3.4
Trade	2 119.6	1 955.8	2 062.7	2 110.9	2 248.3	2 316.7	0.4
Metalworking industry	1 162.9	1 284.3	1 348.6	1 478.8	1 529.3	1 818.5	1.6
Other Non-maritime	5 325.2	5 333.5	5 187.3	5 549.1	5 677.3	6 082.1	2.2
Non-maritime	12 043.6	12 037.6	12 317.0	13 199.0	13 228.3	14 600.8	7.6
Direct	16 455.8	16 401.4	16 734.6	18 111.5	18 051.7	19 367.6	7.3
Indirect	13 491.7	13 314.0	13 228.3	14 862.3	14 312.9	15 934.9	
Total	29 947.5	29 715.4	29 962.9	32 973.8	32 364.6	35 302.4	

(*) *For details, see Annex A.1*
Source: NBB

Between 2016 and 2017, direct value added grew significantly, from € 18 052 million to € 19 368 million, a 7.3% rise. This increase more than reversed the decline recorded in the previous year and marked a return to the trend of strong growth seen until 2015, as shown in Figure 1.1. The highest growth was achieved at Antwerp (which made a 3.7% contribution to overall growth), closely followed by Ghent (2.9%). To a more limited extent, direct value added was also up at the port of Brussels (which made a 0.6% contribution to growth) while remaining approximately the same

---

[1]The contribution of a sector to total growth equals its share in 2016 times the sectoral growth over 2016-2017 period. See Annex A.1

at Zeebrugge and Ostend. The Liège port complex was unable to continue the growth achieved last year and showed a small decline. Indirect value also amounted to around 82% of direct value added (2017).

Table 1.2 shows that the largest sectors across all Belgian ports are the chemical industry, cargo handling, trade and metalworking. With its large share of total value added (22.6%) and own growth of 16.2%, the chemical sector recorded the highest value added figures since 2012. Cargo handling was also up compared to 2016, as were also the metalworking and trade sectors.

The sectors mentioned above are in fact the most important sectors in most of the port areas. Figure 1.2 shows value added (in 2017) for the combinations of port region and sector. While the size of the sectors remained roughly the same as in 2016 at each port, their underlying ranking differs slightly. The largest sector at the port of Antwerp is the chemical industry, which generated 31.9% of value added in 2017, more than double that of the second-largest sector, cargo handling (15.8%). The port of Ghent has three dominant sectors: metalworking (accounting for 24.2% of value added at Ghent), trade, and to a minor extent car manufacturing[2]. Ghent's positive result is due to an increase in its biggest sector, the metalworking industry, and to a lesser extent the chemical sector. The largest sector at the port of Zeebrugge is cargo handling, while metalworking is largest at Ostend. The Liège port complex is also mainly driven by the metalworking industry, plus the energy sector, while the port of Brussels mainly depends on 'other logistic services' (accounting for 62.9% of value added). The relations of most important sectors are analysed in more detail in section 2.

1.2 Employment at the Belgian ports

Table 1.3 gives an overview of the evolution of direct and indirect employment at Belgium's ports between 2012 and 2017. Table 1.4 breaks employment down into its main sectoral components.

Table 1.3: Overview of employment (FTE)

ports	2012	2013	2014	2015	2016	2017	Contr.gr (%)[(*)]
Antwerp	61 294	61 539	61 112	60 732	61 016	61 737	0.6
Ghent	27 229	27 539	28 229	27 841	27 977	28 262	0.2
Zeebrugge	9 971	9 749	9 453	9 301	9 585	9 686	0.1
Ostend	5 103	5 046	5 058	5 021	4 986	4 927	-0.1
Flemish ports	103 597	103 873	103 852	102 895	103 563	104 612	0.9
Liege	9 763	9 076	8 292	8 014	7 814	7 843	0.0
Brussels	4 580	4 181	4 182	4 189	4 024	3 856	-0.1
Inland ports	14 344	13 256	12 474	12 203	11 838	11 699	-0.1
Direct	117 941	117 129	116 326	115 098	115 401	116 311	0.8
Indirect	137 937	136 836	132 753	137 004	138 504	138 468	
Total	255 877	253 965	249 079	252 102	253 906	254 779	

[(*)] *For details, see Annex A.1*
Source: NBB

Following a decline in direct employment at the Belgian ports between 2012 and 2015, there has been a slight increase in direct employment at the ports of Antwerp, Ghent and Zeebrugge over the last two years. Brussels and Ostend recorded a decline in employment in 2017, while employment at the Liège port complex stabilised.

Indirect employment totals around 1.2 times direct employment (2017). It is noteworthy that the indirect employment multiplier is larger than one, while the indirect value added multiplier is below one. Figure 1.4 shows the most important sectors at each port in terms of employment. The largest

---

[2]Note that the 'other non-maritime' and 'other maritime' categories are aggregates of smaller sectors.

Figure 1.1: Overview of value added at the Belgian ports (million €)
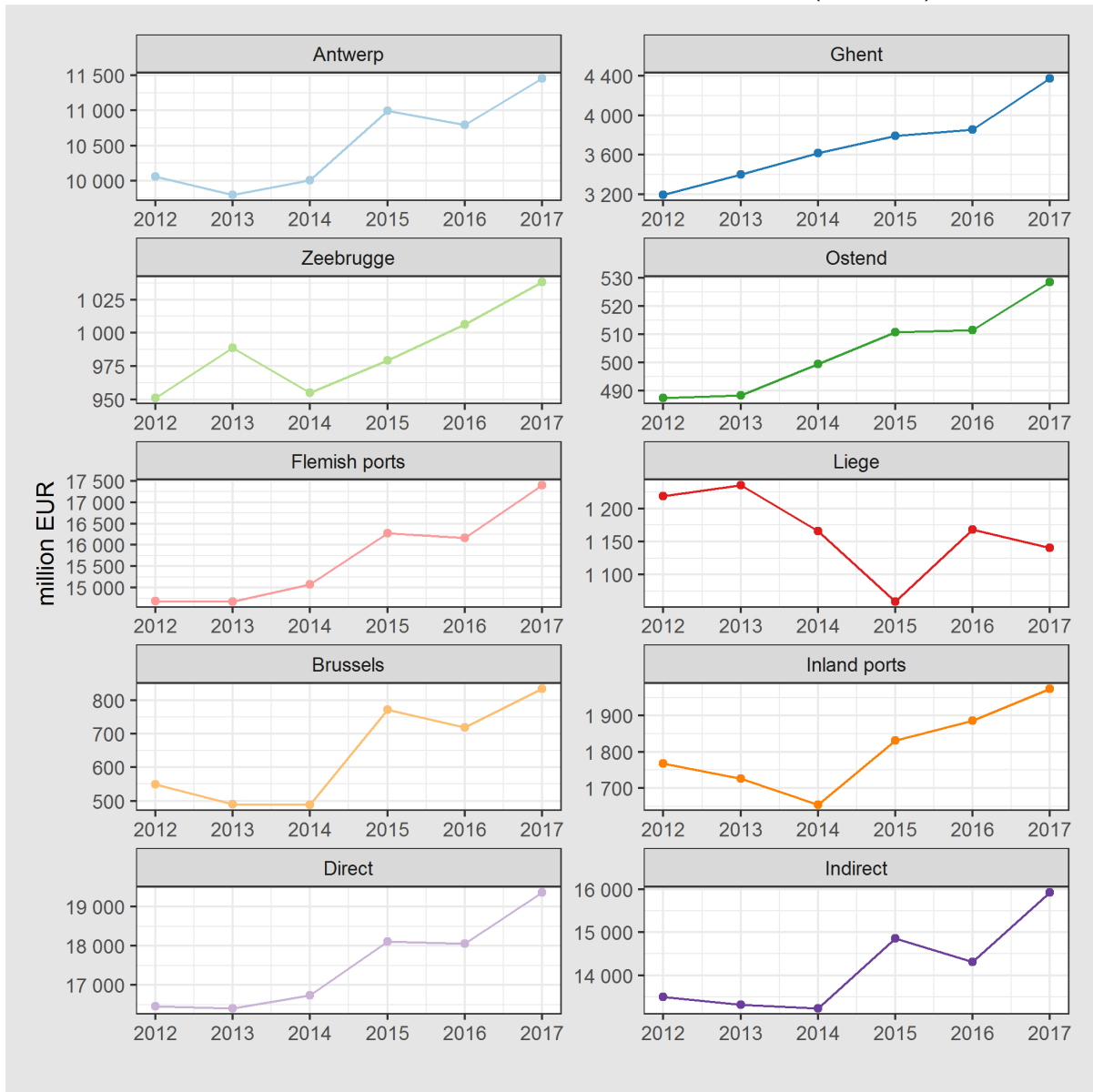
Source: NBB

sector at Antwerp is cargo handling, while the chemical industry - the largest for value added - occupies second place in the employment rankings. Meanwhile at Ghent, car manufacturing and metalworking remain the largest. Although trade is a main contributor to value added at the port, this sector is not a main contributor to employment and is therefore not listed in Table 1.4. At Zeebrugge, Ostend and the Liège port complex, the largest sectors in terms of value added are also the largest employers. At Brussels, 'other logistic services' and trade are the largest sectors in terms of employment. These relationships are analysed in more detail in section 2.

Figure 1.2: Most important sectors at the Belgian ports in terms of value added in 2017 (in %)

Value added for Antwerp (in %)

Cargo handling — 31.9, 23.93, 15.95, 7.98, 0
Other Non-maritime
Trade
Fuel production
Chemical industry
Other Maritime
Shipping companies
Shipping agents and forwarders

Value added for Ghent (in %)

Cargo handling — 29.12, 21.84, 14.56, 7.28, 0
Other Non-maritime
Car manufacturin
Trade
Metalworking industry
Other Maritime
Port authority
Shipping agents and forwarders

Value added for Zeebrugge (in %)

Cargo handling — 23.77, 17.83, 11.88, 5.94, 0
Other Non-maritime
Road transport
Trade
Energy
Other Maritime
Shipping agents and forwarders
Public Sector

Value added for Ostend (in %)

Public Sector — 36.16, 27.12, 18.08, 9.04, 0
Other Non-maritime
Chemical industr
Construction
Metalworking industry
Other Maritime
Port construction and dredging
Fishing and fish industry

Value added for Liege (in %)

Cargo handling — 35.02, 26.27, 17.51, 8.76, 0
Other Non-maritime
Chemical industr
Energy
Metalworking industry
Other Maritime
Shipping agents and forwarders
Shipping companies

Value added for Brussels (in %)

Shipping agents and forwarders — 62.89, 47.17, 31.44, 15.72, 0
Other Non-maritime
Other industries
Trade
Other logistic services
Other Maritime
Cargo handling
Port authority

Source: NBB

4

Table 1.4: Sectoral overview of employment (FTE)

	2012	2013	2014	2015	2016	2017	Contr.gr (%)[*]
Cargo handling	19 753	19 804	19 933	19 647	20 098	20 722	0.5
Shipping agents and forwarders	8 246	8 118	7 952	8 007	7 871	7 862	-0.0
Public Sector	4 386	4 438	4 369	4 185	4 185	4 097	-0.1
Other Maritime	7 626	7 415	7 018	6 890	6 984	6 932	-0.0
Maritime	40 012	39 775	39 272	38 729	39 138	39 613	0.4
Chemical industry	14 738	14 742	14 678	14 535	14 697	14 875	0.2
Metalworking industry	15 178	14 794	14 043	13 608	13 589	13 562	-0.0
Car manufacturing	9 893	10 104	10 146	10 534	10 285	10 293	0.0
Other Non-maritime	38 120	37 715	38 187	37 692	37 693	37 968	0.2
Non-maritime	77 929	77 354	77 054	76 369	76 263	76 698	0.4
Direct	117 941	117 129	116 326	115 098	115 401	116 311	0.8
Indirect	137 937	136 836	132 753	137 004	138 504	138 468	
Total	255 877	253 965	249 079	252 102	253 906	254 779	

[*] *For details, see Annex A.1*
Source: NBB

Figure 1.3: Overview of employment at the Belgian ports (FTE)
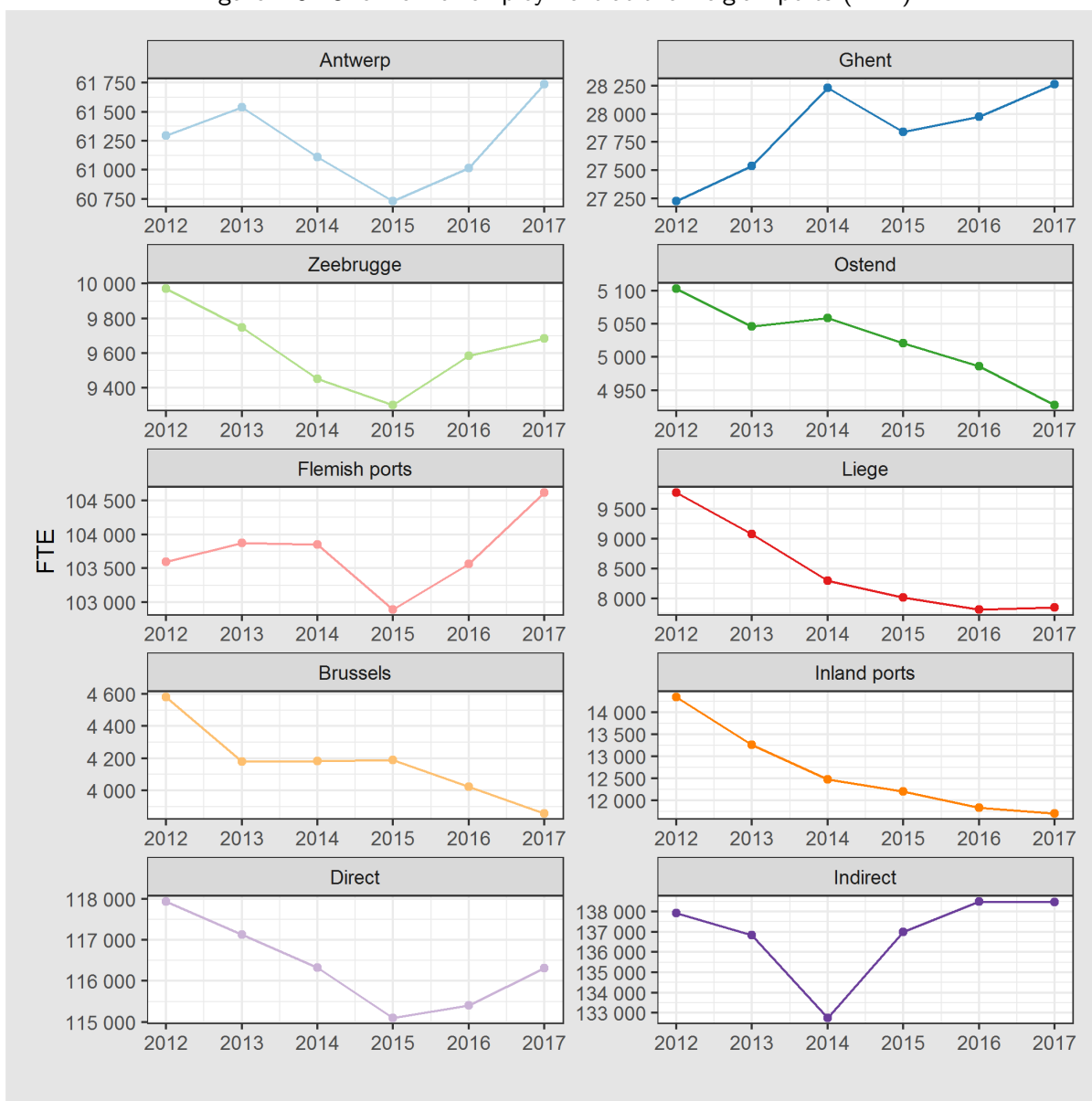
Figure 1.4: Most important sectors at the Belgian ports in terms of employment in 2017 (in %)

Employment for Antwerp (in %)

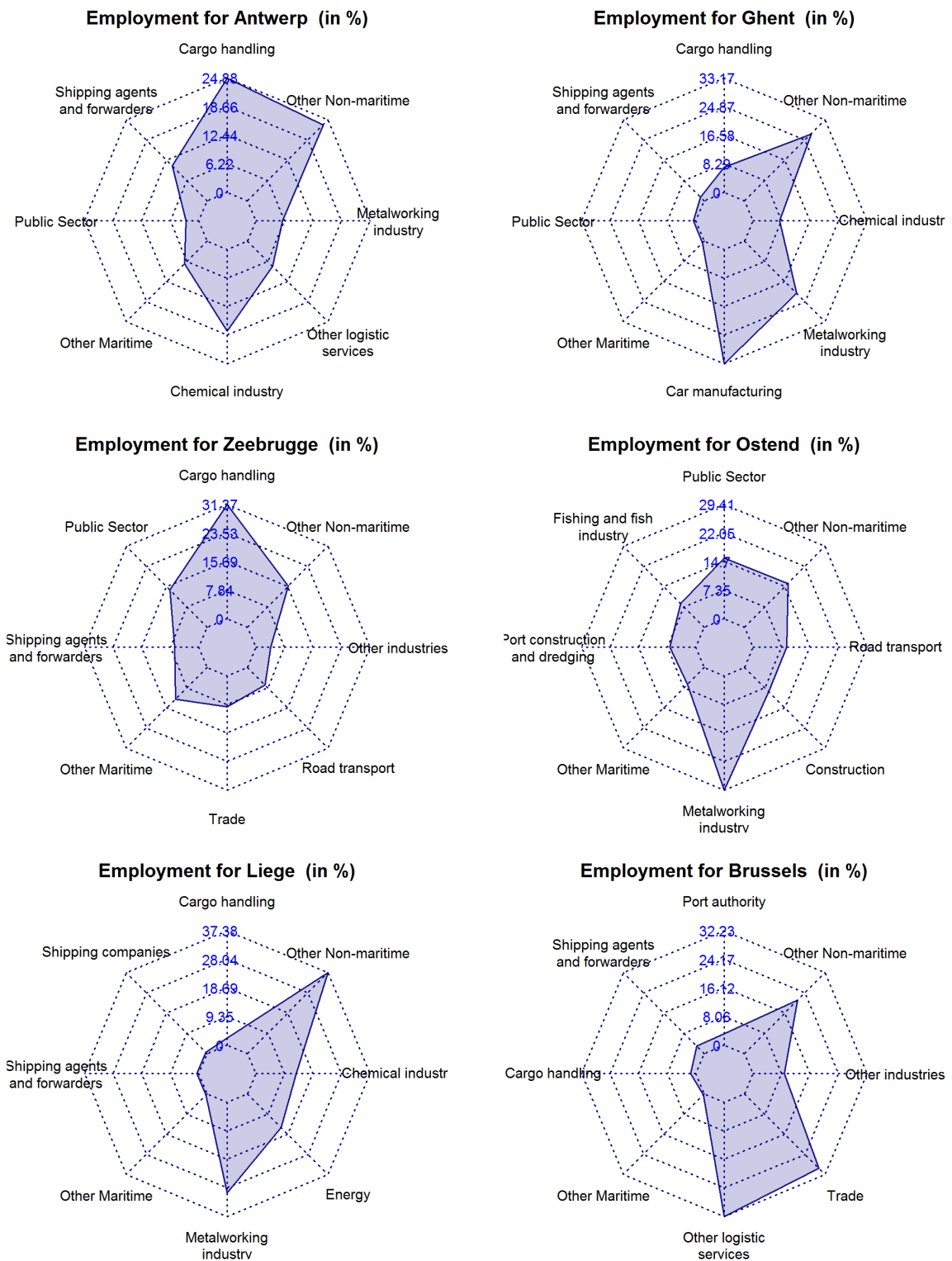
Employment for Ghent (in %)

Employment for Zeebrugge (in %)

Employment for Ostend (in %)

Employment for Liege (in %)

Employment for Brussels (in %)

Source: NBB

1.3 Investment at the Belgian ports

Following the sharp increase in direct investment in 2016, it rose again slightly (+2.4%) in 2017, reaching the highest level seen since 2012. Investment exceeded the € 4 billion mark for the fourth year in a row.

Direct investment rose at Ghent and Liège, registering a decline at the other ports. Ghent reached the highest level of investment for both the maritime and non-maritime cluster seen since 2012, thanks to a significant rise in the car manufacturing, cargo handling and metalworking sectors and to a lesser extent the chemical industry. The Liège port complex recorded the highest investment since 2013, almost reaching its 2012 level. The pattern of investment is closely linked to projects and is therefore highly volatile, so that the figures require a nuanced interpretation.

Table 1.5: Overview of investment (million €)

ports	2012	2013	2014	2015	2016	2017	Contr.gr (%)[*]
Antwerp	2 337.6	2 373.0	3 319.6	3 093.0	3 502.2	3 442.2	-1.3
Ghent	473.0	436.2	414.1	383.8	542.7	712.4	3.6
Zeebrugge	234.4	197.3	203.8	241.7	315.7	303.3	-0.3
Ostend	94.1	76.3	119.5	64.0	87.8	77.6	-0.2
Flemish ports	3 139.3	3 082.9	4 057.0	3 782.5	4 448.4	4 535.6	1.9
Liege	241.8	215.3	198.4	212.1	196.3	228.1	0.7
Brussels	52.0	68.5	53.0	59.7	66.4	61.7	-0.1
Inland ports	293.8	283.8	251.3	271.9	262.6	289.8	0.6
Direct	3 433.1	3 366.7	4 308.3	4 054.3	4 711.0	4 825.4	2.4

[*] For details, see Annex A.1
Source: NBB

Table 1.6: Sectoral overview of investment (million €)

	2012	2013	2014	2015	2016	2017	Contr.gr (%)[*]
Cargo handling	724.3	596.6	683.3	692.1	817.4	907.5	1.9
Shipping companies	387.4	434.6	1 011.9	590.1	751.0	424.8	-6.9
Port construction and dredging	97.4	16.7	75.0	73.7	39.2	340.5	6.4
Other Maritime	424.5	415.9	320.0	303.3	359.6	275.8	-1.8
Maritime	1 633.6	1 463.7	2 090.2	1 659.2	1 967.3	1 948.5	-0.4
Chemical industry	600.0	665.1	836.5	785.6	887.7	927.7	0.8
Fuel production	137.8	247.8	427.1	534.3	626.6	429.9	-4.2
Energy	220.4	234.8	226.1	350.6	321.5	382.6	1.3
Other Non-maritime	841.2	755.2	728.4	724.6	907.9	1 136.7	4.9
Non-maritime	1 799.5	1 902.9	2 218.2	2 395.1	2 743.7	2 876.9	2.8
Direct	3 433.1	3 366.7	4 308.3	4 054.3	4 711.0	4 825.4	2.4

[*] For details, see Annex A.1
Source: NBB

The ports of Antwerp and Zeebrugge both showed a slight decline in direct investment in 2017. 2016 had been an exceptional year for these ports, in which a record level of investment was achieved. Nevertheless, the year 2017 still takes second place at these two ports in investment terms during the period from 2012 onwards. The decline in investment at the port of Antwerp is particularly noticeable in the shipping companies and fuel production sectors. Because of the very significant increase, the port construction and dredging sector contributed about 10% to overall investment at the port of Antwerp, their investments to a large extent making up for the decline at the rest of the port. For the second year in a row, investment in cargo handling reached a very high level. This sectors' € 700 million investment accounted for a fifth of total investment at the port of Antwerp.

Zeebrugge also saw a substantial increase in investment in cargo handling sector, but this was not sufficient to make up for the decline in the energy and road transport sectors, which posted the highest investment in 2016.

The amounts invested by the public sector at the port of Ostend contracted considerably.

Figure 1.5: Overview of investment at the Belgian ports (million €)

Source: NBB

1.4 Financial ratios at the Belgian ports

Table 1.7 shows three financial ratios: return on equity after tax; liquidity in the broad sense (the current ratio); and solvency. Return on equity indicates the return on the capital invested by the shareholders. A higher return on equity does not necessarily imply that the company's financial performance is better. A higher ratio may be the result of high financial leverage, and excessively high financial leverage can be dangerous for a company's solvency. The liquidity ratio indicates a firm's ability to mobilise in due time the cash resources that it needs in order to meet its short-term liabilities, while the solvency ratio sheds light on a company's overall financial strength. Solvency is also seen as a test of the soundness of the capital structure, or the percentage by which the assets may be overvalued before creditors risk losing money in the event of a forced sale. The exact definitions of the ratios can be found in Annex B.

The ratios are calculated on a globalised basis. This means that the ratio is computed not at the individual company level, but for a group of companies. The aggregated ratio adds up the numerators and denominators of the ratio and then divides the aggregated numerator by the aggregated denominator.

Table 1.7: Financial ratios at the Belgian ports

	Return on equity after tax (%)			Liquidity in the broad sense			Solvency (%)		
	2015	2016	2017	2015	2016	2017	2015	2016	2017
Antwerp	5.50	4.21	5.57	1.09	0.91	1.12	37.91	33.80	34.59
Ghent	10.09	8.27	16.29	1.32	1.30	1.33	45.01	43.07	44.45
Zeebrugge	7.51	6.79	5.89	1.41	1.35	1.27	48.97	48.29	46.81
Ostend	5.58	2.41	9.33	1.22	1.31	1.20	42.94	41.53	39.52
Flemish ports	6.16	4.90	7.36	1.16	1.01	1.17	39.15	35.65	36.41
Liege	-2.58	-1.21	3.28	0.72	0.67	0.58	41.63	39.23	37.51
Brussels	13.71	3.90	6.11	0.98	0.67	1.14	45.11	46.27	56.26
Total	6.74	4.06	6.71	1.07	0.90	1.10	40.39	37.83	39.23

Source: NBB

Annex A.2 shows that the globalised ratio gives a larger weighting to larger companies. The globalised ratio is a weighted average of the individual companies' ratios. Weight essentially means size[3], and therefore companies with a higher weight have greater impact on the globalised ratio, as do companies with a small weight but with an extremely high value for the ratio. Figure 1.6 disentangles these two effects. Companies are ranked in descending order of weight. The cumulative weight of the first n companies is presented on the horizontal axis, from zero (no companies) to one (all companies). The vertical axis presents how the ratio changes to reach its final value (at the right of each line), starting with the first company and adding up the values for the other companies in succession. Each line represents one year of the 2015-2017 period. A large horizontal shift to the right happens when a company with a large weight is added. A large vertical shift occurs whenever a company has an extreme ratio. By way of clarification, some fluctuations in return on equity in a few ports are covered in the following paragraphs.

At the port of Antwerp, the globalised return on equity was 4.2% in 2016, increasing to 5.6% in 2017. These values are represented by the dots on the right-hand side of the first panel of Figure 1.6. The three lines diverge only after a cumulative weight of around 60% on the horizontal axis, meaning that the differences are attributable to the companies with the smaller weights (because all companies are ranked in descending order of weight). The difference at the beginning (the fluctuations on

---

[3] More precisely, company size is measured in terms of the ratio's denominator

the left-hand side) are caused by two larger companies (Electrabel and BASF Antwerpen) which swapped places in the ranking.

At the port of Ostend, the globalised return on equity was 5.6% in 2015, declining to 2.4% in 2016, and rebounding to 9.3% in 2017. This is apparently to due to an extreme value for the ROE ratio of one individual company (the jump at 0.75 on the horizontal axis), which moreover, has a relatively large weight.

At the Liège port complex, the globalised return on equity was -2.6% in 2015, increasing to -1.2% in 2016 and then climbing to 3.3% in 2017. The most influential company at the port, despite having a weight of around 70%, does not account for the change. The change is actually due to companies with smaller weights but without exceptional values for their individual ratios. The most influential company has a negative value right from the start and the other companies are unable to make up for that.

At the port of Brussels, the globalised return on equity was 13.7% in 2015, declining to 3.9% in 2016 and rebounding to 6.1% in 2017. The difference exists from the start of the three lines but thereafter the lines are more or less parallel, meaning that the most influential company (Solvay, with a weight of around 76%, see horizontal axis) accounts for that difference.

Figure 1.6: Convergence path of return on equity
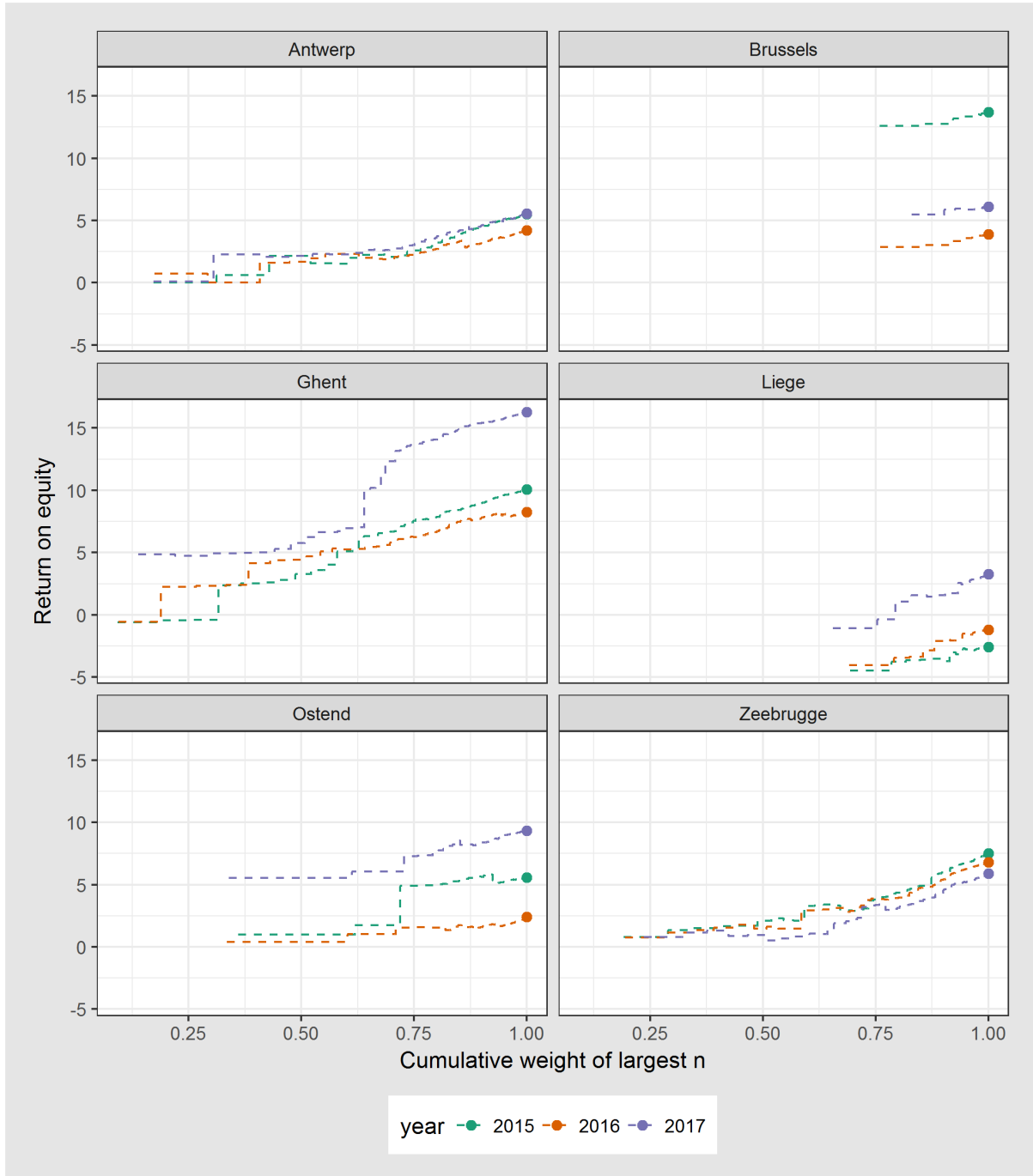
Source: NBB

Figure 1.7: Convergence path of liquidity
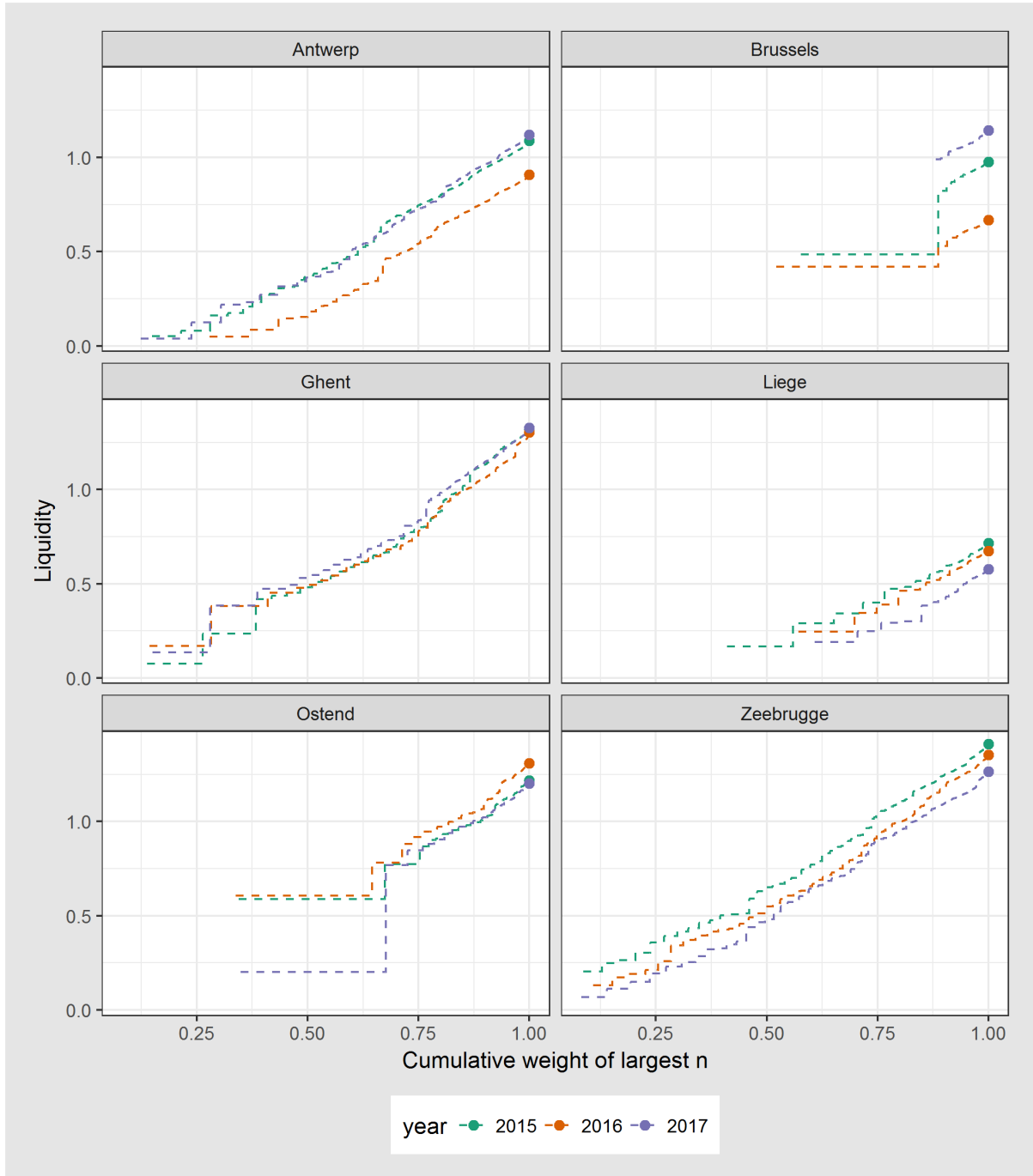
Figure 1.8: Convergence path of solvency
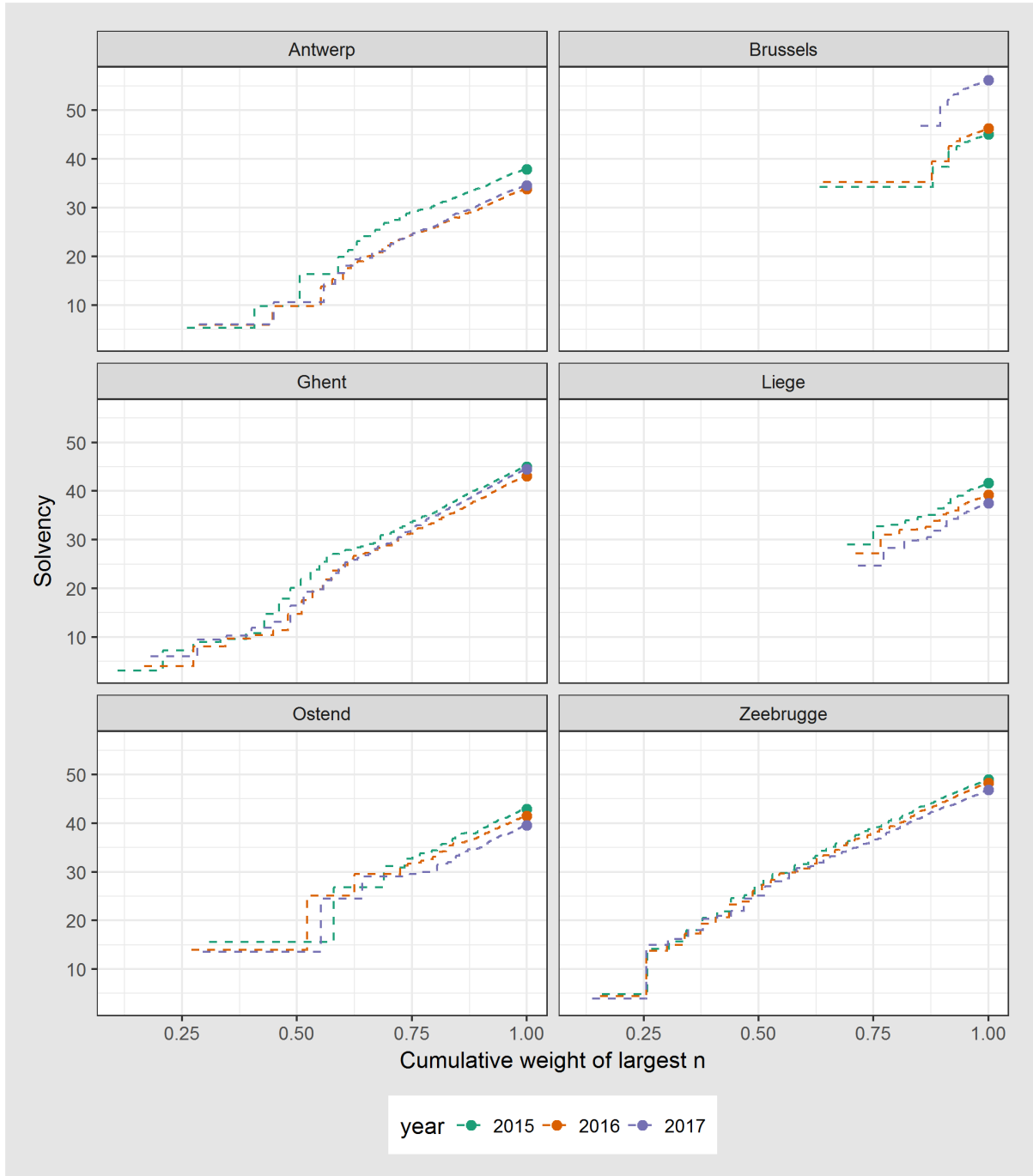
Source: NBB

1.5 Relative importance of the components of value added

The value added of a company, and by extension of a sector or region, can be computed in two different ways. Value added can be calculated as the difference between the value of the outputs and the costs of the inputs required to produce them. This is called the 'production approach'. Another way is to analyse how value added is spent. Companies 'add value' to their inputs and use this value either to pay their employees (staff costs), depreciate their assets (depreciation), meet charges such as provisions (other charges) and to increase the value of the company or distribute dividends to shareholders, make interest payments, pay corporation taxes, etc. (operating profit). This is known as the 'cost approach'. The latter method is used in this chapter (see Annex C for details).

As value added is equal to the sum of the components mentioned above, every change in value added must be due to a change in one or more of these elements. Figure 1.9 shows the importance of and changes in the various components of value added between 2016 and 2017[4]. The upper panel shows the breakdown for 2016, the middle panel shows the figures for 2017 and the bottom panel (using a different scale on the vertical axis) shows the breakdown of the change in value added.

In 2017, operating profit was the main driver for growth in value added at Belgium's ports. The chemical industry, the metalworking industry and 'other logistic services' were the most important contributors. Conversely, profits in the energy sector and at shipping companies declined. Staff costs accounted for a significant part of the value added in most sectors. Depreciation accounted for a greater share of value added in capital intensive sectors such as cargo handling, chemical industry and shipping companies. 'Other charges' represented a large share of value added in the trade sector due to the high level of taxation on the sale of petroleum products.

---

[4]The calculation of components of value added is based on filed annual accounts.

Figure 1.9: Components of value added (million €)
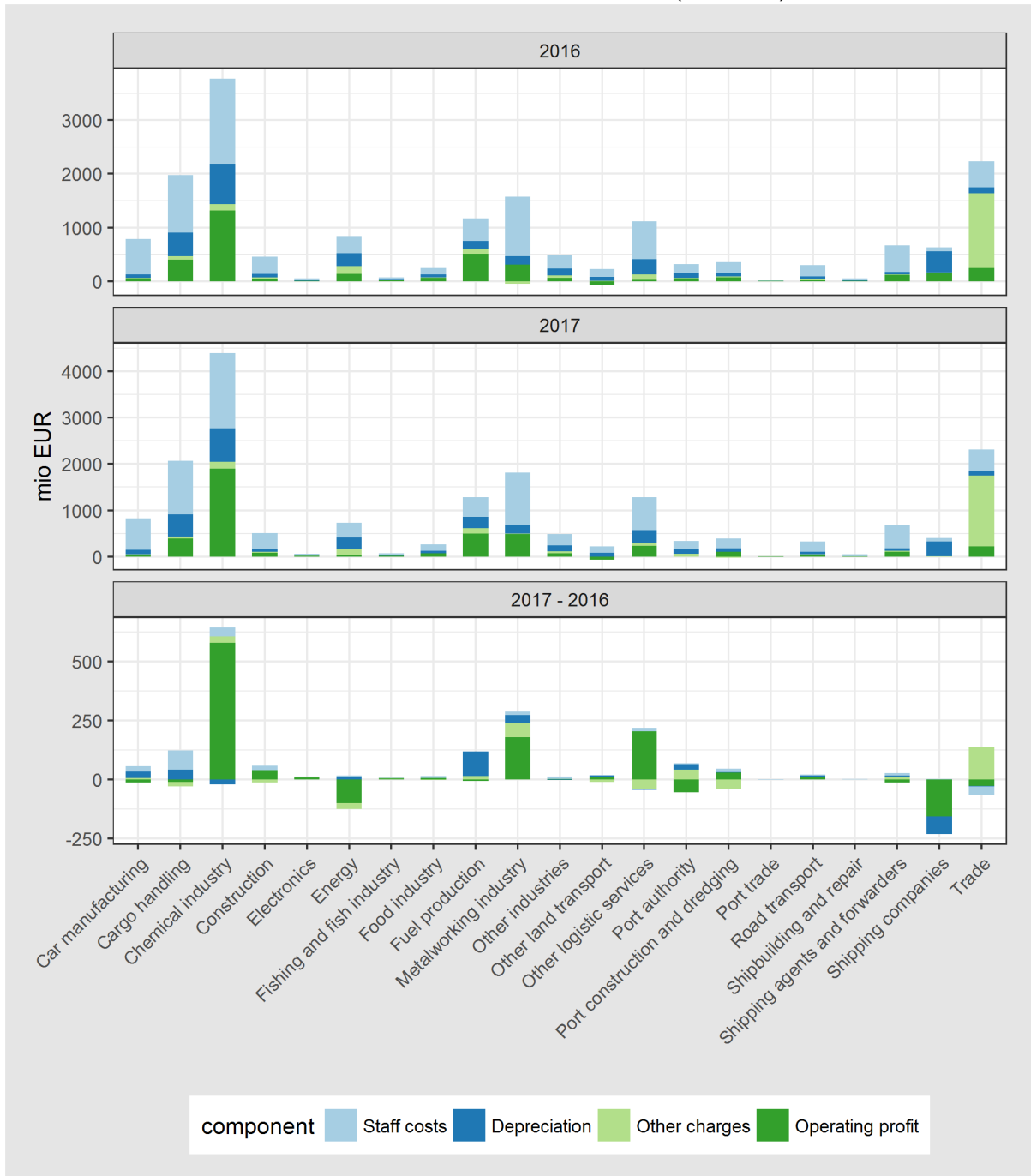
Source: NBB

1.6 Importance of the Belgian offshore windfarms

Renewed impetus was given to renewable energy production in mid-2018 as the European Commission raised the target to 32% by 2030.

Wind energy generation has a low variable production cost compared to other renewable energy sources, prompting a growing number of companies to invest in this sector [5]. As there are more windy days at sea than on land, offshore windfarms are able to produce more electricity. Since January 2002, Flanders has offered green certificates to promote power generation from renewable energy sources. In combination with that, the federal, Flemish, Walloon and Brussels governments have developed a scheme under which network operators must purchase a minimum amount of these green certificates and at a guaranteed minimum price[6]. The federal minimum prices for offshore wind energy are € 107 per certificate from installations that are the subject of a domain concession and for production derived from the first 216 MW of installed capacity or € 90 per certificate from installations that are part of the same domain concession for production derived from installed capacity in excess of the first 216 MW. These figures are significantly above the prices paid for certificates for onshore wind energy, which range between € 65 and € 90 depending on the region and the period of installation. Contracts for new offshore wind farms are awarded by means of tenders, which will probably result in lower public subsidies. In neighbouring countries the first zero-subsidy wind bids are already awarded.

Although offshore windfarms need only a small workforce to operate, they require frequent maintenance. Due to increasing use of wind power within the power system, frequent start-ups and shut-downs are required, resulting in fluctuations in the energy produced.

In this section we aim to report the offshore wind farm branch, in view of its growing importance and great future potential. We shall focus on the principal players, as multiple statistical barriers make it difficult to include all the information in a port study.

First, wind energy production is not considered as a separate branch of the economy as there is no specific statistical NACE classification for it. Windfarm companies are classified under the NACE code for energy production. Among others, this NACE code also includes nuclear power plants. Note that several companies related to the offshore wind energy branch are already included in multiple other sectors of this port study. Secondly, each port has an associated geographical zone, and offshore windfarms are not located within these boundaries. As Figure 1.10 makes clear, it could be wrong to link a windfarm to a particular port if another port is closer to it. Most operations and maintenance of the offshore windfarms on Belgian territory are carried out from the port of Ostend, while the installation base and investment for the windfarms vary. Other ports linked to the windfarms on the Belgian territory include Zeebrugge and the Dutch port Vlissingen. Additional problems concern the involvement of foreign companies and the fact that not all companies have a local branch in the port's area in statistical terms.

1.6.1 Generating capacity

Figure 1.11 gives an overview of the new wind power installations for the first half of 2018 in Europe. In this period Belgium was in second place regarding offshore windfarm installations, but the sector is still expanding rapidly.

---

[5]Wind energy represented the largest investment opportunity in the power sector in 2017 and total investment over Europe were more than € 51 billion (source: WindEurope).

[6]Network operators were obliged to buy for 0.8% of their supply of green certificates, and this obligation increases to 20.5% by 2020 (source: VREG).

Figure 1.10: Zones for windfarms in Belgium
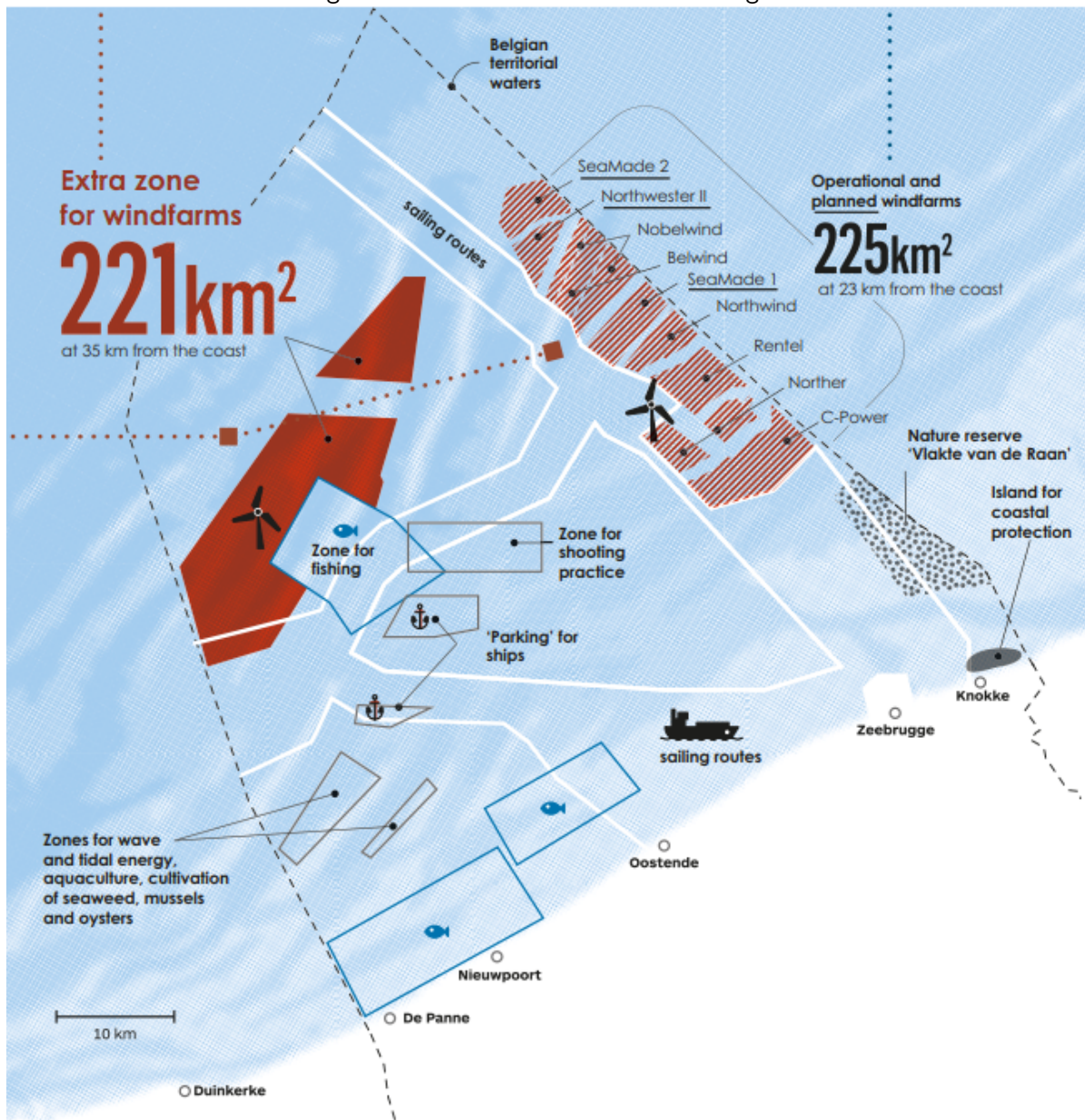
Source: De Tijd / tijd.be / 21-04-2018

With six offshore windfarms in total and more than 800 MW installed capacity from 232 connected turbines, Belgium was ranked fifth in Europe in 2017 as shown in Figure 1.12. Only the UK, Germany, Denmark and the Netherlands performed better.

As power generating capacity per turbine is constantly rising, it is possible to reduce the number of turbines per windfarm without changing the planned amount of generating capacity. The Belwind park turbines, installed ten years ago, had a capacity of 2.3 MW whereas the latest turbines used for Northwester 2 have a generating capacity of almost 10 MW. General Electrics is one of the companies working on prototypes such as the Haliade X capable of generating up to 12 MW. New technologies can also help to tackle problems like the lack of ideal seabed conditions for offshore projects. Here, the use of floating windfarms, such as Hywind in Scotland, operational from September 2017, and consisting of 5 turbines generating 30 MW, offer new possibilities. A similar windfarm, Mermaid, combining wave energy absorption, is under construction in Belgium. Another example of emerging

Figure 1.11: New wind power capacity in the first half of 2018
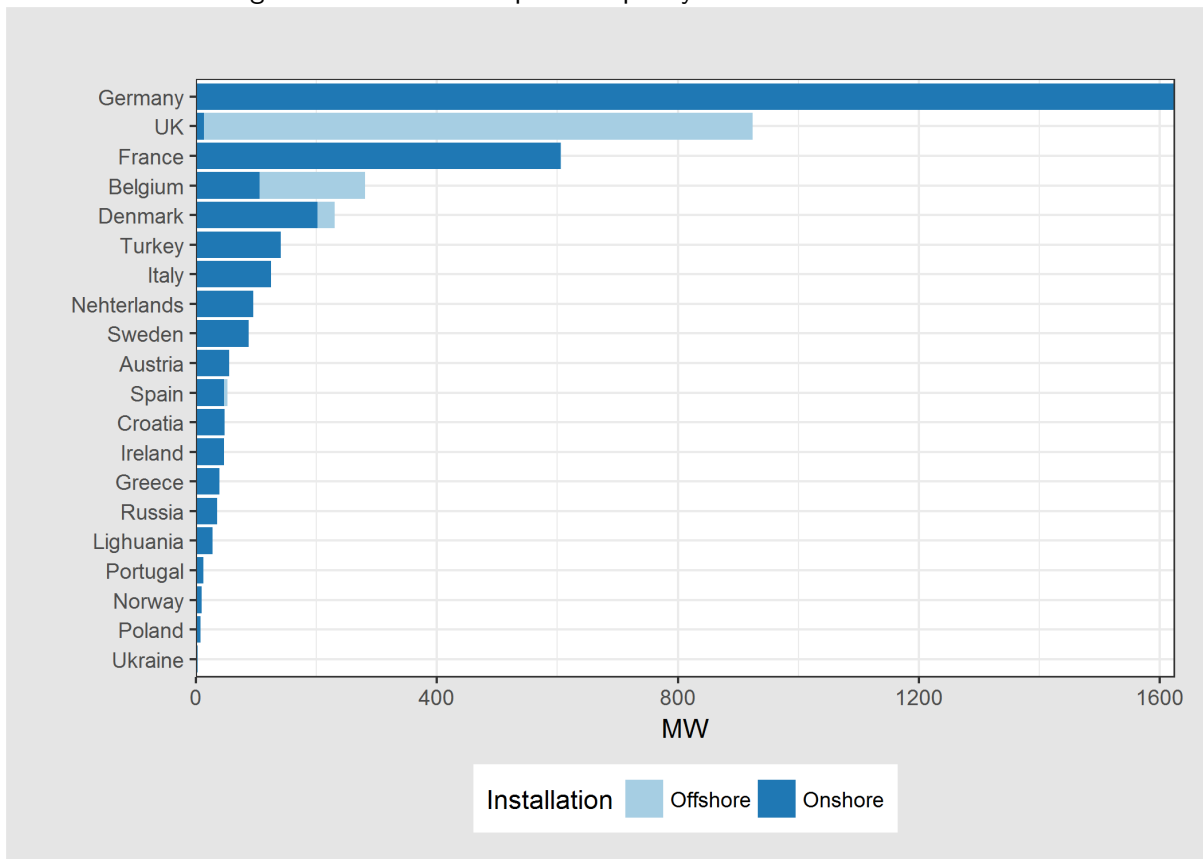
Source: WindEurope

technology is the installation of a Modular Offshore Grid, a giant connection facility, which will collect power from four Belgian windfarms and transmit the electricity to Zeebrugge in 2019. This solution avoids having the need for 40 km of additional cabling per windfarm, thus minimising the ecological impact.

The first windfarm company in Belgium was founded in January 1999. Since then, there has been a significant rise in the number of windfarm companies and especially contributing to the sector. As a result of the continuous growth and demand for new technology, a number of suppliers from various other sectors are indirectly involved. However, it is hard to determine the windfarm-related share of their turnover, value added and employment.

Table 1.8 lists the currently installed offshore windfarms in Belgium. The offshore terminal in Ostend, REBO (Renewable Energy Base Ostend), sets a target of 2.2 GW in 2020 and plans to extend the installation to 4 GW by 2030. The amount of energy currently being produced is quite low in comparison with the 0.5 to 1 GW generated by a single nuclear power plant; as we can see from the 4 reactors in Doel. But once again, we would point out that the sector is still expanding rapidly.

1.6.2 Value added

The value added of the windfarm companies is determined by the depreciation of their investment and by the amount of the green certificates.

Figure 1.13 charts the value added off the windfarm companies. Belwind, founded in 2006, immediately generated a small amount of value added from 2010, and tripled that figure two years

Figure 1.12: Capacity of grid-connected offshore windfarms at the end of 2017 in Europe
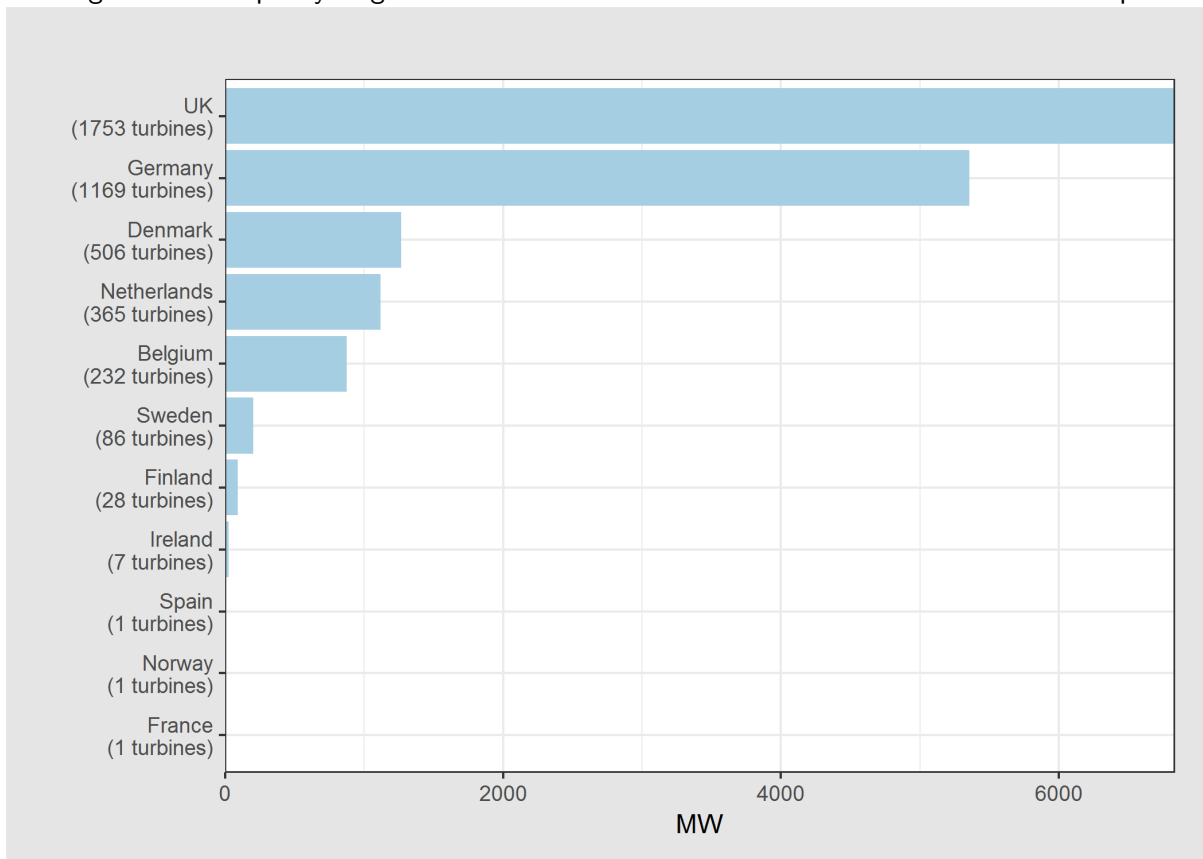
Source: WindEurope

later. However, a slight decline was noticeable from 2014 onwards. C-Power was already active well before 2013, but its added value more than doubled in the year that Thornton bank became operational. In 2014, C-Power's value added went up slightly and has since remained steady at around € 125 million. Northwind's windfarm went live in 2014, and immediately generated value added of almost € 76 million. The year 2015 was even more exceptional, with a rise of about 25%, but value added subsequently dropped slightly to around € 90 million. Although only operational from 2017, Nobelwind generated almost € 50 million in its first year.

Table 1.8: Capacity of Belgian offshore windfarms

Operational from year	Windfarm	Generating capacity (in MW)	Number of turbines
2010	Belwind	165.0	55
2013	Thornton Bank (C-Power)	325.2	54
2014	Belwind (Alstom Haliade)	6.0	1
2014	Northwind	216.0	72
2017	Nobelwind	165.0	50
2018	Rentel	309.0	42
	Operational	1 186.2	274
2019	Norther	369.6	44
2019	Northwester 2	219.0	23
	Poseidon P60 (Mermaid)	2.3	1
2020	Seamade (Seastar)	239.1	30
	Under construction	821.0	75
	Port 2020 Tenders	1 750.0	

Sources: 4C Offshore

Figure 1.13: Value added of the Belgian offshore windfarms (million €)
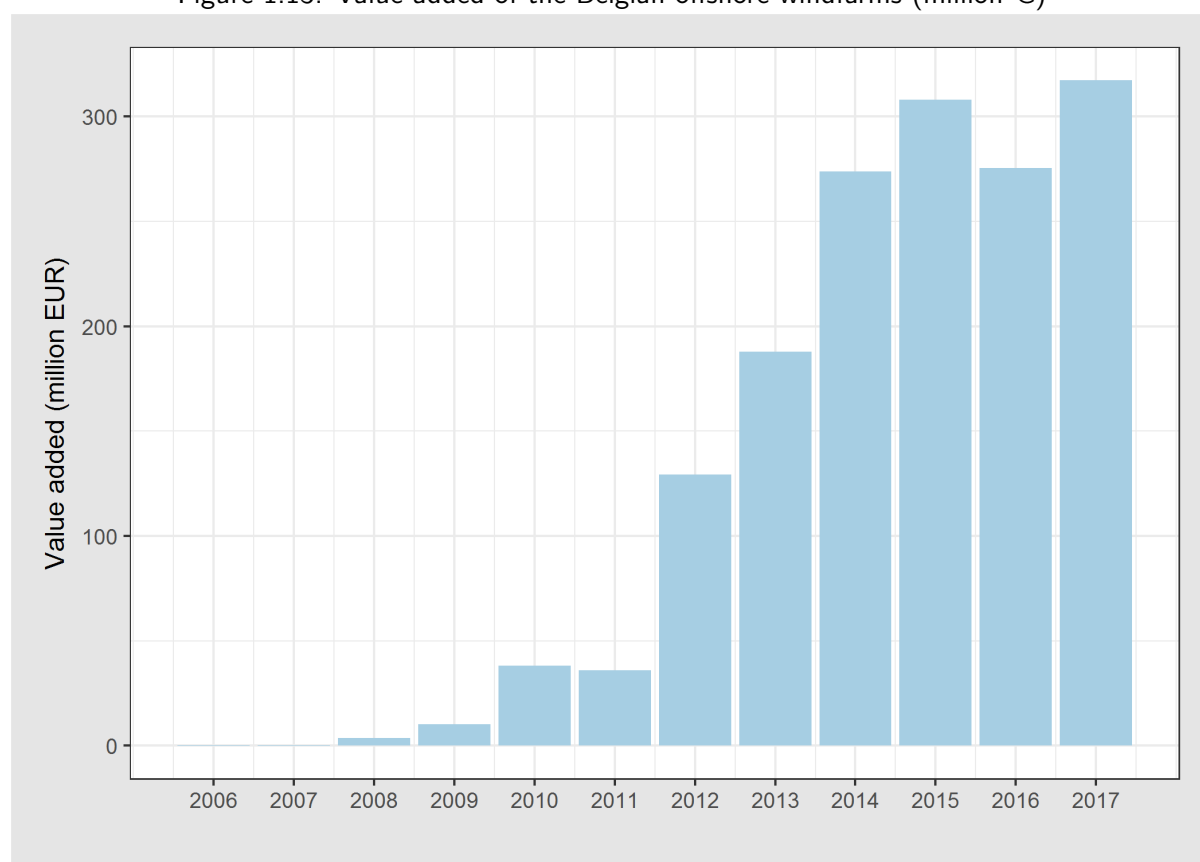
Source: NBB

1.6.3 Employment

The number of direct jobs in the windfarm companies themselves is rather small, as shown in Figure 1.14, but windfarms have an impact on employment in engineering, construction, management and maintenance companies. Many of these companies are located abroad. Once fully functional, most windfarms no longer employ people, except for C-Power. In 2017, the year before it went live, Rentel had around 20 FTE.

Figure 1.14: Employment of the Belgian offshore windfarms (FTE)
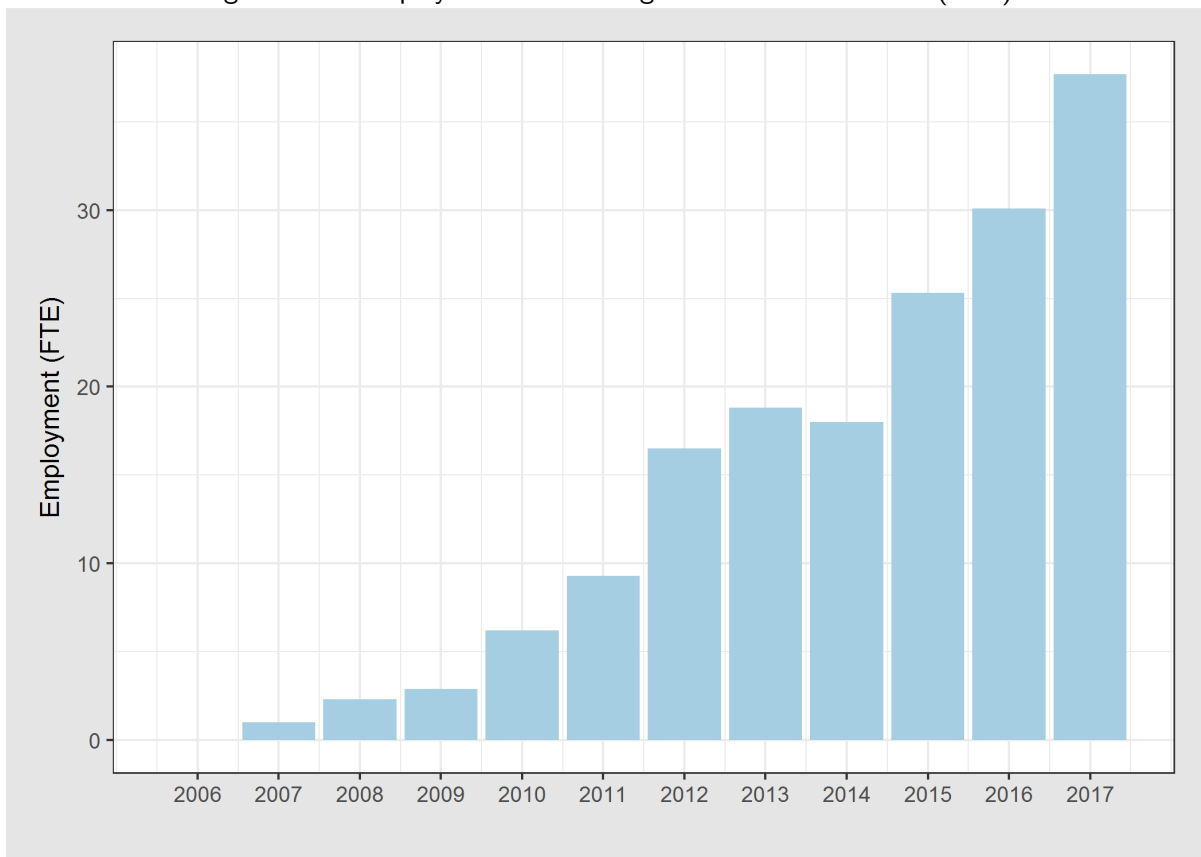
Source: NBB

1.6.4 Investment

Offshore wind energy construction projects transporting the energy to land require more investment than onshore windfarms. However, it is important to point out that the port where the investment takes place is not necessarily the one where value added will be generated. A good example is C-Power, which was initially located in the region of Antwerp, whereas the value added benefits the Ostend region since the company moved its headquarters there a few years later. This once again confirms that windfarm companies can not always be linked to a specific port.

The level of investment drops significantly one or two years after a windfarm becomes operational. It is no surprise that the windfarms currently under construction represent most of the sector's investment.

Even though Rentel increased its investment tenfold in comparison with the preceding years, the figure more than doubled again in 2017 to reach almost € 385 million. We see a similar doubling for Norther where investment reached € 162 million in 2017. Other windfarms under construction recorded only limited investment.

Figure 1.15: Investment of the Belgian offshore windfarms (million €)
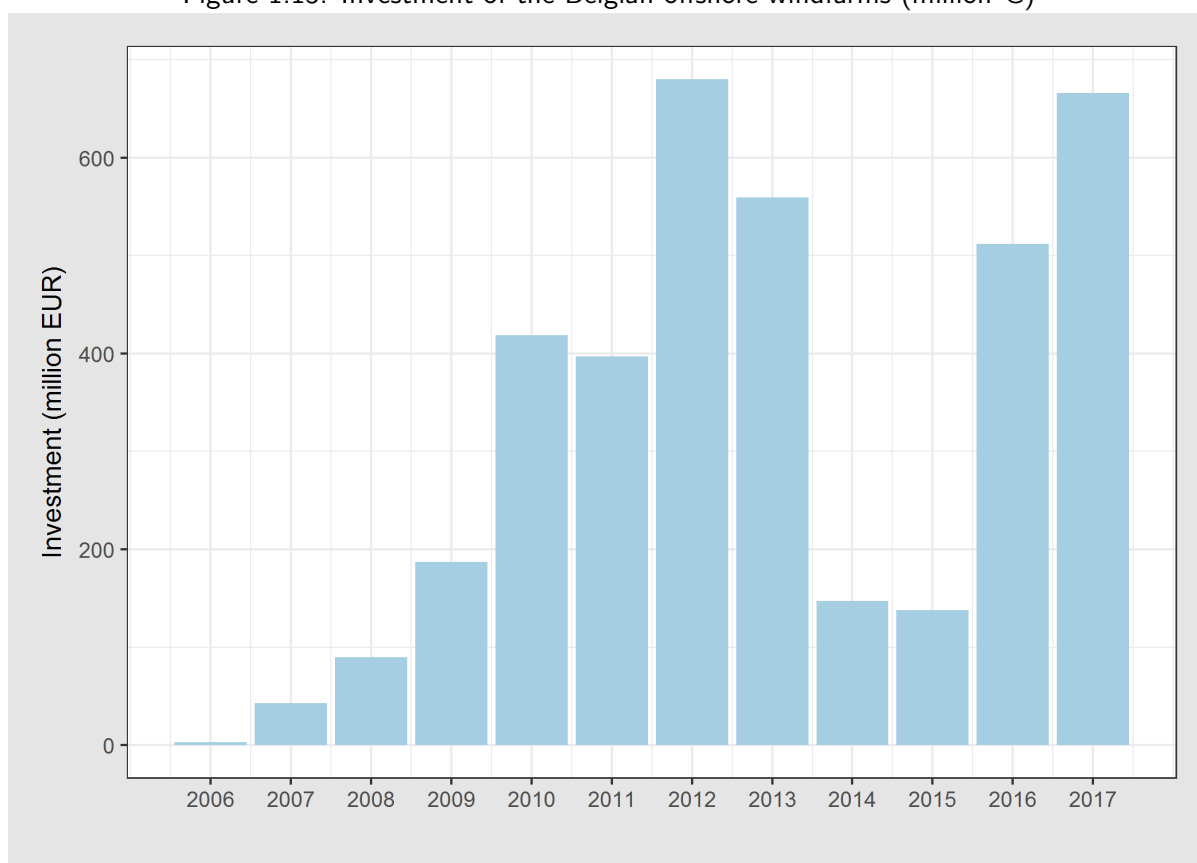
The investment of Elia, Belgium's electricity transmission system operator, in the Modular Offshore Grid (MOG) is estimated at € 400 million. Elia is classified under the energy sector and is not part of the windfarms. The MOG connects the cables from the offshore wind power from Rentel, Northwester 2, Mermaid and Seastar to the Stevin onshore station in Zeebrugge and can be extended in the future in a cost-effective, environment-friendly and reliable way.

1.7 The consequences of Brexit and trade wars for the Belgian economy

In recent years, a number of events have, either directly or indirectly, raised question marks over the overall trend towards increasingly opening up to international trade in goods. The United Kingdom's decision to leave the European Union ('Brexit') and the US government's current trade policy are the most telling examples of this. Given the ties we have with our close partner the UK, Brexit will have major consequences for the Belgian economy, in particular for port activity. It is in fact already having an impact, given the lack of certainty as to how the process will be carried out and what form Belgium's relations with the United Kingdom will take in the future. This summary addresses a number of these questions, based on information available end January 2019.

1.7.1 Brexit

Political background

On 23 June 2016 a small majority of British citizens voted in a referendum to exit the European Union (hence the term 'Brexit'). As a result, the United Kingdom government notified the European Council on 29 March 2017 of the country's intention to leave the EU, thus triggering a procedure which is expected to lead to the first-ever withdrawal of an EU member state from the Union.

On 25 November 2018, an agreement was concluded between the British government and the European Council, comprising a) a withdrawal agreement and b) a political declaration on the future relationship between the EU and the United Kingdom. In order to avoid an abrupt, disorganised exit, the withdrawal agreement has to be ratified by both the House of Commons and the European Parliament before 29 March 2019. It is hard to predict what will happen as regards the procedure from the UK side, given that there are many uncertainties of a political nature, so that the risk of the UK side not ratifying the agreement in due time is actually quite high.

The withdrawal agreement is an international legally binding treaty which fixes the terms under which the UK is to leave the EU. Key clauses deal inter alia with the rights of European citizens established in the United Kingdom and of British citizens established in a member state of the EU prior to the end of the transition period; a financial settlement, whose basic principle is that financial commitments undertaken by the EU-28 will be honoured by all 28 countries, including the United Kingdom; a dispute settlement procedure; and a transition period. The transition period means that while the United Kingdom is to leave the EU and withdraw from its institutions on 29 March 2019, the current situation as regards the internal market, the customs union and European policies, with their associated rights and obligations, would be maintained until 31 December 2020. This transition period could be extended by common agreement once, for a maximum of two years, i.e. perhaps until the end of 2022.

Given, on the one hand the desire to avoid re-establishing a physical border between the two parts of the island of Ireland, and on the other the need to ensure the formalities associated with a border crossing between the EU and a non-EU country, in particular as regards trade in goods, a last-resort solution (the so-called 'backstop' option) was set out in a special protocol within the withdrawal agreement. This solution, which would create a customs territory between the European Union and the United Kingdom, would be applied until final agreement had been reached regarding future relations between the UK and the EU, including an alternative solution for avoiding a physical border on the island of Ireland.

The political declaration establishes the parameters for negotiating an "ambitious, broad, deep and flexible partnership" across trade and economic cooperation and also in several other fields, including foreign policy, security and defence. The intention is that trade in goods between the EU and the UK will be handled through a "free trade area combining deep regulatory and customs cooperation".

Major potential economic consequences

Since 2016, the uncertainty created by the result of the 'Brexit' referendum has been reflected in the movements of the UK currency, the pound sterling, and in a slowdown of the UK's domestic demand. While these changes have had an impact on market conditions for Belgian exporters, at this stage overseas trade data does not suggest any disruption in goods trading between Belgium and the United Kingdom. Moreover, Belgium's trade surplus vis-à-vis the UK has remained high, standing at around € 6.7 billion in 2017 and totalling some € 4.5 billion for the first nine months of 2018.

Figure 1.16: Repercussions of Brexit on the sterling exchange rate and on Belgium's trade with the UK

Euro/sterling exchange rate

Change in the level of Belgium's trade in goods with the UK
(Value indices [2010 = 100]: average of the three preceding months)
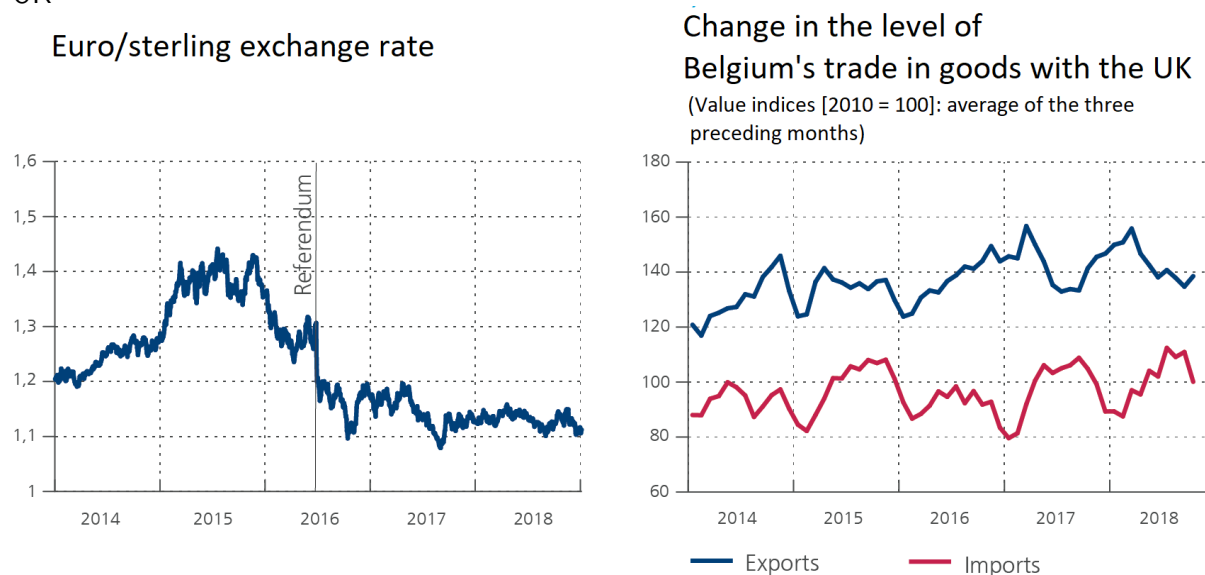
Source: Thomson Reuters, NBB

A number of studies have given an estimate of the long-term economic costs of Brexit. In the absence of agreement on more favourable future relations than those established under the basic principles of the World Trade Organization (WTO), these costs could be quite high. If we take into account only the consequences of the higher costs of trade due to customs tariffs and non-tariff barriers, the impact in terms of loss of GDP would be over 3% for the United Kingdom and for Ireland. It would be 1% for Belgium, i.e. higher than the EU average (0.6% of GDP). However, these impacts would be substantially reduced if an agreement on a closer relationship were to be reached.

Nevertheless, Brexit will have an impact on more than just trade. If current uncertainties persist, it is also likely to affect the economies of the UK and the EU member states as a whole. It might also reduce the appeal of the British economy as regards direct foreign investment and worker immigration, and the country's lower level of integration into the EU economy could put the brakes on any increase in productivity in the long term. Moreover, most studies estimate that the macroeconomic cost of Brexit could be even higher for the United Kingdom, rising as high as 10% of GDP, or even higher according to some extreme scenarios.

Impact on Belgian companies

In addition to the impact described above, Belgium has a wider exposure to the United Kingdom. Some 3.8% of Belgian value added stems from British end-customer demand.

A large number of Belgian companies trade goods and services with the United Kingdom. VAT data for the year 2017 indicates that over 41 000 firms are direct exporters and/or importers. In addition,

taking into account the links that many other Belgian firms have as suppliers to companies directly exporting to or importing from the UK, close to 67% of all Belgian firms are impacted by demand from the United Kingdom. Similarly, 24% of all Belgian companies obtain supplies directly from the British market or through importers, and thus risk having to face increases in production costs because of the higher cost of goods coming from the UK[7]. The number of firms which might be affected rises considerably when indirect supplier relationships are taken into account.

Figure 1.17: Belgium is likely to be quite highly impacted by a hard Brexit (WTO scenario) (Median loss in percentage points of GDP, based on seven studies - deviation compared with a scenario in which the United Kingdom remains in the European Union)
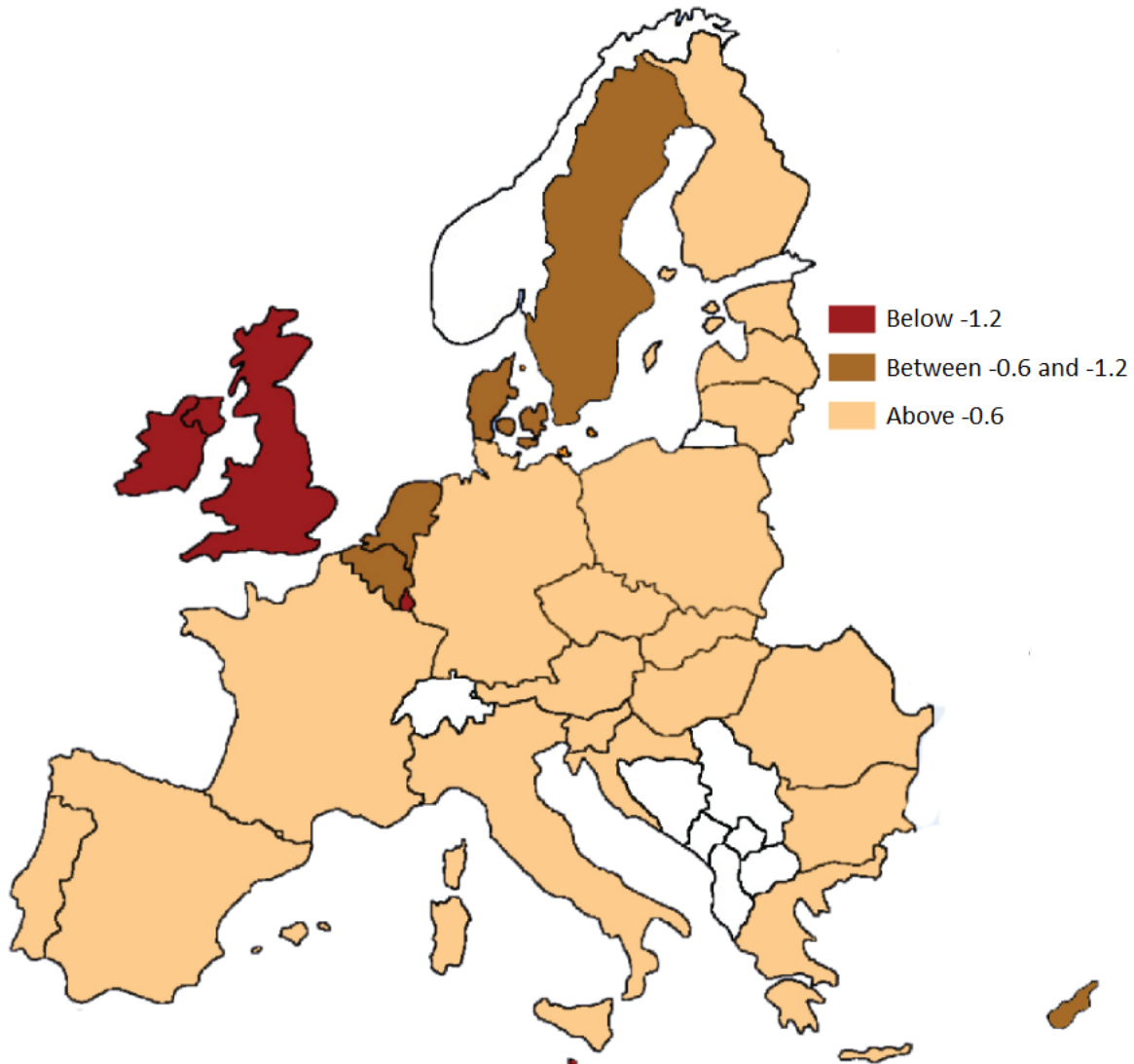
Source: Patrick Bisciari (2019), A survey of the long-term impact of Brexit on the UK and on the EU27 economies, NBB, Working Paper 366, https://www.nbb.be/fr/articles/survey-long-term-impact-brexit-uk-and-eu27-economies

Of the companies which export to the United Kingdom, close to 8 000 SMEs will be particularly affected. In 2017, for some 20% of these firms, the UK was the destination for over half of their exports within the EU. A large number of companies are also likely to be penalised by a lack of

---

[7]See: Emmanuel Dhyne and Cedric Duprez (2017), Its a small, small world A guided tour of the Belgian production network, *International Productivity Monitor*, 32, 84-96

understanding of the administrative procedures for exporting outside the EU, over and above the tariffs which might affect them directly.

It is estimated that around a third of all exporters to the United Kingdom have, to date, no experience of the customs procedures that apply to exports outside the European Union.

Table 1.9: Number of Belgian companies engaged in trading goods and/or services with the United Kingdom (2017)

	Exporting companies	Importing companies	Companies which both export and import
Total of which:	18 510	28 400	5 805
Companies employing less than 50 FTE staff	7 963	11 214	n.
Companies for which the United Kingdom represents at least 50% of their exports within the EU	6 105	n.	n.
Companies with no past experience of procedures for exporting outside the EU	6 067	n.	n.

Source: NBB

The imposition of barriers - tariff barriers but more importantly non-tariff barriers, such as drawing up specific compliance rules for the UK market - would affect the size of trade flows. This would therefore have an impact on the Belgian logistics and maritime transport sectors. If no agreement is reached, the fishing sector will also be severely affected, as companies in this sector will no longer enjoy access to British waters.

1.7.2 The new US protectionism

Another threat to Belgian trade comes from the aggressive trade policy that President Trump favours. The Trump administration has decided to impose new customs duties on a series of products imported into the United States - inter alia solar panels, washing machines, steel and aluminium. These measures are aimed first and foremost at China, which has been accused of unfair trade practices and intellectual property theft. However, they have also affected other trading partners, including EU countries. In 2018 the Trump administration launched an inquiry into imports from EU countries in the automobile sector. Meanwhile, most of the trade partners affected by the new customs duties on steel and aluminium have responded with retaliatory measures on US products.

Belgian value added generated from United States imports of goods and services across the board amounted to some 4.1% of Belgium's GDP over the 2009-2011 period. This percentage is lower than that of the more established trading partners of the United States, such as Canada (15.6%) and Mexico (14.2%), but is relatively high in comparison with the percentages of other European countries, for example Germany (3.6%) and France (2.2%). The figure for Belgium highlights the overall exposure of the Belgian economy to US imports. It shows what the Belgian economy stands to lose in terms of business if ever the United States were to simply close itself off to exports from abroad.

Taken by themselves, the macroeconomic impact of the recently-adopted protectionist measures are relatively limited. For instance, Belgian value added arising from US imports of base metals -

including steel and aluminium - amounts to just 0.07% of Belgium's GDP. The companies concerned, including their supply chains, will nevertheless be adversely affected to a considerable degree.

As a supplier to both China and the United States, Belgium is indirectly involved in trade between the two countries. During the 2009-2011 period [8], Belgium contributed to Chinese exports to the United States to the extent of 0.14% of its GDP. In the other direction, Belgium contributed the equivalent of 0.03% of its GDP to US exports into China.

Lastly, Belgium's exposure to US car imports amounts to 0.14% of its GDP. This exposure is mainly indirect, i.e. it reflects Belgian production incorporated into the manufacture of products abroad which are destined for the US market. One example is car parts made in Belgium which are incorporated into the assembly lines of German cars exported to the United States.

---

[8]Data on value added arising from international trade is based on input-output matrices which are only published once every five years and with a three-year time-lag.

2 Analysis by port

2.1 Port of Antwerp

2.1.1 Port developments

In 2017, the port of Antwerp achieved a record volume of traffic for the fifth year running: 223.7 million tonnes. All forms of transshipment recorded growth, except dry bulk (-3.6%). Container traffic grew by 4.3% in 2017 to a total of 123.0 million tonnes (10.45 million TEU, a new record). Liquid bulk increased by 5.7% compared to 2016. Roll-on Roll-off traffic and conventional cargo were up by 10.5% and 4.8% respectively.

The traffic mix at the port of Antwerp has changed considerably over the past 10 years. In 2007 containers accounted for almost 52% of the total volume. By 2017 that share had risen to 55%. Over those 10 years, containerisation reduced the share of conventional cargo from 11% to less than 5%. The share of dry bulk declined from 13% to about 5%. In contrast, liquid bulk increased strongly from 22% to 33% of total traffic in 2017.

In 2018, the handled freight volume in the port of Antwerp grew by a further 5.2% to reach 235.2 million tonnes. Container freight is continuing to expand strongly, now totalling 130.9 million tonnes (+6.4%). Liquid and dry bulk are up by 3.6% and 7.2% respectively, while conventional cargo stabelized.

According to the Antwerp Port Authority the maximum container capacity will very soon be reached, so that additional container handling capacity is urgently needed. From among the many alternatives, the Flemish government has selected Alternative 9, which will be further tweaked in nautical and operational terms. This alternative confines expansion to the south of the new Saeftinghedok, and has the advantage of a limited impact on nature and mobility, as well as preserving the village of Doel.

The Antwerp Port Authority wants to create a sustainable future for the port by focusing on mobility (by reducing the proportion of road transport and thus increasing the share for barge and railway transport), digital transformation (by means of NxtPort), energy transition and innovative sustainability projects.

The port of Antwerp is home to the largest integrated chemical cluster in Europe. Several international chemical giants are still investing in the port of Antwerp. In the coming years the level of investment will remain significant as Ineos and Borealis both plan to build a propane dehydrogenisation plant with a price-tag of respectively € 3 billion and € 1 billion.

Tank storage companies have accounted for a major share of investment in the cargo handling sector in recent years. New terminal projects will keep investment in this sector at a substantial level.

The Antwerp Port Authority is still in search of an investor or concession-holder for the Churchill Industrial Zone project site. This is a multimodal site covering an area of approximately 88 hectares near the Churchill dock in the Port of Antwerp. This attractive industrial investment opportunity is situated in the heart of the main integrated industrial and logistics platform of Europe.

At the time of writing, not all final figures were available. The most recent situation of the volumes are to be found via the website `http://www.vlaamsehavencommissie.be/vhc/thema/statistiek-vlaamse-havens`.

Table 2.1: Maritime traffic at the port of Antwerp (million tonnes)

	2015	2016	2017	Change 2016-17 (%)	Share 2017 (%)
Containers	113.3	117.9	123.0	4.3	55.0
Roll-on Roll-off	4.7	4.6	5.1	10.5	2.3
Conventional cargo	10.0	9.8	10.3	4.8	4.6
Liquid bulk	66.7	69.2	73.2	5.7	32.7
Dry bulk	13.8	12.6	12.2	-3.6	5.5
Total	208.4	214.1	223.7	4.4	

Source: Port Authority, Flemish Port Commission

2.1.2 Value added

Table 2.2 shows direct and indirect value added at the port of Antwerp over the 2012-2017 period. Between 2016 and 2017, direct value added increased from € 10 791 million to € 11 453 million. As a result of this 6.1% increase, direct value added reached an all-time high. Indirect value added totalled around 81% of direct value added in 2017.

Table D.1 in Annex D shows value added at the port of Antwerp in detail, together with the respective shares of the component economic sectors and their changes over the years. Direct value added is broken down into a maritime and a non-maritime cluster, each of which is further subdivided into the contributing sectors. In terms of value added, the port of Antwerp is mainly (68.5%) non-maritime. Nevertheless, the maritime cluster, which accounts for almost a third of value added, is still very important. Value added in the maritime cluster shrank by 2.0%, while that of the non-maritime cluster was up 10.3%.

The chemical industry, which accounted for a 31.9% share of value added, was the most important sector at the port of Antwerp in 2017. Cargo handling was the second largest sector at the port with a 15.8% share, followed by the fuel production industry with 10.3%. The decline in value added in the maritime cluster was largely due to the shipping companies (-31.7%), whose share fell from 6.1% to 3.9%.

The shares in value added achieved by shipping agents and forwarders, a component of the maritime cluster, showed a downward trend in the 2012-2017 period, while the chemical industry's share grew during the period. Because of its size, this sector has an impact on the other sectors' shares of value added. The shares of both the trade sector and fuel production grew modestly, but almost continuously. Meanwhile the energy sector, car manufacturing, the metalworking industry and 'other land transport' lost share over the years.

The last column in Table 2.2 shows the contribution of each component to total growth over the 2016-2017 period. As the share of the non-maritime cluster is twice as large as the maritime cluster, it was, with 6.8%, entirely responsible for the overall growth. The contribution of the maritime cluster to total growth was slightly negative (-0.7%). Biggest contributing sectors to total growth in 2017 were cargo handling, trade, fuel production, chemical industry and 'other logistic services'.

Note that the contributions to total growth in this table differ from each components' own growth[9]. This is illustrated in Figure 2.1. The left-hand panel shows the sector's own growth for the 2012-2017 period, while the right-hand panel shows the sector's contribution to the port's total growth for this period. The latter takes into account the sector's own growth and its share in the port's activities (see Annex D.1.1 for details).

---

[9]The contribution of a sector to the total growth equals its share in 2016 times the sectoral growth over 2016-2017 period. See Annex A.1

The figure shows that the maritime cluster's contribution to growth in value added seems to be driven by the shipping companies. Although shipping companies do not have the largest weighting, this sector nevertheless posted extremely high growth rates and its contribution is a combination of weight and growth. Meanwhile the non-maritime cluster's contribution to growth appears to be moving in step with growth in the chemical industry and fuel production. As these two are the largest non-maritime sectors they consequently carry more weight.

Changes in commodity prices and sales prices can impact the evolution of value added in a given sector. Other determinants are mergers, restructuring, failures, business relocation and the establishment of new companies. Higher depreciation due to investment programmes or the recording, reversal of impairments and provisions in the annual accounts can also influence the evolution of value added. Electrabel reduced allocations for nuclear provisions in its 2017 annual accounts and also felt the impact of the diminished availability of its nuclear power generation units. Kuwait Petroleum recorded a higher taxation figure on the sale of petroleum products. Several companies recorded higher depreciation as a result of prior investments. BASF Antwerpen benefited from sales price increases. Growth in traffic volume at the port led the employers' organisation CEPA to hire more dockers, and thus pay higher personnel costs. The value added of several shipping companies was impacted by a sharp decline in freight rates.

Direct value added at the port of Antwerp shows a rather high degree of concentration: 5% of the companies accounted for almost 80% of direct value added, while 13 companies generated half of all value added. This is illustrated in Figure 2.3. The top 10 companies in terms of value added are listed in Table 2.3.

Table 2.2: Antwerp, value added (million €)

	2012	2013	2014	2015	2016	2017	Contr.gr (%)[*]
Cargo handling	1 481.2	1 563.3	1 604.8	1 665.0	1 697.7	1 803.9	1.0
Shipping agents and forwarders	591.3	631.6	593.1	632.8	603.0	607.8	0.0
Shipping companies	558.1	368.0	438.8	739.8	661.6	451.8	-1.9
Other Maritime	708.6	718.3	686.3	749.7	714.9	740.3	0.2
Maritime	3 339.2	3 281.2	3 323.0	3 787.3	3 677.2	3 603.8	-0.7
Chemical industry	2 946.1	2 944.2	3 113.2	3 421.9	3 165.2	3 653.5	4.5
Fuel production	970.8	806.2	824.9	1 064.5	1 066.4	1 182.4	1.1
Trade	903.6	855.1	917.0	908.1	997.9	1 065.8	0.6
Other Non-maritime	1 896.1	1 914.0	1 831.1	1 816.4	1 884.3	1 947.2	0.6
Non-maritime	6 716.6	6 519.6	6 686.2	7 210.9	7 113.7	7 849.0	6.8
Direct	10 055.9	9 800.7	10 009.2	10 998.2	10 790.9	11 452.7	6.1
Indirect	9 029.9	8 525.2	8 478.5	9 222.4	8 647.6	9 284.3	
Total	19 085.8	18 326.0	18 487.7	20 220.6	19 438.6	20 737.0	

[*] *For details, see Annex A.1*
Source: NBB

Table 2.3: Top 10 Value added, Antwerp

Rank	Name	Sector
1	BASF Antwerpen	Chemical industry
2	Kuwait Petroleum (belgium)	Trade
3	Exxonmobil Petroleum & Chemical	Fuel production
4	Centrale Der Werkgevers Aan De Haven Van Antwerpen	Cargo handling
5	Total Raffinaderij Antwerpen	Fuel production
6	Antwerp Port Authority	Port authority
7	Electrabel	Energy
8	Covestro	Chemical industry
9	Evonik Antwerpen	Chemical industry
10	Lanxess	Chemical industry

Source: NBB

Figure 2.1: Value added at the port of Antwerp
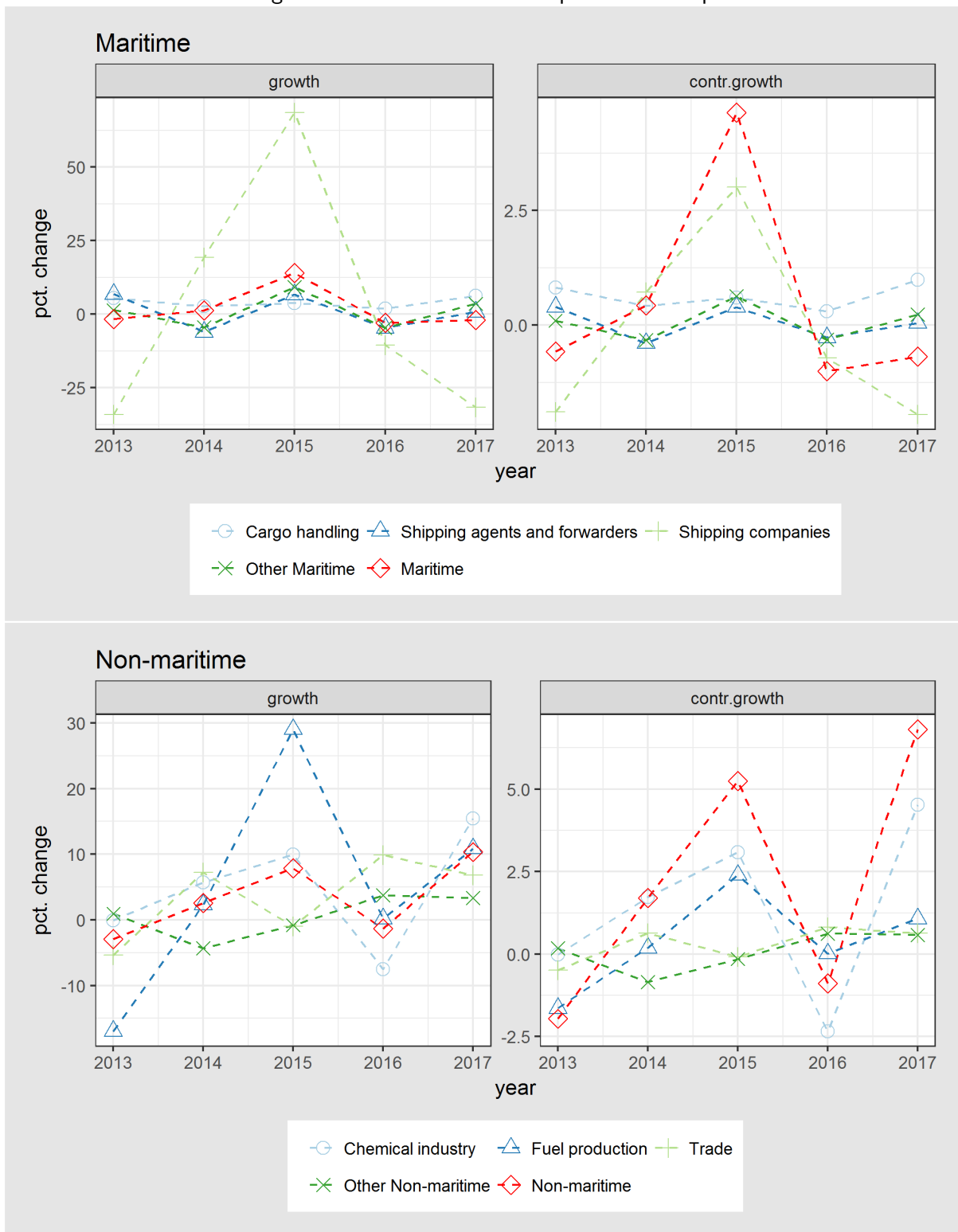
Source: NBB

2.1.3 Employment

Table 2.4 shows direct and indirect employment at the port of Antwerp over the 2012-2017 period. Between 2016 and 2017, the number of direct full-time equivalent jobs rose by 1.2%, from 61 016 to 61 737 FTE. Indirect employment totalled around 133% of direct employment in 2017.

Table D.2 in Annex D shows employment at the port of Antwerp in detail, together with the respective shares of the component economic sectors and their changes over the years. Direct employment is broken down into a maritime and a non-maritime cluster, each of which is further subdivided into the contributing sectors. The maritime cluster employed 45.3% of the workforce at the port of Antwerp (compared to 31.5% of value added), while 54.7% of the personnel at the port were employed in the non-maritime cluster (compared to 68.5% of value added in this cluster). Employment in both clusters expanded by 1.2%.

With almost a quarter of direct employment, cargo handling was the leading employer at the port of Antwerp in 2017. The chemical industry followed in second place with 17.8%. The 10.7% share taken by the shipping agents and forwarders shows the importance of logistics for the port of Antwerp.

The maritime and non-maritime cluster's shares of total employment were relatively stable between 2012 and 2017. However, cargo handling saw its share grow every successive year, in contrast to the public sector and the Antwerp Port Authority. In the non-maritime cluster, most sectors remained quite stable, although car manufacturing and 'other land transport' lost employment over the years, in contrast with the growing share of 'other logistic services'.

The last column in Table 2.4 shows the contribution of each component to total growth over the 2016-2017 period. Both the maritime and non-maritime cluster made a contribution to growth of 0.5% and 0.6% respectively, by recruiting additional staff. The sectors making the biggest contribution to employment growth in 2017 were cargo handling, the chemical industry and 'other logistic services'.

Note that the contributions to total growth in this table differ from each components' own growth[10]. This is illustrated in Figure 2.2. The left-hand panel shows the sector's own growth for the 2012-2017 period, while the right-hand panel shows the sector's contribution to the port's total growth for this period. The latter takes into account the sector's own growth and its share in the port's activities (see Annex D.1.2 for details).

The figure shows that the maritime cluster's contribution to employment growth appears to be driven by cargo handling. Meanwhile, the non-maritime cluster's contribution to growth appears to be moving in step with the 'other non-maritime' group.

Mergers, restructuring, relocations of business, failures and establishment of new companies have an impact on the evolution of employment in a specific sector. Electrabel allocated more personnel to the power plants at the port of Antwerp. Growth in traffic volume at the port led the employers' organisation CEPA to recruit more dockers. Meanwhile, several companies in the chemical industry also recruited additional staff.

Direct employment at the port of Antwerp shows a rather high degree of concentration: 5% of the companies accounted for 79% of direct employment, while 13 companies employed almost half of all personnel. This is illustrated in Figure 2.3. The top 10 companies in terms of employment are listed in Table 2.5.

---

[10]The contribution of a sector to the total growth equals its share in 2016 times the sectoral growth over 2016-2017 period. See Annex A.1

Figure 2.2: Employment at the port of Antwerp
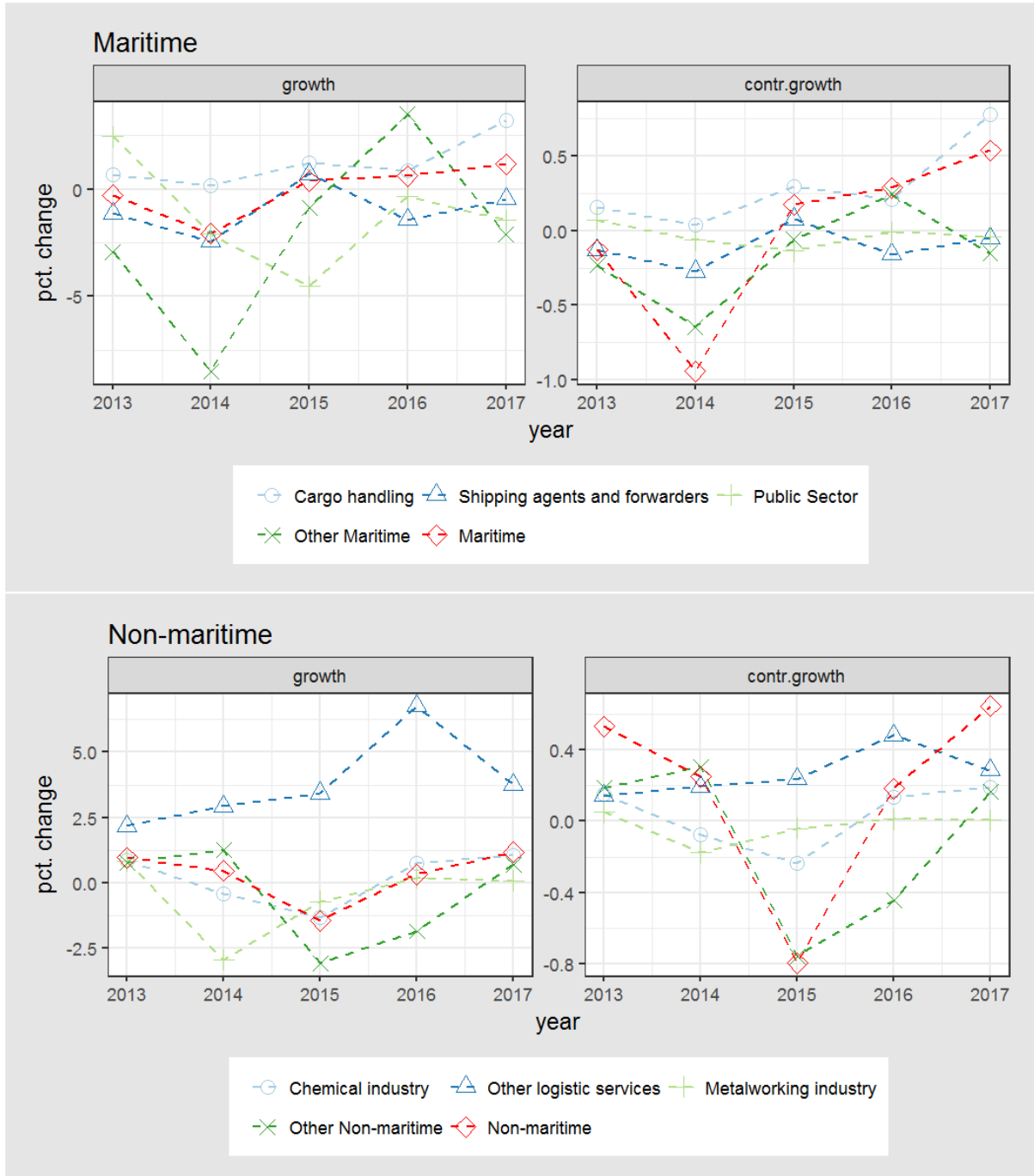
Source: NBB

Figure 2.3: Concentration in the port of Antwerp
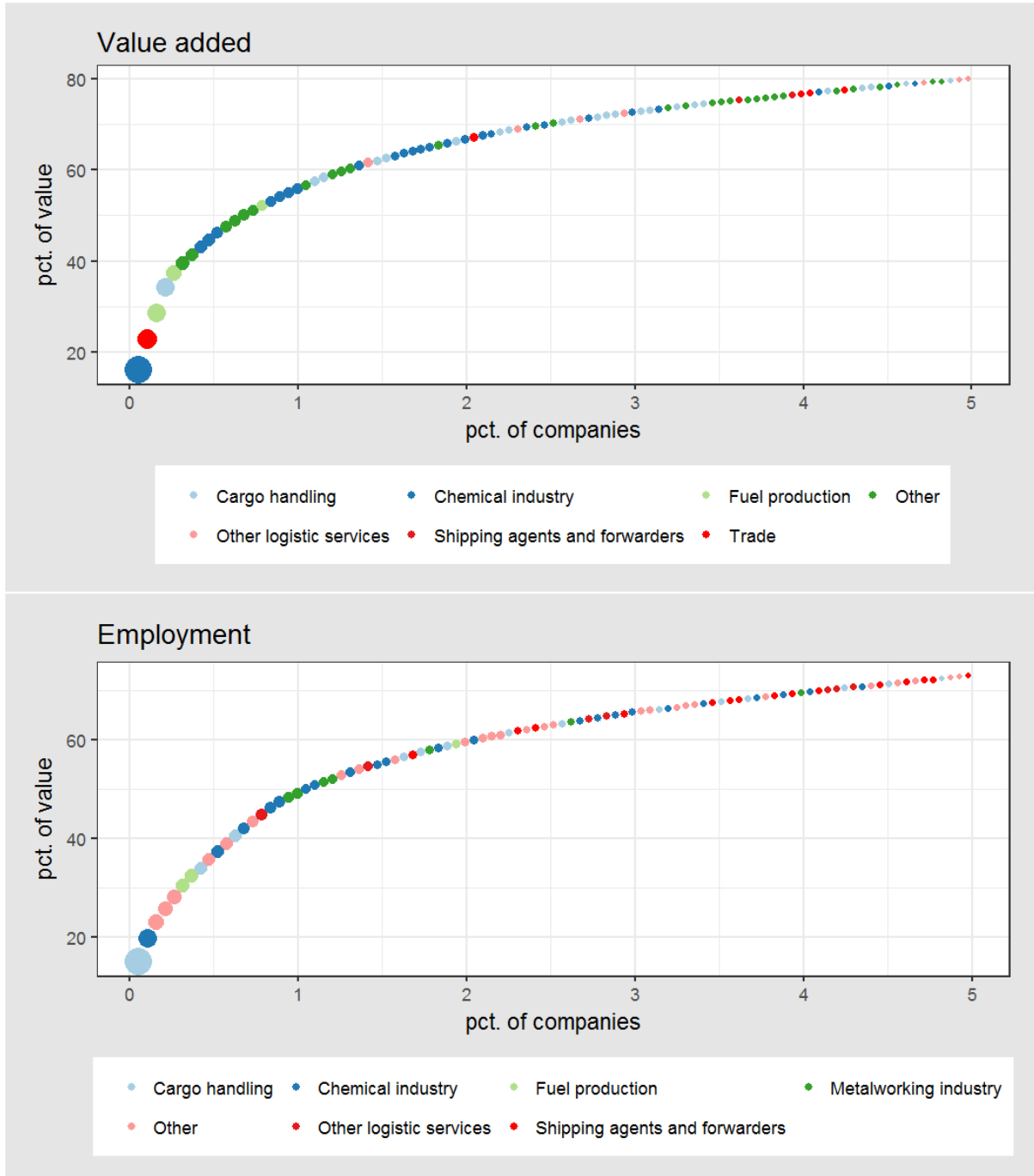
Source: NBB

Table 2.4: Employment at the port of Antwerp (FTE)

	2012	2013	2014	2015	2016	2017	Contr.gr (%)[*]
Cargo handling	14 462	14 558	14 581	14 760	14 886	15 362	0.8
Shipping agents and forwarders	6 947	6 868	6 701	6 748	6 653	6 622	-0.1
Public Sector	1 822	1 867	1 828	1 745	1 740	1 714	-0.0
Other Maritime	4 809	4 668	4 271	4 235	4 383	4 290	-0.2
Maritime	28 041	27 961	27 381	27 488	27 662	27 989	0.5
Chemical industry	10 889	10 982	10 936	10 794	10 874	10 990	0.2
Other logistic services	3 974	4 061	4 180	4 324	4 617	4 791	0.3
Metalworking industry	3 656	3 687	3 579	3 554	3 560	3 563	0.0
Other Non-maritime	14 733	14 848	15 035	14 573	14 304	14 404	0.2
Non-maritime	33 253	33 578	33 731	33 244	33 355	33 748	0.6
Direct	61 294	61 539	61 112	60 732	61 016	61 737	1.2
Indirect	82 579	82 375	79 900	83 981	84 193	82 447	
Total	143 873	143 914	141 012	144 713	145 209	144 183	

[*] *For details, see Annex A.1*
Source: NBB

Table 2.5: Top 10 Employment, Antwerp

Rank	Name	Sector
1	Centrale Der Werkgevers Aan De Haven Van Antwerpen	Cargo handling
2	BASF Antwerpen	Chemical industry
3	BNRC Group	Other land transport
4	Public Sector	Public Sector
5	Antwerp Port Authority	Port authority
6	Total Raffinaderij Antwerpen	Fuel production
7	Exxonmobil Petroleum & Chemical	Fuel production
8	Electrabel	Energy
9	Evonik Antwerpen	Chemical industry
10	Dredging International	Port construction and dredging

Source: NBB

2.1.4 Investment

Table 2.6 shows investment at the port of Antwerp over the 2012-2017 period. Between 2016 and 2017, investment contracted by 1.7%, from € 3 502 million to € 3 442 million.

Table D.3 in Annex D shows investment at the port of Antwerp in detail, together with the respective shares of the component economic sectors and their changes over the years. Investment is broken down into a maritime and a non-maritime cluster, each of which is further subdivided into the contributing sectors. The maritime cluster contributed 46.2% of the total investment at the port of Antwerp, while 53.8% of the investment at the port was related to the non-maritime cluster, which saw a 1% increase. Conversely, investment in the maritime cluster declined by 4.7%.

In 2017, the chemical industry remained the largest investor at the port of Antwerp, with a 23.6% share. Cargo handling was ranked second with a 20.3% share. Other important investors were fuel production and shipping companies. However, this latter sector almost halved the amounts invested during the period. Conversely, the port construction and dredging sector saw a nine-fold increase in its investment and this sector accounted for 9.7% of total investment at the port of Antwerp in 2017.

The evolution of the shares of overall investment within the maritime cluster during the 2012-2017 period was dominated by the volatility in levels of investment by shipping companies. As a result of the declining investment at these companies, cargo handling took over as the leading investor in the cluster. In the non-maritime cluster, the chemical industry is the undisputed major investor. Its share in total investment remained quite stable during the period. Meanwhile, investment in the energy sector continues to grow.

The last column in Table 2.6 shows the contribution of each component to total growth over the 2016-2017 period. The non-maritime cluster made a positive contribution to the overall increase (+0.5%), while the maritime cluster's contribution to total investment growth was negative. The sectors contributing most to total investment growth in 2017 were port construction and dredging, the energy sector and 'other industries'.

Note that the contributions to total growth in this table differ from each components' own growth[11]. This is illustrated in Figure 2.4. The left-hand panel shows the sector's own growth for the 2012-2017 period, while the right-hand panel shows the sector's contribution to the port's total growth for this period. The latter takes into account the sector's own growth and its share in the port's activities (see Annex D.1.3 for details).

The figure shows that the maritime cluster's contribution to investment growth appears to be driven by the shipping companies, while the non-maritime cluster's contribution appears to be moving in step with growth in the chemical industry and fuel production. As the two sectors are the largest in their cluster, they consequently carry greater weight.

The pattern of investment is closely linked to projects and is therefore highly volatile, so that the figures require a nuanced interpretation. Several companies in the DEME dredging group invested in vessels. The energy sector benefited not only from maintenance investments by electricity producer Electrabel, but also from the construction of wind turbines in the port area by Vleemo and Wind aan de stroom, and the new industrial steam network of Ecluse. Meanwhile, Total Refinery Antwerpen is going ahead with its Optara-project, whose purpose is to adapt its fuel production site. ExxonMobil Petroleum & Chemical is completing the construction of its new delayed coker unit, a $US 1 billion project designed to enable the production of higher-value products. EBE has bought dry bulk carriers in order to commence activities as a shipping company. Norwegian company Kebony is building a

---

[11]The contribution of a sector to the total growth equals its share in 2016 times the sectoral growth over 2016-2017 period. See Annex A.1

wood plant. Cargo handling has benefited from a number of storage tank projects. Meanwhile, the Antwerp Port Authority has invested in offices, container terminals and quays. The top 10 companies in terms of investment are listed in Table 2.7.

Table 2.6: Investment at the port of Antwerp (million €)

	2012	2013	2014	2015	2016	2017	Contr.gr (%)
Cargo handling	619	493	579	612	675	700	0.7
Shipping companies	384	433	1 010	589	737	405	-9.5
Port construction and dredging	93	15	27	71	34	335	8.6
Other Maritime	293	291	215	188	221	150	-2.0
Maritime	1 388	1 232	1 831	1 460	1 668	1 589	-2.3
Chemical industry	490	577	737	692	792	812	0.6
Fuel production	127	239	418	525	617	420	-5.6
Energy	76	75	108	167	142	249	3.1
Other Non-maritime	257	251	225	249	284	372	2.5
Non-maritime	950	1 141	1 489	1 633	1 834	1 853	0.5
Direct	2 338	2 373	3 320	3 093	3 502	3 442	-1.7

Source: NBB

Table 2.7: Top 10 Investment, Antwerp

Rank	Name	Sector
1	Dredging, Environmental & Marine Engineering	Port construction and dredging
2	Exxonmobil Petroleum & Chemical	Fuel production
3	BASF Antwerpen	Chemical industry
4	Total Raffinaderij Antwerpen	Fuel production
5	Electrabel	Energy
6	Nippon Shokubai Europe	Chemical industry
7	Euronav	Shipping companies
8	Total Olefins Antwerp	Chemical industry
9	Dredging International	Port construction and dredging
10	Exmar Marine	Shipping companies

Source: NBB

Figure 2.4: Investment at the port of Antwerp
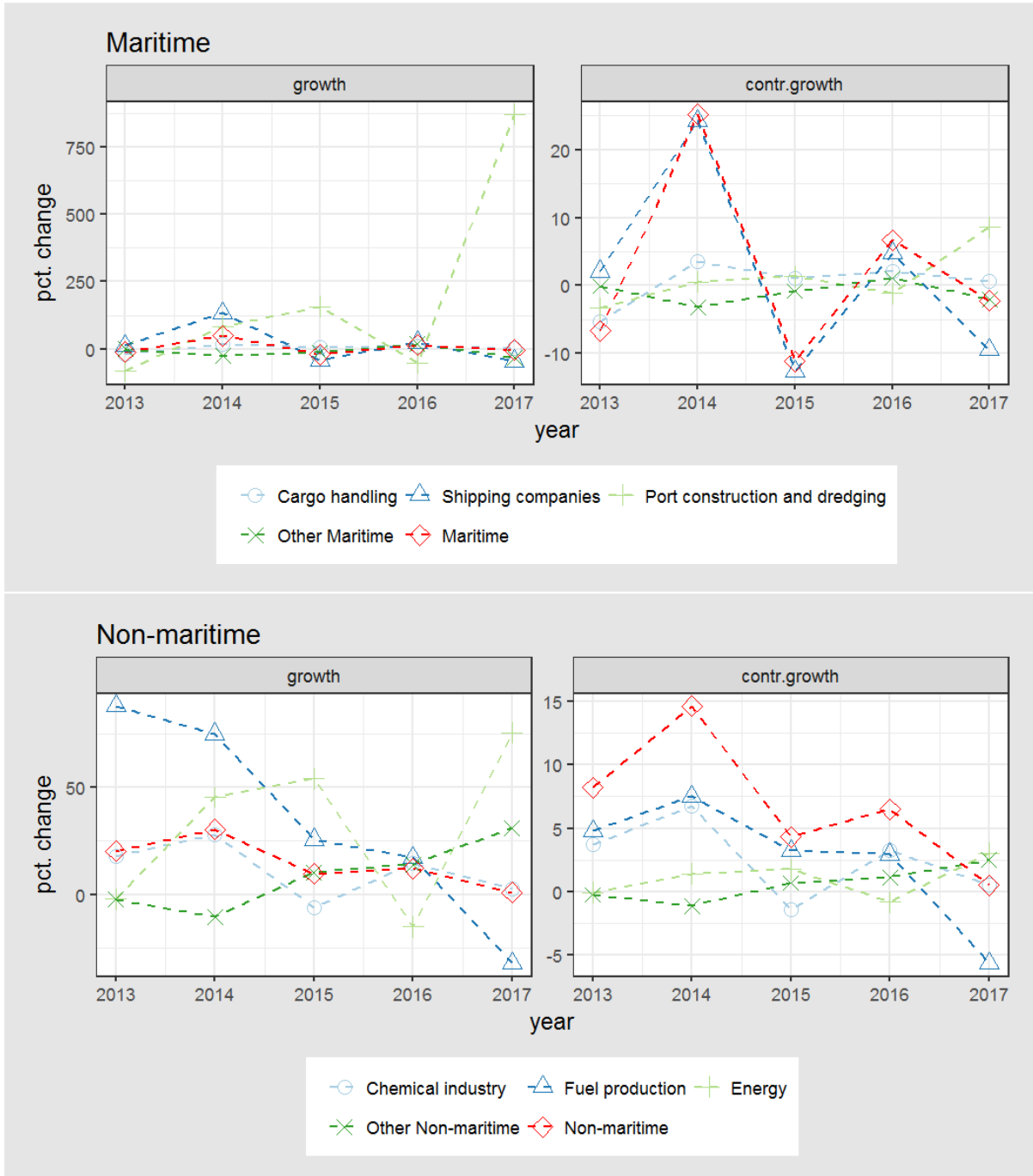
Source: NBB

2.2 Port of Ghent

2.2.1 Port developments

Total traffic handled by the port of Ghent increased strongly again in 2017: from 29.1 million tonnes in 2016 to 32.5 million tonnes (+11.7%). Dry bulk, accounting for almost 65% of the total volume, was up by 18.8% at 21.1 million tonnes. Following a substantial rise in 2016, liquid bulk declined slightly in 2017 (-1.7%). RoRo and container traffic increased (up by 11.4% and 3.8% respectively) and conventional cargo declined by 2.5%.

In December 2017, the port of Ghent and Zeeland Seaports merged to become North Sea Port. The merged port handled a total volume of 66.6 million tonnes, making it the tenth largest port in Europe.

In 2018, the Ghent port area handled 32.6 million tonnes, a very limited increase.

As in previous years, the principal infrastructure project for the port of Ghent in 2017 was the new lock in Terneuzen on Dutch territory. This new lock will enable the port of Ghent and Terneuzen to receive vessels up to 120 000 dwt. The project with a price tag of € 753 million is scheduled for completion in 2022.

Table 2.8: Maritime traffic at the port of Ghent (million tonnes)

	2015	2016	2017	Change 2016-17 (%)	Share 2017 (%)
Containers	0.3	0.1	0.1	3.8	0.4
Roll-on Roll-off	2.1	2.1	2.4	11.4	7.2
Conventional cargo	3.6	3.7	3.6	-2.5	11.1
Liquid bulk	3.7	5.4	5.3	-1.7	16.4
Dry bulk	16.7	17.7	21.1	18.8	64.8
Total	26.4	29.1	32.5	11.7	

Source: Port Authority, Flemish Port Commission

At the time of writing, not all final figures were available. The most recent situation of the volumes are to be found via the website `http://www.vlaamsehavencommissie.be/vhc/thema/statistiek-vlaamse-havens`.

2.2.2 Value added

Table 2.9 shows direct and indirect value added at the port of Ghent over the 2012-2017 period. Between 2016 and 2017, direct value added increased from € 3 856 million to € 4 374 million. As a result of this 13.4% increase, direct value added reached an all-time high.

Table D.4 in Annex D shows value added at the port of Ghent in detail, together with the respective shares of the component economic sectors and their changes over the years. Direct value added is broken down into a maritime and a non-maritime cluster, each of which is further subdivided into the contributing sectors. In terms of value added, the port of Ghent is mainly (92%) non-maritime. Value added was up in both the maritime and non-maritime cluster over the period, by 5.8% and 14.2% respectively.

The metalworking industry accounted for almost a quarter of direct value added at the port of Ghent in 2017. Trade was the second largest sector with a share of more than one-fifth of value added. Car manufacturing followed at a distance with a 17% share of value added. Together, these three economic sectors accounted for more than 60% of all value added at the port of Ghent. Meanwhile, cargo handling generated the most value added in the maritime cluster.

The metalworking industry's share of value added grew strongly during the 2012-2017 period. Because of its size, this sector has an impact on the shares of the other sectors. During the period, the metalworking industry overtook trade as the largest economic sector in the port of Ghent. The chemical industry showed an almost continuous upward trend over the 2012-2017 period, in contrast to the 'other industries'.

The last column in Table 2.9 shows the contribution of each component to total growth over the 2016-2017 period. As the non-maritime cluster's share of value added is eleven times that of the maritime cluster, it was almost entirely responsible for overall growth (+12.9%). The contribution of the maritime cluster to total growth, at +0.5%, was relatively limited. The sectors contributing most to total growth in 2017 were metalworking, chemical and fuel production industries, and trade.

Note that the contributions to total growth in this table differ from each components' own growth[12]. This is illustrated in Figure 2.5. The left-hand panel shows the sector's own growth for the 2012-2017 period, while the right-hand panel shows the sector's contribution to the port's total growth for this period. The latter takes into account the sector's own growth and its share in the port's activity (see Annex A.1 for details).

The figure shows that the maritime cluster's contribution to growth in value added appears to be driven by cargo handling. Meanwhile, the non-maritime cluster's contribution appears to be moving in step with growth in the metalworking industry. However, the 'other non-maritime' group, especially the chemical industry, also appear to have an impact on growth of value added in the non-maritime cluster.

Changes in commodity prices and sales prices can impact the evolution of value added in a given sector. Other determinants are mergers, restructuring, failures, business relocation and the establishment of new companies. Higher depreciation due to investment programmes or the recording, reversal of impairments and provisions in the annual accounts can also influence the evolution of value added. Steel company ArcelorMittal enjoyed higher sales prices. Total Belgium recorded a higher amount of taxation on the sale of petroleum products. Anglo Belgian Corporation increased its sales of diesel engines. Kronos, a producer of titanium dioxide, achieved higher sales volumes and prices. Oleon experienced greater demand for oleochemicals. Car manufacturer Volvo Car Belgium and truck manufacturer Volvo Group Belgium both recorded higher depreciation and staff costs in their annual accounts.

Direct value added at the port of Ghent shows a rather high degree of concentration: 5% of the companies accounted for 79% of direct value added, while just 5 companies generated more than half of all value added. This is illustrated in Figure 2.7. The top 10 companies in terms of value added are listed in Table 2.10.

---

[12] The contribution of a sector to the total growth equals its share in 2016 times the sectoral growth over 2016-2017 period. See Annex A.1

Figure 2.5: Value added at the port of Ghent
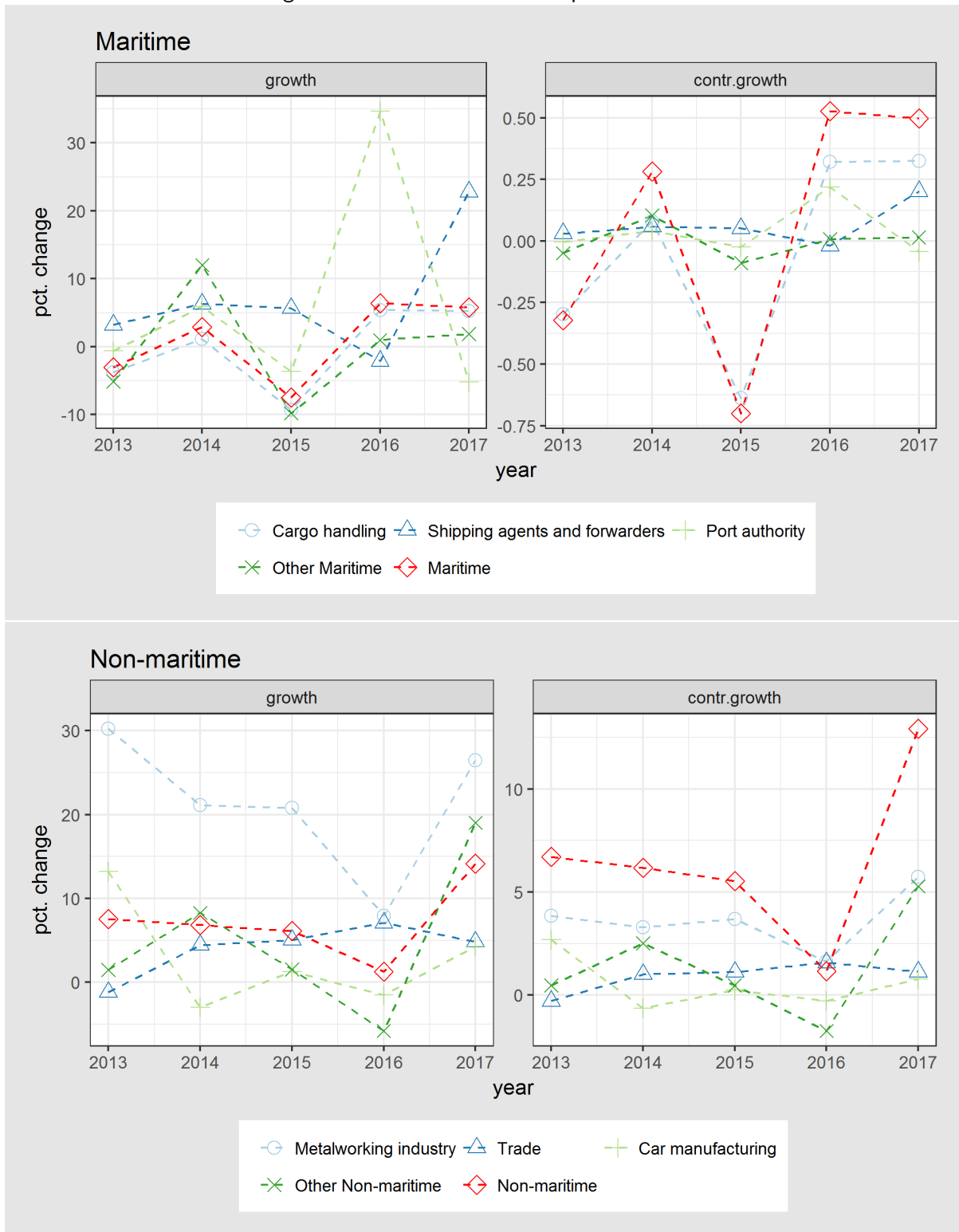
Source: NBB

Table 2.9: Ghent, value added (million €)

	2012	2013	2014	2015	2016	2017	Contr.gr (%)[*]
Cargo handling	254.4	244.9	247.6	224.5	236.7	249.2	0.3
Shipping agents and forwarders	30.1	31.0	33.0	34.8	34.1	41.9	0.2
Port authority	23.6	23.4	24.8	23.9	32.2	30.5	-0.0
Other Maritime	30.9	29.3	32.8	29.6	29.9	30.5	0.0
Maritime	338.9	328.6	338.2	312.9	332.9	352.1	0.5
Metalworking industry	406.3	529.3	641.0	774.3	835.6	1 056.6	5.7
Trade	780.9	771.6	805.9	846.4	906.3	950.0	1.1
Car manufacturing	649.6	735.4	713.5	722.6	711.5	741.9	0.8
Other Non-maritime	1 018.4	1 033.4	1 119.0	1 136.0	1 070.1	1 273.6	5.3
Non-maritime	2 855.1	3 069.7	3 279.4	3 479.3	3 523.4	4 022.1	12.9
Direct	3 194.0	3 398.3	3 617.6	3 792.2	3 856.3	4 374.2	13.4
Indirect	3 259.9	3 565.2	3 735.5	4 020.9	4 041.7	4 610.2	
Total	6 453.9	6 963.5	7 353.1	7 813.1	7 898.0	8 984.4	

[*] *For details, see Annex A.1*
Source: NBB

Table 2.10: Top 10 Value added, Ghent

Rank	Name	Sector
1	Arcelormittal Belgium	Metalworking industry
2	Total Belgium	Trade
3	Volvo Car Belgium	Car manufacturing
4	Volvo Group Belgium	Car manufacturing
5	Belgian Shell	Trade
6	Taminco	Chemical industry
7	Stora Enso Langerbrugge	Other industries
8	Kronos Europe	Chemical industry
9	Cri Catalyst Company Belgium	Chemical industry
10	BP Europa SE	Fuel production

Source: NBB

2.2.3 Employment

Table 2.11 shows direct and indirect employment at the port of Ghent over the 2012-2017 period. Between 2016 and 2017, the number of direct full-time equivalent jobs rose by 1.0%, from 27 977 to 28 262 FTE.

Table D.5 in Annex D shows employment at the port of Ghent in detail, together with the respective shares of the component economic sectors and their changes over the years. Direct employment is broken down into a maritime and a non-maritime cluster, each of which is further subdivided into the contributing sectors. The maritime cluster employed 10.3% of all personnel at the port of Ghent during the period (compared to 8.0% of value added), while 89.7% of the workforce at the port was employed in the non-maritime cluster (compared to 92.0% of value added). Employment increased in both the maritime and non-maritime cluster, by 2.2% and 0.9% respectively.

With almost a third of direct employment, car manufacturing was the largest employer at the port of Ghent in 2017. The metalworking industry took second place with more than a fifth of full-time equivalent jobs. Other major employers were cargo handling and the chemical industry.

The maritime cluster's share in employment fell in the year 2015 as a result of the transfer of personnel from a local supplier, in the cargo handling sector, to car manufacturer Volvo Car Belgium, resulting in a gain in jobs in the non-maritime cluster. However, the cargo handling sector's share of employment rebounded in the following years. Meanwhile, the trade sector saw its share of employment shrink during the period. In contrast, the construction sector gained share.

The last column in Table 2.11 shows the contribution of each component to total growth in employment over the 2016-2017 period. Both the maritime and non-maritime cluster contributed to total growth, by 0.2% and 0.8% respectively, by recruiting additional staff. The sectors making the biggest contribution to total employment growth in 2017 were construction, 'other industries', shipping agents and forwarders, the food industry and 'other logistic services'.

Note that the contributions to total growth in this table differ from each components' own growth[13]. This is illustrated in Figure 2.6. The left-hand panel shows the sector's own growth for the 2012-2017 period, while the right-hand panel shows the sector's contribution to the port's total growth for this period. The latter takes into account the sector's own growth and its share in the port's activities (see Annex A.1 for details).

The figure shows that the maritime cluster's contribution to employment growth appears to be driven by cargo handling, while the non-maritime cluster's contribution appears to be moving in step with growth in the metalworking industry. However, the 'other non-maritime' group, in particular the construction sector, also seems to have an impact on growth in the non-maritime cluster.

Mergers, restructuring, business relocations, failures and the establishment of new companies have an impact on the evolution of employment in a given sector. Car manufacturer Volvo Car Belgium offered permanent contracts to personnel on temporary contracts. Logistics contractors Distri-Log and Logistics & Packaging Solutions created new business establishments at the port of Ghent.

Direct employment at the port of Ghent shows a rather high degree of concentration: 5% of the companies accounted for 72% of direct employment, while just five companies accounted employed almost half of all personnel. This is illustrated in Figure 2.7. The top 10 companies in terms of employment are listed in Table 2.12.

---

[13]The contribution of a sector to the total growth equals its share in 2016 times the sectoral growth over 2016-2017 period. See Annex A.1

Figure 2.6: Employment at the port of Ghent
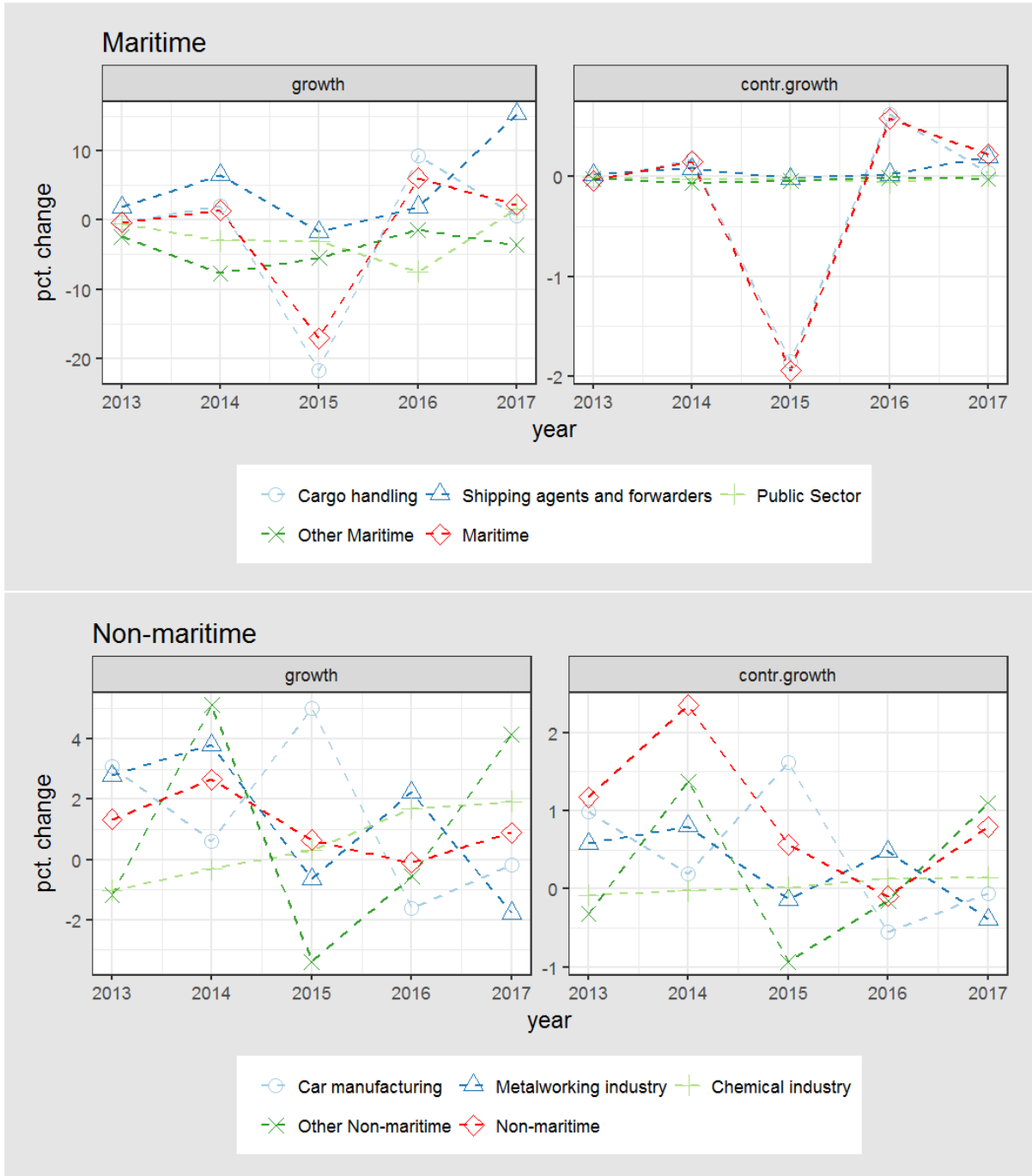
Source: NBB

Figure 2.7: Concentration in the port of Ghent
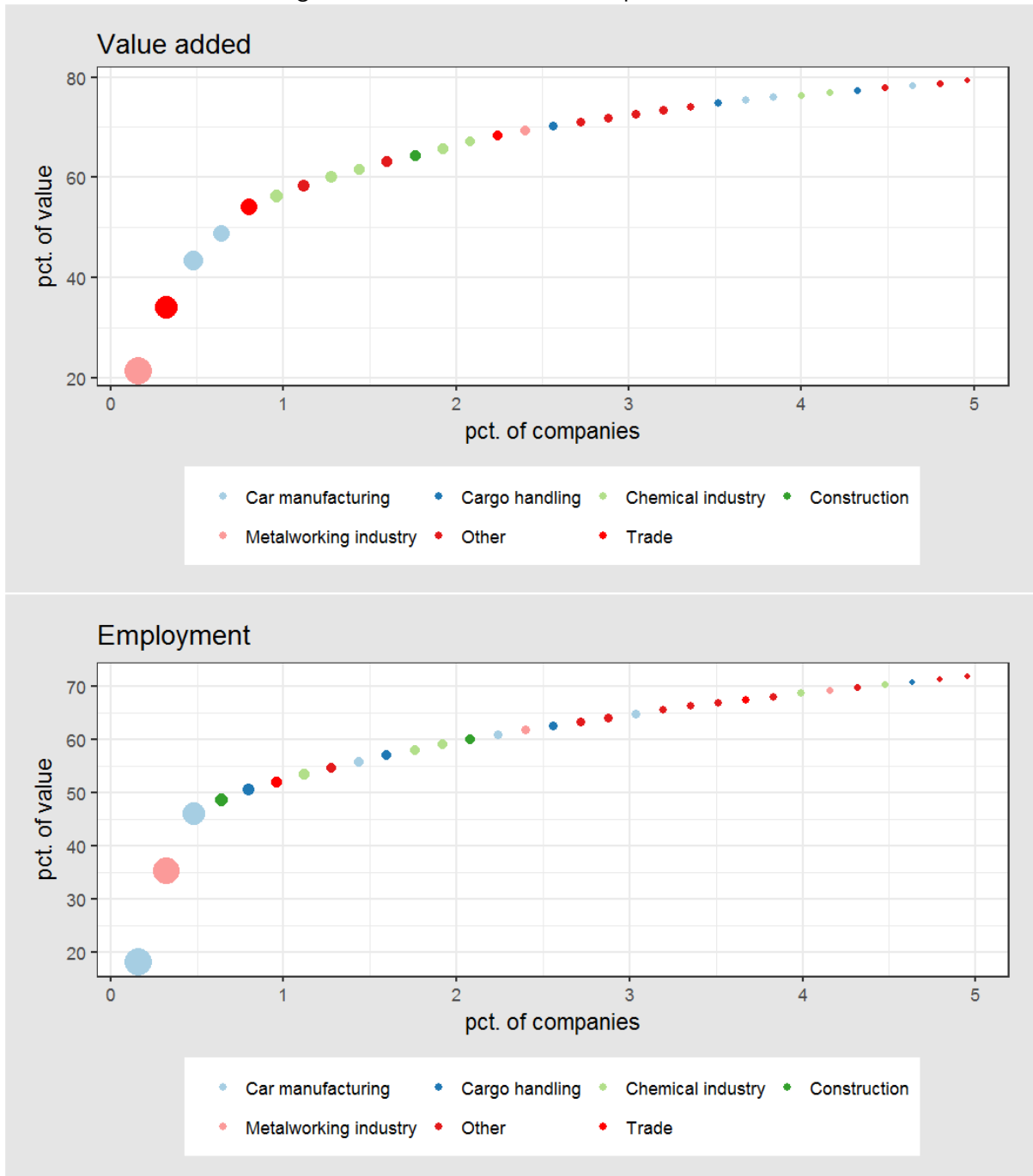
Source: NBB

Table 2.11: Employment at the port of Ghent (FTE)

	2012	2013	2014	2015	2016	2017	Contr.gr (%)[*]
Cargo handling	2 370	2 361	2 407	1 883	2 058	2 069	0.0
Shipping agents and forwarders	332	338	360	354	360	415	0.2
Public Sector	243	242	235	228	211	214	0.0
Other Maritime	246	240	221	209	206	199	-0.0
Maritime	3 191	3 181	3 223	2 673	2 835	2 897	0.2
Car manufacturing	8 762	9 033	9 088	9 544	9 391	9 373	-0.1
Metalworking industry	5 677	5 836	6 057	6 018	6 152	6 043	-0.4
Chemical industry	2 130	2 109	2 102	2 109	2 145	2 186	0.1
Other Non-maritime	7 468	7 381	7 759	7 496	7 454	7 762	1.1
Non-maritime	24 038	24 358	25 006	25 168	25 142	25 365	0.8
Direct	27 229	27 539	28 229	27 841	27 977	28 262	1.0
Indirect	33 527	33 987	34 307	36 318	38 264	36 233	
Total	60 756	61 526	62 537	64 159	66 241	64 495	

[*] *For details, see Annex A.1*
Source: NBB

Table 2.12: Top 10 Employment, Ghent

Rank	Name	Sector
1	Volvo Car Belgium	Car manufacturing
2	Arcelormittal Belgium	Metalworking industry
3	Volvo Group Belgium	Car manufacturing
4	Denys	Construction
5	Centrale Van De Werkgevers Aan De Haven Van Gent	Cargo handling
6	Honda Motor Europe Logistics	Trade
7	Taminco	Chemical industry
8	Stora Enso Langerbrugge	Other industries
9	Plastal	Car manufacturing
10	Ghent Handling And Distribution	Cargo handling

Source: NBB

2.2.4 Investment

Table 2.13 shows investment at the port of Ghent over the 2012-2017 period. Between 2016 and 2017, investment increased by 31.3%, from € 543 million to € 712 million, an all-time high.

Table D.6 in Annex D shows investment at the port of Ghent in detail, together with the respective shares of the component economic sectors and their changes over the years. Investment is broken down into a maritime and a non-maritime cluster, each of which is further subdivided into the contributing sectors. The maritime cluster contributed 23.6% to investment at the port of Ghent during the period. More than three quarters of all investment at the port was related to the non-maritime cluster. Investment was up in both the maritime and non-maritime clusters, by 37.0% and 29.6% respectively.

By 2017, car manufacturing had overtaken the metalworking industry as the largest investor at the port, with a 26.9% share of investment. The shares of the metalworking industry and cargo handling stood at 22.3% and 20.0% respectively. The chemical industry accounted for 9.9% of all investments at the port of Ghent in 2017.

The maritime cluster's share in investment in the 2012-2017 period was the highest in 2017. This was due to higher investment in the dominant sector, cargo handling. As a result, the non-maritime cluster's share of investment moved in the opposite direction. However, the car manufacturing sector's share has been rising rapidly since 2013 so that the share of investment coming from the major investors remained stable, in spite of the strong growth figures.

The last column in Table 2.13 shows the contribution of each component to total growth in investment over the 2016-2017 period. Both the maritime and non-maritime cluster made contributions to the overall increase. The sectors contributing most to total investment growth in 2017 were car manufacturing, cargo handling and the metalworking industry.

Note that the contributions to total growth in this table differ from each components' own growth[14]. This is illustrated in Figure 2.8. The left-hand panel shows the sector's own growth for the 2012-2017 period, while the right-hand panel shows the sector's contribution to the port's total growth for this period. The latter takes into account the sector's own growth and its share in the port's activity (see Annex A.1 for details).

The figure shows that the maritime cluster's contribution to investment growth appears to be driven by cargo handling, while the non-maritime cluster's contribution to investment growth appears to be moving in step with growth in the car manufacturing industry.

The pattern of investment is closely linked to projects and is therefore highly volatile, so that the figures require a nuanced interpretation. ArcelorMittal invested in a new furnace for its galvanising line. Volvo Cars Belgium invested in a new CMA automobile platform. Douglas Terminals invested in a new tank terminal. Oleon invested in its oleo-stearin plant and a cogeneration turbine. The top 10 companies in terms of investment are listed in Table 2.14.

---

[14]The contribution of a sector to the total growth equals its share in 2016 times the sectoral growth over 2016-2017 period. See Annex A.1

Figure 2.8: Investment at the port of Ghent
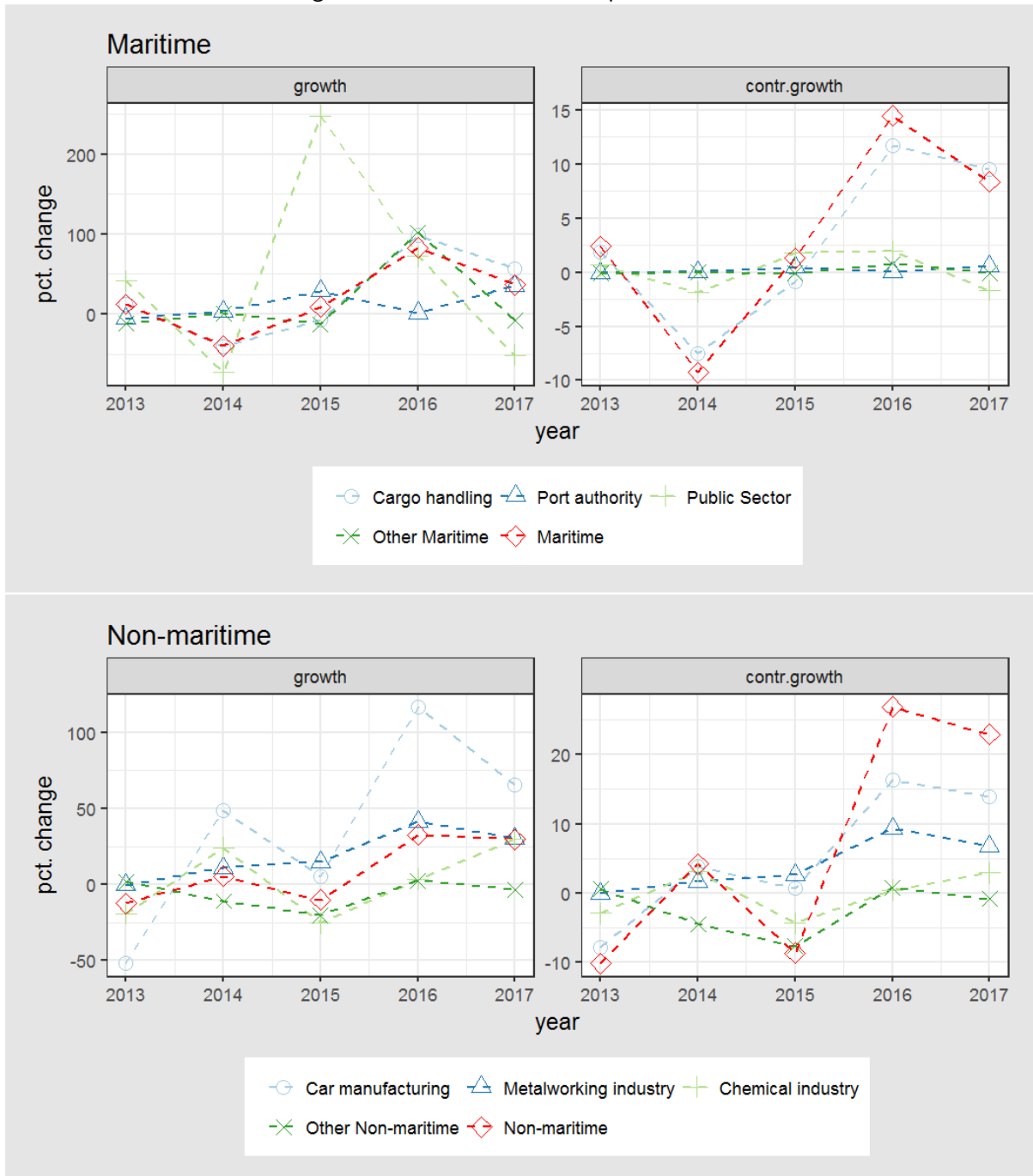
Source: NBB

Table 2.13: Investment at the port of Ghent (million €)

	2012	2013	2014	2015	2016	2017	Contr.gr (%)
Cargo handling	73	81	49	46	90	142	9.5
Port authority	7	6	7	8	9	12	0.6
Public Sector	8	11	3	10	18	9	-1.7
Other Maritime	4	3	3	3	6	5	-0.1
Maritime	91	102	62	67	123	168	8.4
Car manufacturing	71	34	51	53	116	192	14.0
Metalworking industry	68	68	75	86	122	159	6.8
Chemical industry	70	57	70	52	54	70	3.0
Other Non-maritime	173	175	156	124	128	123	-0.8
Non-maritime	382	334	352	317	420	544	22.9
Direct	473	436	414	384	543	712	31.3

Source: NBB

Table 2.14: Top 10 Investment, Ghent

Rank	Name	Sector
1	Volvo Car Belgium	Car manufacturing
2	Arcelormittal Belgium	Metalworking industry
3	Douglas Terminals	Cargo handling
4	Oiltanking Ghent	Cargo handling
5	Volvo Group Belgium	Car manufacturing
6	Tower Automotive Belgium	Car manufacturing
7	Oleon	Chemical industry
8	Kronos Europe	Chemical industry
9	Ghent Port Authority	Port authority
10	Taminco	Chemical industry

Source: NBB

2.3 Port of Zeebrugge

2.3.1 Port developments

Roll-on Roll-off traffic was up by 4.3% at 15.0 million tonnes in 2017 in the port of Zeebrugge. The volume of new cars handled was another all-time record. With a total of 2.83 million cars (against 2.78 million in 2016) Zeebrugge retained its position as the worlds largest car handling port. Container traffic increased in 2017, for both deep-sea and short-sea, to a total of 15.4 million tonnes (+6.5%) or 1.5 million TEU. Liquid bulk declined in 2017 by 31.5% to 4.1 million tonnes, mainly as a result of the sharp fall in the volume of liquid natural gas (-62%). The volume of traffic with the United Kingdom remained stable in 2017, despite the Brexit threat.

In 2018, the port of Zeebrugge handled 40.1 million tonnes of goods. The 8% increase was mostly due to the RoRo and liquid natural gas segments. Container volume remained stable.

Investments in the RoRo, automotive and gas sectors are leading the way to new growth and container traffic is picking up again. Zeebrugge has become an important trading centre for natural gas and is witnessing promising growth in the use of LNG as a fuel for ships and trucks. Deepsea LoLo container traffic remains an area of attention for the Zeebrugge Port Authority

In Zeebrugge, 46% of the traffic is UK-related. Out of that total, 67% is export, so Brexit will possibly have an impact not only on the port but also on industries in a wide surrounding area.

Parts of the new logistical zone are ready and could provide a boost for the port. The Chinese Lingang group intends to invest € 85 million in a logistic park on a 30 hectare site in this part of the port.

At the time of writing, not all final figures were available. The most recent situation of the volumes are to be found via the website `http://www.vlaamsehavencommissie.be/vhc/thema/statistiek-vlaamse-havens`.

Table 2.15: Maritime traffic at the port of Zeebrugge (million tonnes)

	2015	2016	2017	Change 2016-17 (%)	Share 2017 (%)
Containers	15.6	14.4	15.4	6.5	41.4
Roll-on Roll-off	13.5	14.4	15.0	4.3	40.3
Conventional cargo	1.2	1.5	1.3	-11.4	3.6
Liquid bulk	6.8	6.0	4.1	-31.5	11.1
Dry bulk	1.3	1.5	1.3	-11.8	3.5
Total	38.3	37.8	37.1	-1.8	

Source: Port Authority, Flemish Port Commission

2.3.2 Value added

Table 2.16 shows direct and indirect value added at the port of Zeebrugge over the 2012-2017 period. Between 2016 and 2017, direct value added increased from € 1 006 million to € 1 038 million. As a result of this 3.2% increase, direct value added reached an all-time high.

Table D.7 in Annex D shows value added at the port of Zeebrugge in detail, together with the respective shares of the component economic sectors and their changes over the years. Direct value added is broken down into a maritime and a non-maritime cluster, each of which is further subdivided into the contributing sectors. In terms of value added, the port of Zeebrugge is mainly (57.4%) maritime. Value added was up in both the maritime and non-maritime cluster, by 1.6% and 5.3% respectively.

Cargo handling accounted for almost a quarter of value added at the port of Zeebrugge in 2017. The public sector (the administration and the Belgian Navy) was the second-largest sector at the port, with a 9.9% share, followed by the energy and trade sectors.

The maritime cluster's share of value added jumped to a higher level from the year 2014 onwards due to the growing importance of cargo handling. Because of the size of this sector, it has an impact on the shares of the other sectors. In the non-maritime cluster, the trade sector's share of value added has been on a downward trend. The road transport sector's share picked up again from 2016. Meanwhile, the share of value added contributed by 'other logistic services' continues to grow.

The last column in Table 2.16 shows the contribution of each component to total growth over the 2016-2017 period. The non-maritime cluster (+2.2%) was largely responsible for the overall growth. Nevertheless, the maritime cluster's contribution to total growth (+1.0%) was also significant. The sectors contributing most to total value added growth in 2017 were road transport, port construction and dredging, 'other industries', the chemical industry and the energy sector.

Note that the contributions to total growth in this table differ from each components' own growth[15]. This is illustrated in Figure 2.9. The left-hand panel shows the sector's own growth for the 2012-2017 period, while the right-hand panel shows the sector's contribution to the port's total growth for this period. The latter takes into account the sector's own growth and its share in the port's activity (see Annex A.1 for details).

The figure shows that the maritime cluster's contribution to value added growth appears to be driven by shipping agents and forwarders (due to the high volatility of this sector), but cargo handling appears to be increasing its impact on growth in the maritime cluster. Meanwhile the non-maritime cluster's contribution to growth was seriously diminished by the relocation of a significant production company out of the port area in 2014. In the 2014-2017 period, the non-maritime cluster's contribution to value added growth appears to be moving in step with growth in the 'other non-maritime' group.

Changes in commodity prices and sales prices can impact the evolution of value added in a given sector. Other determinants are mergers, restructuring, failures, business relocation and the establishment of new companies. Higher depreciation due to investment programmes or the recording, reversal of impairments and provisions in the annual accounts can also influence the evolution of value added. Food processor Marine Harvest Pieters achieved better sales margins. Growth in labour-intensive tasks related to the handling of cars in the port caused the employers' organisation CEWEZ to hire more dockers, resulting in higher staff costs. An increase in the number of cars handled by International Car Operations had a positive impact on the company's value added.

Direct value added at the port of Zeebrugge shows a rather high degree of concentration: 5% of the companies accounted for 66% of direct value added, while just 11 companies generated more than half of direct value added. This is illustrated in Figure 2.11. The top 10 companies in terms of value added are listed in Table 2.17.

---

[15]The contribution of a sector to the total growth equals its share in 2016 times the sectoral growth over 2016-2017 period. See Annex A.1

Figure 2.9: Value added at the port of Zeebrugge
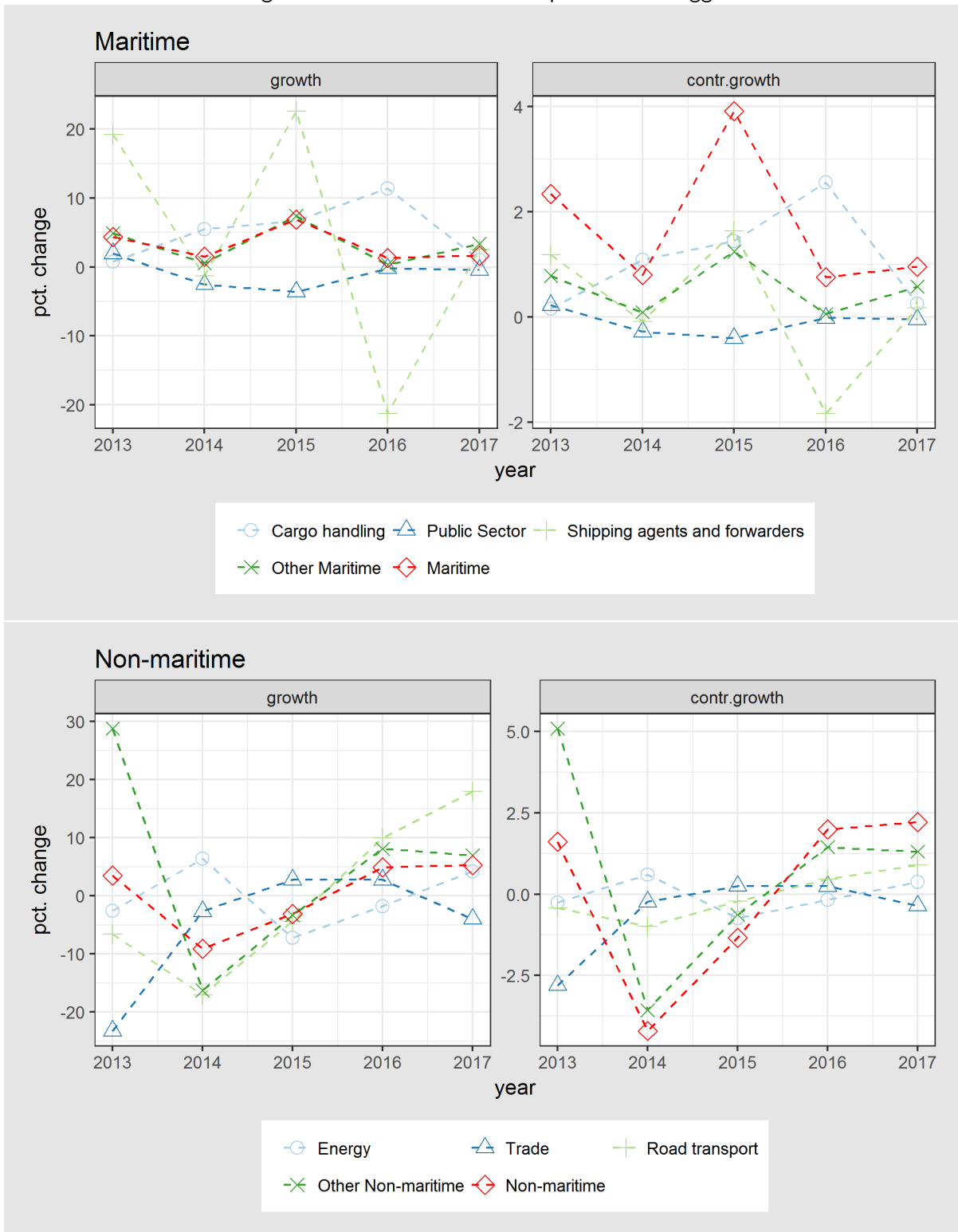
Source: NBB

Table 2.16: Zeebrugge, value added (million €)

	2012	2013	2014	2015	2016	2017	Contr.gr (%)[*]
Cargo handling	193.2	194.7	205.4	219.2	244.2	246.8	0.3
Public Sector	107.8	109.9	107.1	103.3	103.1	102.6	-0.0
Shipping agents and forwarders	58.5	69.8	68.9	84.5	66.5	68.2	0.2
Other Maritime	151.7	159.1	160.0	171.9	172.4	178.2	0.6
Maritime	511.2	533.5	541.4	578.9	586.3	595.8	1.0
Energy	95.0	92.5	98.4	91.3	89.6	93.4	0.4
Trade	114.7	88.1	85.7	88.1	90.5	86.9	-0.4
Road transport	61.6	57.5	47.7	45.6	50.1	59.1	0.9
Other Non-maritime	168.5	216.9	181.6	175.6	189.8	202.9	1.3
Non-maritime	439.7	455.0	413.4	400.5	420.0	442.3	2.2
Direct	951.0	988.5	954.9	979.4	1 006.3	1 038.2	3.2
Indirect	743.2	785.7	753.1	823.8	865.1	816.1	
Total	1 694.2	1 774.3	1 708.0	1 803.2	1 871.3	1 854.3	

[*] *For details, see Annex A.1*
Source: NBB

Table 2.17: Top 10 Value added, Zeebrugge

Rank	Name	Sector
1	Centrale der werkgevers Zeebrugge	Cargo handling
2	Belgian Navy	Public Sector
3	Fluxys LNG	Energy
4	Zeebrugge Port Authority	Port authority
5	Cobelfret Ferries	Shipping companies
6	Public Sector	Public Sector
7	Artes Depret	Port construction and dredging
8	Fluxys Belgium	Energy
9	P.B.I. Fruit Juice Company	Food industry
10	I.V.B.O.	Other industries

Source: NBB

2.3.3 Employment

Table 2.18 shows direct en indirect employment at the port of Zeebrugge over the 2012-2017 period. Between 2016 and 2017, the number of direct full-time equivalent jobs increased by 1.1%, from 9 585 to 9 686 FTE.

Table D.8 in Annex D shows employment at the port of Zeebrugge in detail, together with the respective shares of the component economic sectors and their changes over the years. Direct employment is broken down into a maritime and a non-maritime cluster, each of which is further subdivided into the contributing sectors. The maritime cluster employed 64.6% of the worforce at the port of Zeebrugge during the period (compared to 57.4% of value added). Around a third of the personnel working at the port were employed in the non-maritime cluster (compared to 42.6% of value added). Employment in the maritime sector rose by 2.6%, while the number of full-time equivalent jobs in the non-maritime cluster fell by 1.7%.

With almost a third of direct employment, cargo handling was the leading employer at the port of Zeebrugge in 2017. The public sector (the administration and the Belgian Navy) took second place, providing a seventh of all full-time equivalent jobs. Other major employers were trade, road transport, shipping agents and forwarders, and the fishing and fish industry.

The maritime cluster's share of employment jumped to a higher level from the year 2014 onwards due to the growing importance of cargo handling. Because of its size, this sector has an impact on the shares of the other sectors. The shares in employment of road transport and 'other logistic services' are picking up again from 2016.

The last column in Table 2.18 shows the contribution of each component to total growth over the 2016-2017 period. The maritime cluster contributed 1.7% to total growth in employment by recruiting additional staff. In contrast, the non-maritime cluster's contribution to total employment growth at the port of Zeebrugge shrank by 0.6%. Cargo handling made the biggest contribution to total growth in 2017. 'Other logistic services' and shipping companies also made a contribution to growth. The other sectors made only a minimal - or slightly negative - contribution to total growth.

Note that the contributions to total growth in this table differ from each components' own growth[16]. This is illustrated in Figure 2.10. The left-hand panel shows the sector's own growth for the 2012-2017 period, while the right-hand panel shows the sector's contribution to the port's total growth for this period. The latter takes into account the sector's own growth and its share in the port's activity (see Annex A.1 for details).

The figure shows that the maritime cluster's contribution to employment growth appears to be driven by cargo handling. Meanwhile, the non-maritime cluster's contribution to growth was seriously diminished by the relocation of a significant production company out of the port area in 2014. In the 2014-2017 period, the non-maritime cluster's contribution to growth appears to be moving in step with growth in the trade sector. However, road transport is also having an impact.

Mergers, restructuring, business relocations, failures and the establishment of new companies have an impact on the evolution of employment in a given sector. Cobelfret Ferries allocated more staff to the port of Zeebrugge in 2017. Growth in labour-intensive tasks related to the handling of cars at the port led the employers' organisation CEWEZ to hire more dockers.

Direct employment in the port of Zeebrugge shows a rather high degree of concentration: 5% of the companies accounted for 66% of direct employment, while 11 companies employed more than half of the personnel working there. This is illustrated in Figure 2.11. The top 10 companies in terms of employment are listed in Table 2.19.

---

[16]The contribution of a sector to the total growth equals its share in 2016 times the sectoral growth over 2016-2017 period. See Annex A.1

Figure 2.10: Employment at the port of Zeebrugge
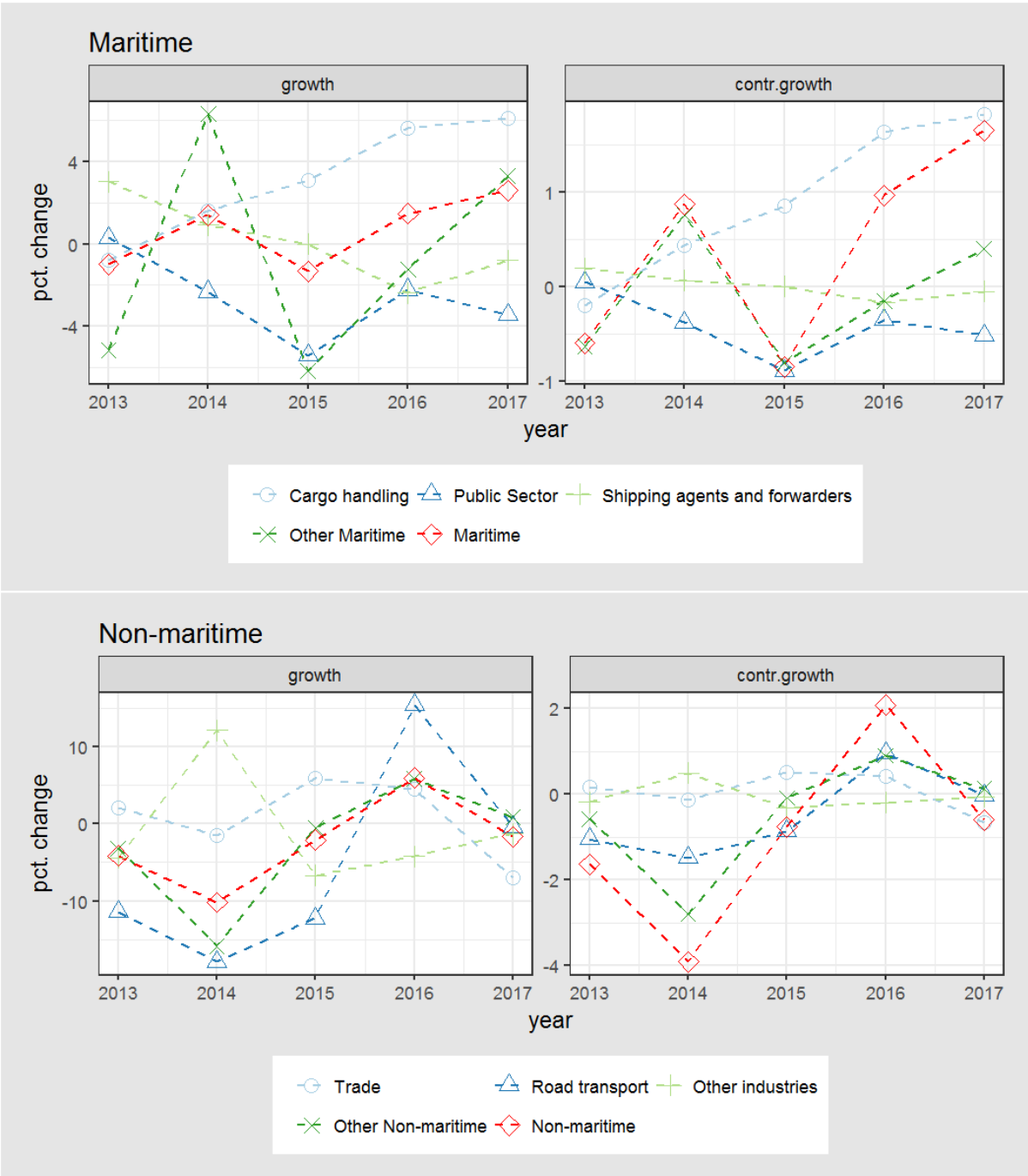
Source: NBB

Figure 2.11: Concentration in the port of Zeebrugge
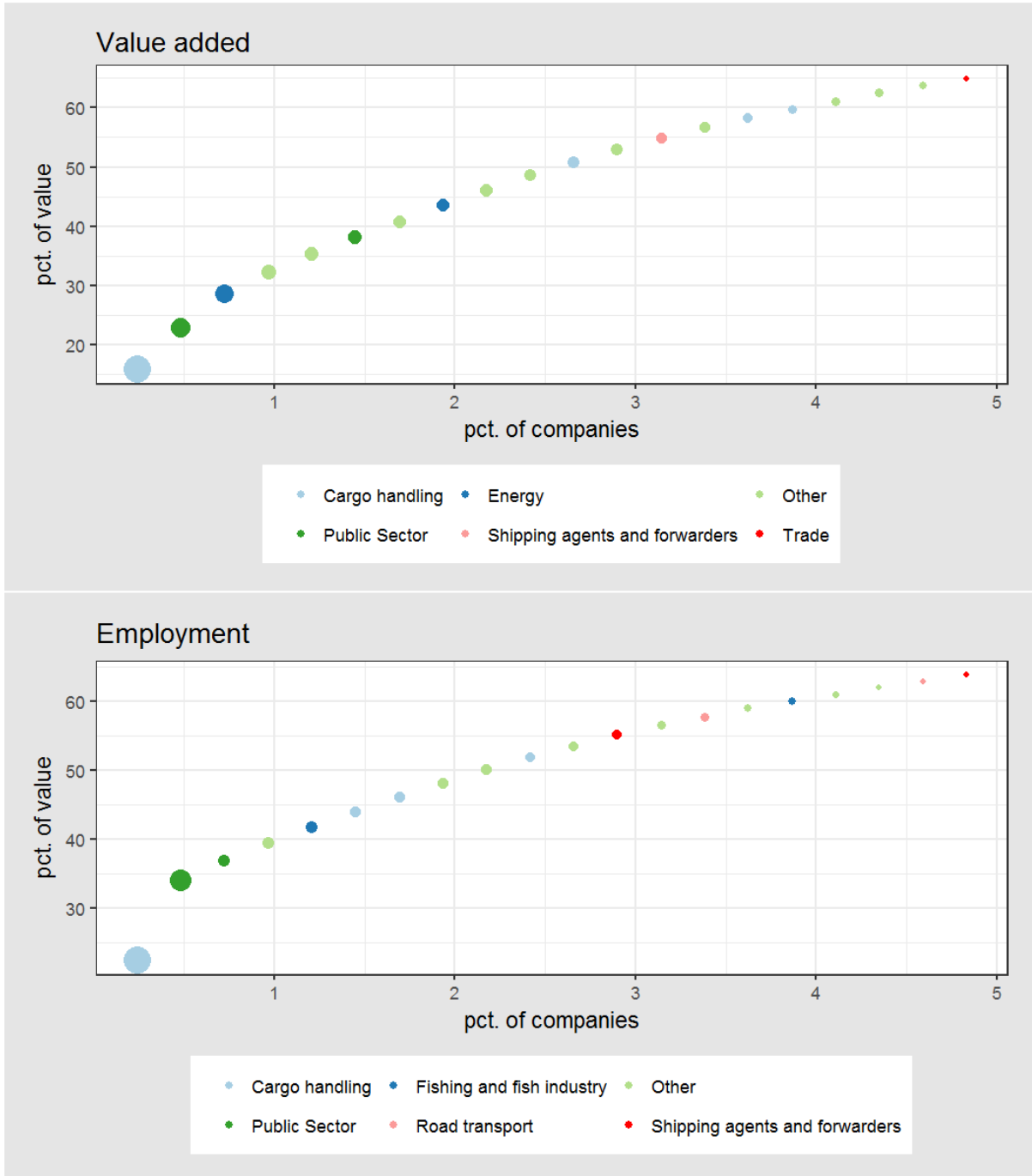
Source: NBB

Table 2.18: Employment at the port of Zeebrugge (FTE)

	2012	2013	2014	2015	2016	2017	Contr.gr (%)[*]
Cargo handling	2 608	2 588	2 630	2 711	2 863	3 038	1.8
Public Sector	1 595	1 600	1 563	1 478	1 445	1 396	-0.5
Shipping agents and forwarders	632	652	658	658	642	637	-0.1
Other Maritime	1 231	1 168	1 242	1 165	1 151	1 189	0.4
Maritime	6 067	6 007	6 092	6 012	6 101	6 260	1.7
Trade	799	816	803	851	889	827	-0.6
Road transport	910	806	662	581	670	668	-0.0
Other industries	417	399	447	417	400	394	-0.1
Other Non-maritime	1 778	1 721	1 449	1 441	1 524	1 537	0.1
Non-maritime	3 905	3 742	3 361	3 290	3 483	3 426	-0.6
Direct	9 971	9 749	9 453	9 301	9 585	9 686	1.1
Indirect	10 238	10 002	9 952	10 282	10 537	10 377	
Total	20 210	19 751	19 405	19 583	20 121	20 062	

[*] *For details, see Annex A.1*
Source: NBB

Table 2.19: Top 10 Employment, Zeebrugge

Rank	Name	Sector
1	Centrale der werkgevers Zeebrugge	Cargo handling
2	Belgian Navy	Public Sector
3	Public Sector	Public Sector
4	P.B.I. Fruit Juice Company	Food industry
5	Marine Harvest Pieters	Fishing and fish industry
6	Wallenius Wilhelmsen Logistics Zeebrugge	Cargo handling
7	Artes Depret	Port construction and dredging
8	I.V.B.O.	Other industries
9	International Car Operators	Cargo handling
10	Prince Belgium	Chemical industry

Source: NBB

2.3.4 Investment

Table 2.20 shows investment at the port of Zeebrugge over the 2012-2017 period. Between 2016 and 2017, investment shrank by 3.9%, from € 316 million to € 303 million.

Table D.9 in Annex D shows investment at the port of Zeebrugge in detail, together with the respective shares of the component economic sectors and their changes over the years. Investment is broken down into a maritime and a non-maritime cluster, each of which is further subdivided into the contributing sectors. The maritime and non-maritime clusters each contributed to about half of the investment at the port of Zeebrugge. Investment in the maritime cluster rose by 23.7%, while conversely, investment in the non-maritime cluster fell by 21.4%.

The decline in investment at the port of Zeebrugge in 2017 was largely due to the energy and road transport sectors, although both these sectors made significant investment in the previous year. Moreover, the energy sector still remained the largest investor at the port of Zeebrugge in 2017 with a 21.4% share of total investment. Cargo handling accounted for a fifth of investment at the port. Meanwhile the public sector contributed 10.1%. Other major investors were the Zeebrugge Port Authority and 'other land transport'.

Because of the size of its share, the energy sector was the dominant sector for investment at the port of Zeebrugge during the 2012-2017 period. It therefore had an impact on the shares of the other sectors, which have, as a direct consequence, been rather volatile.

The last column in Table 2.20 shows the contribution of each component to total growth in investment over the 2016-2017 period. The maritime cluster contributed 9.2% of total investment growth at the port of Zeebrugge in 2017. Meanwhile the non-maritime cluster's contribution to investment growth was negative (-13.1%). The sectors making the biggest contribution to total investment growth in 2017 were the public sector and cargo handling.

Note that the contributions to total growth in this table differ from each components' own growth[17]. This is illustrated in Figure 2.12. The left-hand panel shows the sector's own growth for the 2012-2017 period, while the right-hand panel shows the sector's contribution to the port's total growth for this period. The latter takes into account the sector's own growth and its share in the port's activity (see Annex A.1 for details).

The figure shows that the maritime cluster's contribution to investment growth appears to be driven by cargo handling, while the non-maritime cluster's contribution to growth seems to be moving in step with investment growth in the energy sector.

The pattern of investment is closely linked to projects and is therefore highly volatile, so that the figures require a nuanced interpretation. The Belgian National Railway Company invested in its marshalling yard. The Zeebrugge Port Authority invested inter alia in quays, dredging works and adaptation of berths. Cobelfret Ferries invested in a RoRo freight ferry. C.Ro Ports Zeebrugge invested in the expansion of the RoRo terminal. Fluxys LNG invested inter alia in a fifth storage tank. DD Trans invested in, among other assets, containers and container chassis. The top 10 companies in terms of investment are listed in Table 2.21.

---

[17]The contribution of a sector to the total growth equals its share in 2016 times the sectoral growth over 2016-2017 period. See Annex A.1

Figure 2.12: Investment at the port of Zeebrugge
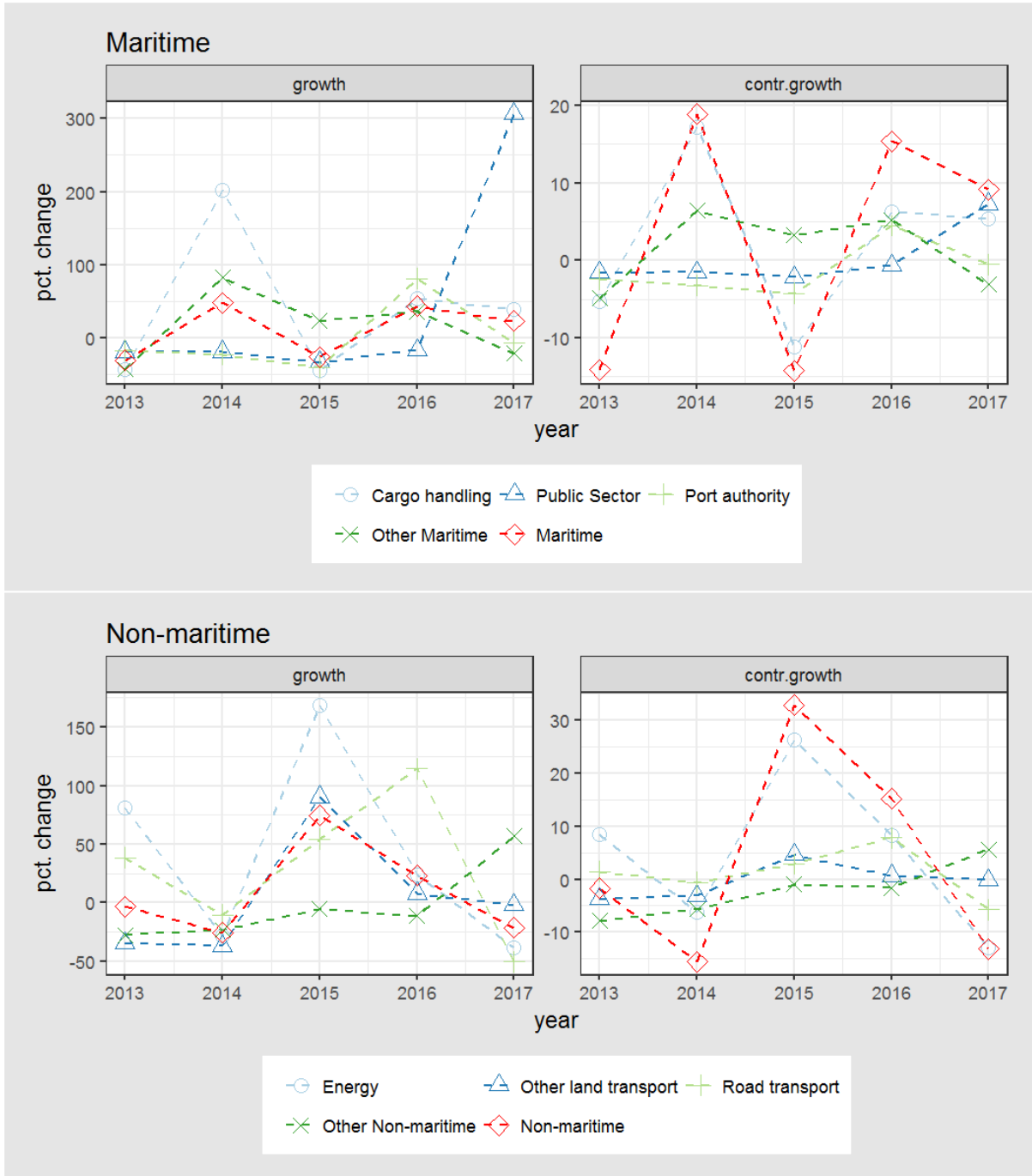
Source: NBB

Table 2.20: Investment at the port of Zeebrugge (million €)

	2012	2013	2014	2015	2016	2017	Contr.gr (%)
Cargo handling	29	17	51	28	43	60	5.4
Public Sector	20	16	13	9	8	31	7.3
Port authority	34	28	22	13	24	23	-0.5
Other Maritime	27	15	28	35	47	37	-3.1
Maritime	110	77	114	85	122	151	9.2
Energy	24	44	32	85	106	65	-12.8
Other land transport	25	16	10	20	21	21	-0.1
Road transport	9	12	11	17	36	18	-5.7
Other Non-maritime	66	48	37	35	31	49	5.6
Non-maritime	125	120	90	157	193	152	-13.1
Direct	234	197	204	242	316	303	-3.9

Source: NBB

Table 2.21: Top 10 Investment, Zeebrugge

Rank	Name	Sector
1	Fluxys LNG	Energy
2	C.RO Ports Zeebrugge	Cargo handling
3	Public Sector	Public Sector
4	Zeebrugge Port Authority	Port authority
5	BNRC Group	Other land transport
6	Cobelfret Ferries	Shipping companies
7	International Car Operators	Cargo handling
8	DD trans	Road transport
9	P.B.I. Fruit Juice Company	Food industry
10	Umicore Specialty Materials Brugge	Chemical industry

Source: NBB

2.4 Port of Ostend

2.4.1 Port developments

In 2017, transshipment in the port of Ostend declined by 6.1%, to a total of 1.4 million tonnes. Dry bulk accounted for 95% of the total.

In 2018, the port of Ostend handled 1.5 million tonnes, a substantial increase of almost 10%.

In recent years the port of Ostend has presented itself as an "Energy Port". The port authority is investing jointly with Rebo in the necessary infrastructure. The installation and maintenance of the vast majority of the offshore wind parks off the Belgian coast is or will be handled from the Rebo-terminal in Ostend. These offshore related activities generate additional shipping movements to and from the port, and also generate employment in the port area as Ostend acts as a marshalling port and attracts operating, maintenance and service companies.

At the time of writing, not all final figures were available. The most recent situation of the volumes are to be found via the website `http://www.vlaamsehavencommissie.be/vhc/thema/statistiek-vlaamse-havens`.

Table 2.22: Maritime traffic at the port of Ostend (million tonnes)

	2015	2016	2017	Change 2016-17 (%)	Share 2017 (%)
Total	1.3	1.5	1.4	-6.1	

Source: Port Authority, Flemish Port Commission

2.4.2 Value added

Table 2.23 shows direct and indirect value added at the port of Ostend over the 2012-2017 period. Between 2016 and 2017, direct value added increased by 3.3%, from € 511 million to € 529 million. The value added generated in 2017 was the highest during this period.

Table D.10 in Annex D shows value added at the port of Ostend in detail, together with the respective shares of the component economic sectors and their changes over the years. Direct value added is broken down into a maritime and a non-maritime cluster, each of which is further subdivided into the contributing sectors. In terms of value added, the port of Ostend is mainly (68.1%) non-maritime. Nonetheless, the maritime cluster, which generates almost a third of value added, is still very important. Value added generated by the maritime cluster was down by 5.6% over the period, while the non-maritime cluster's value added rose by 8.1%.

The metalworking industry generated more than a third of value added at the port of Ostend in 2017. The public sector (the administration and the Belgian Navy) was the second largest sector at the port with an 11.1% share. Other significant contributors to value added were port construction and dredging, the fishing and fish industry, the chemical industry and the construction industry.

The metalworking industry's share of valued added grew during the 2012-2017 period. Because of its size, this sector has an impact on the shares of the other sectors and on the non-maritime cluster as a whole. The cargo handling sector showed a downward trend during the period. Conversely, fisheries and the fish industry generated greater value added almost each successive year. The food industry also showed an upward trend. The public sector share of value added rose from 2016 onwards. The downward trend seen in the construction industry rebounded in 2017, back up to the level achieved at the beginning of the period. Meanwhile, road transport's share of value added began to pick up again from 2015.

The last column in Table 2.23 shows the contribution of each component to total growth in value added over the 2016-2017 period. As the share of the non-maritime cluster is twice as large as the maritime cluster, it was entirely responsible for the overall growth. The maritime cluster's contribution to total growth was negative. The sectors making the biggest contribution to total growth in 2017 were the metalworking and construction industries, and to a lesser extent, the fishing and fish industry. Contributions made by the other sectors were minimal or negative.

Note that the contributions to total growth in this table differ from each components' own growth[18]. This is illustrated in Figure 2.13. The left-hand panel shows the sector's own growth for the 2012-2017 period, while the right-hand panel shows the sector's contribution to the port's total growth for this period. The latter takes into account the sector's own growth and its share in the port's activities (see Annex A.1 for details).

The figure shows that the maritime cluster's contribution to growth in value added appears to be driven by port construction and dredging, while the non-maritime cluster's contribution to growth appears to be moving in step with growth in the metalworking industry.

Changes in commodity prices and sales prices can impact the evolution of value added in a given sector. Other determinants are mergers, restructuring, failures, business relocation and the establishment of new companies. Higher depreciation due to investment programmes or the recording, reversal of impairments and provisions in the annual accounts can also influence the evolution of value added. Food processor Marine Harvest Pieters achieved better sales margins. Meanwhile, an increase in turnover had a positive impact on the operating result and value added at several companies. This was the case for, among other firms, Algemene Ondernemingen Soetaert, Daikin Europe, 2XL and Morubel.

Direct value added at the port of Ostend shows a rather high degree of concentration: 5% of the companies accounted for almost 67% of direct value added, while just four companies generated more than half of all value added. This is illustrated in Figure 2.15. The top 10 companies in terms of value added are listed in Table 2.24.

Table 2.23: Ostend, value added (million €)

	2012	2013	2014	2015	2016	2017	Contr.gr (%)[(*)]
Public Sector	50.1	49.9	51.7	51.5	58.1	58.9	0.2
Fishing and fish industry	33.8	37.2	39.8	38.8	40.5	43.5	0.6
Port construction and dredging	57.0	59.4	57.6	70.5	57.1	42.6	-2.8
Other Maritime	27.4	24.1	23.3	25.3	22.9	23.6	0.1
Maritime	168.3	170.5	172.4	186.1	178.6	168.6	-1.9
Metalworking industry	153.7	161.5	169.6	168.3	164.6	191.1	5.2
Construction	37.3	33.1	31.7	32.6	30.9	39.1	1.6
Chemical industry	36.0	38.3	36.7	34.2	38.4	36.6	-0.4
Other Non-maritime	92.0	84.9	89.1	89.6	98.9	93.0	-1.2
Non-maritime	319.0	317.8	327.1	324.8	332.8	359.9	5.3
Direct	487.4	488.3	499.5	510.8	511.4	528.5	3.3
Indirect	371.3	372.5	366.3	393.4	384.8	375.7	
Total	858.7	860.8	865.8	904.2	896.2	904.2	

[(*)] *For details, see Annex A.1*
Source: NBB

---

[18]The contribution of a sector to the total growth equals its share in 2016 times the sectoral growth over 2016-2017 period. See Annex A.1

Figure 2.13: Value added at the port of Ostend
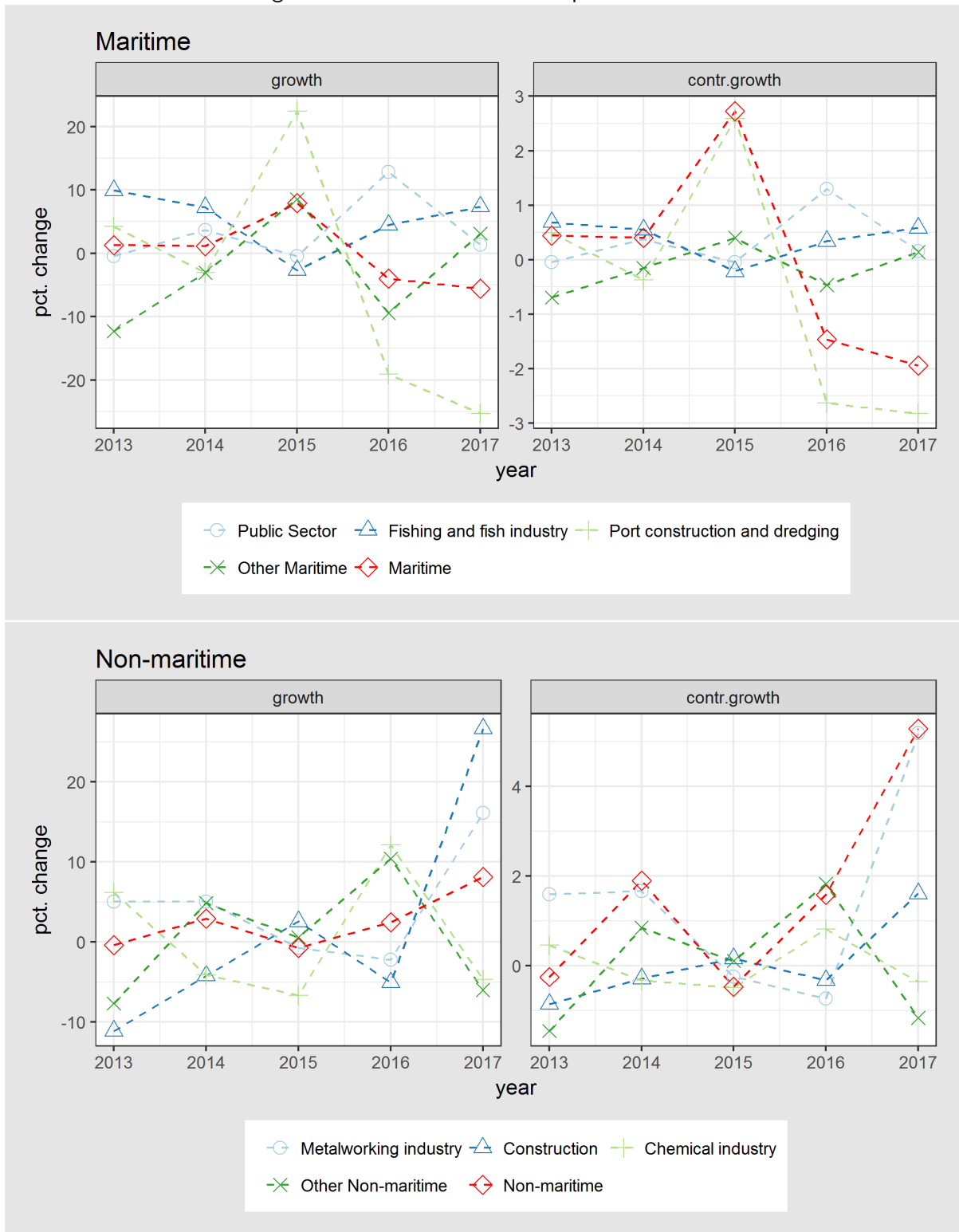
Source: NBB

Table 2.24: Top 10 Value added, Ostend

Rank	Name	Sector
1	Daikin Europe	Metalworking industry
2	Baggerwerken Decloedt & Zoon	Port construction and dredging
3	Public Sector	Public Sector
4	Proviron Functional Chemicals	Chemical industry
5	Verhelst Aannemingen	Construction
6	Biostoom Oostende	Energy
7	Algemene Ondernemingen Soetaert	Construction
8	Fides Petfood	Food industry
9	Belgian Navy	Public Sector
10	Morubel	Fishing and fish industry

Source: NBB

2.4.3 Employment

Table 2.25 shows direct and indirect employment at the port of Ostend over the 2012-2017 period. Between 2016 and 2017, the number of direct full-time equivalent jobs fell by 1.2%, from 4 986 to 4 927 FTE.

Table D.11 in Annex D shows employment at the port of Ostend in detail, together with the respective shares of the component economic sectors and their changes over the years. Direct employment is broken down into a maritime and a non-maritime cluster, each of which is further subdivided into the contributing sectors. The maritime cluster employed 37.1% of the workforce at the port of Ostend (compared to 31.9% of value added), while 62.9% of the personnel at the port were employed in the non-maritime cluster (compared to 68.1% of value added). Employment shrank by more than 1% in both clusters.

With 29.4% of direct employment, the metalworking industry was the leading employer at the port of Ostend in 2017. The public sector (the administration and the Belgian Navy) took second place with 15.7%. Other major employers were construction, road transport and the fishing and fish industry.

Both the maritime and non-maritime cluster's shares of employment at the port of Ostend were relatively stable between 2012 and 2017. In the maritime cluster, the port construction and dredging sector's share declined during the period. Conversely, the public sector and the fishing and fish industry shares showed an upward trend. In the non-maritime cluster, the metalworking industry, which accounted for about half of the employment in this cluster, was the main driver. The construction industry's share rebounded from 2016.

The last column in Table 2.25 shows the contribution of each component to total growth in employment over the 2016-2017 period. Both the maritime and non-maritime cluster made a negative contribution to total growth, -0.4% and -0.7% respectively. Sectors recruiting additional staff were the metalworking industry, the road transport sector and fishing and fish industry, and, to a lesser extent, construction and 'other industries'.

Note that the contributions to total growth in this table differ from each components' own growth[19]. This is illustrated in Figure 2.14. The left-hand panel shows the sector's own growth for the 2012-2017 period, while the right-hand panel shows the sector's contribution to the port's total growth for this period. The latter takes into account the sector's own growth and its share in the port's activities (see Annex A.1 for details).

The figure shows that the maritime cluster's contribution to growth of employment appears to be driven by the public sector, while the non-maritime cluster's contribution appears to be moving in step with growth in the 'other non-maritime' group.

Mergers, restructuring, business relocation, failures and the establishment of new companies have an impact on the evolution of employment in a given sector. The remarkable contraction in the trade sector was due to a number of events: the absorption of Gesco, Sophalfin's decission to move its business outside the port area and the halving of the average Vlaamse Visveiling workforce. As from 2017, dockers employed at the port of Ostend have been managed by the employers' organisation CEWEZ, which is based in the port of Zeebrugge.

Direct employment at the port of Ostend shows a rather high degree of concentration: 5% of the companies accounted for almost 67% of direct employment, while just four companies employed almost half the workforce. This is illustrated in Figure 2.15. The top 10 companies in terms of employment are listed in Table 2.26.

---

[19]The contribution of a sector to the total growth equals its share in 2016 times the sectoral growth over 2016-2017 period. See Annex A.1

Figure 2.14: Employment at the port of Ostend
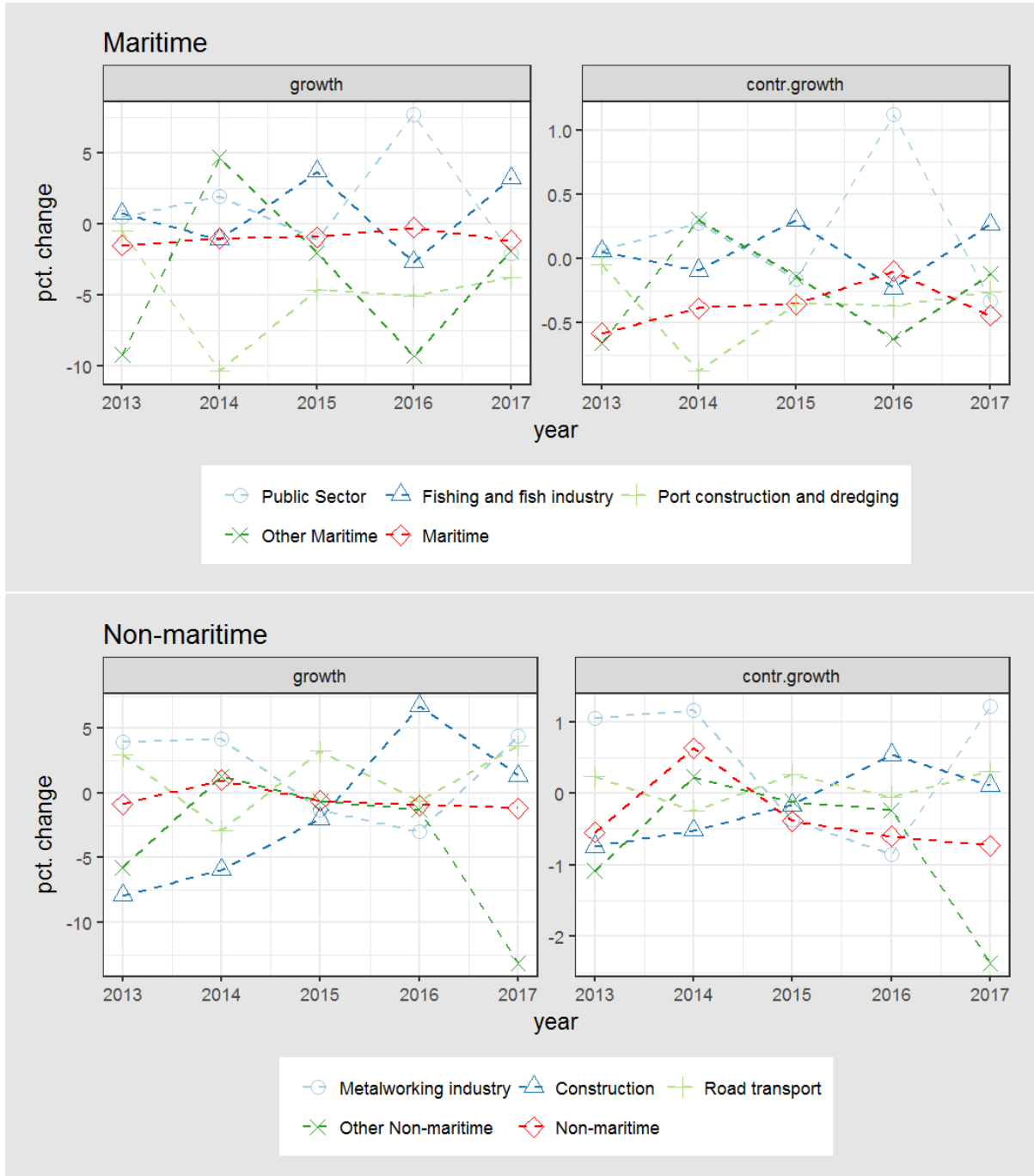
Source: NBB

Figure 2.15: Concentration in the port of Ostend

Source: NBB

Table 2.25: Employment at the port of Ostend (FTE)

	2012	2013	2014	2015	2016	2017	Contr.gr (%)[*]
Public Sector	723	726	740	732	788	772	-0.3
Fishing and fish industry	410	413	409	424	413	426	0.3
Port construction and dredging	428	426	381	364	345	332	-0.3
Other Maritime	362	329	344	337	306	300	-0.1
Maritime	1 924	1 894	1 875	1 857	1 852	1 830	-0.4
Metalworking industry	1 338	1 391	1 450	1 431	1 388	1 449	1.2
Construction	476	439	413	404	432	437	0.1
Road transport	406	418	406	419	417	432	0.3
Other Non-maritime	958	903	915	909	897	779	-2.4
Non-maritime	3 179	3 152	3 184	3 164	3 134	3 097	-0.7
Direct	5 103	5 046	5 058	5 021	4 986	4 927	-1.2
Indirect	4 481	4 385	4 336	4 491	4 409	4 246	
Total	9 584	9 431	9 395	9 512	9 395	9 173	

[*] *For details, see Annex A.1*
Source: NBB

Table 2.26: Top 10 Employment, Ostend

Rank	Name	Sector
1	Daikin Europe	Metalworking industry
2	Public Sector	Public Sector
3	Baggerwerken Decloedt & Zoon	Port construction and dredging
4	Verhelst Aannemingen	Construction
5	Proviron Functional Chemicals	Chemical industry
6	Algemene Ondernemingen Soetaert	Construction
7	Belgian Navy	Public Sector
8	Mainfreight Logistic Services Belgium	Road transport
9	Clemaco Contracting	Shipbuilding and repair
10	Morubel	Fishing and fish industry

Source: NBB

2.4.4 Investment

Table 2.27 shows investment at the port of Ostend over the 2012-2017 period. Between 2016 and 2017, investment fell by 11.6%, from € 88 million to € 78 million.

Table D.12 in Annex D shows investment at the port of Ostend in detail, together with the respective shares of the component economic sectors and their changes over the years. Investment is broken down into a maritime and a non-maritime cluster, each of which is further subdivided into the contributing sectors. The maritime cluster contributed 30.4% of all investment at the port of Ostend, while 69.6% of investment at the port was related to the non-maritime cluster, which saw its investment rise by 2%. Conversely, investment in the maritime cluster fell by 32.3%.

In 2017, the construction industry was the largest investor at the port of Ostend, accounting for a fifth of the amounts invested. The fishing and fish industry, whose investment at the port of Ostend increased by 150%, was ranked second, with a sixth of the total. Other major investors were the metalworking and chemical industries, public, trade and road transport sectors.

Both the maritime and non-maritime cluster's shares in total investment showed considerable volatility over the 2012-2017 period. For several years the public sector was the leading investor, with an average 16% share. In the non-maritime cluster, construction has in recent years overtaken the metalworking industry as the leading investor.

The last column in Table 2.27 shows the contribution of each component to total growth over the 2016-2017 period. The maritime cluster (-12.8%) was responsible for the overall decrease. Following strong growth in 2016, investment by the public sector fell by 77.4%. Meanwhile, the non-maritime cluster made a positive (+1.2%) contribution to total investment growth over the period. The biggest contributor to total investment growth in 2017 was the fishing and fish industry. Other contributors were the chemical, metalworking and food industries and road transport.

Note that the contributions to total growth in this table differ from each components' own growth[20]. This is illustrated in Figure 2.16. The left-hand panel shows the sector's own growth for the 2012-2017 period, while the right-hand panel shows the sector's contribution to the port's total growth for this period. The latter takes into account the sector's own growth and its share in the port's activity (see Annex A.1 for details).

The figure shows that the maritime cluster's contribution to investment growth appears to be driven by a combination of port construction and dredging, and the public sector. Meanwhile, the non-maritime cluster's contribution to growth appears to be moving in step with investment growth in the construction and 'other non-maritime' group.

The pattern of investment is closely linked to projects and is therefore highly volatile, so that the figures require a nuanced interpretation. Daikin Europe invested in, among other assets, new test chambers. AIM Recycling Europe invested in a recycling plant for ferrous and non-ferrous scrap waste. Cat and dog food producer Fides Petfood invested, inter alia, in a new office building and expansion of its production facility. Meanwhile, the public sector is investing in a new maritime research centre. The top 10 companies in terms of investment are listed in Table 2.28.

---

[20]The contribution of a sector to the total growth equals its share in 2016 times the sectoral growth over 2016-2017 period. See Annex A.1

Figure 2.16: Investment at the port of Ostend
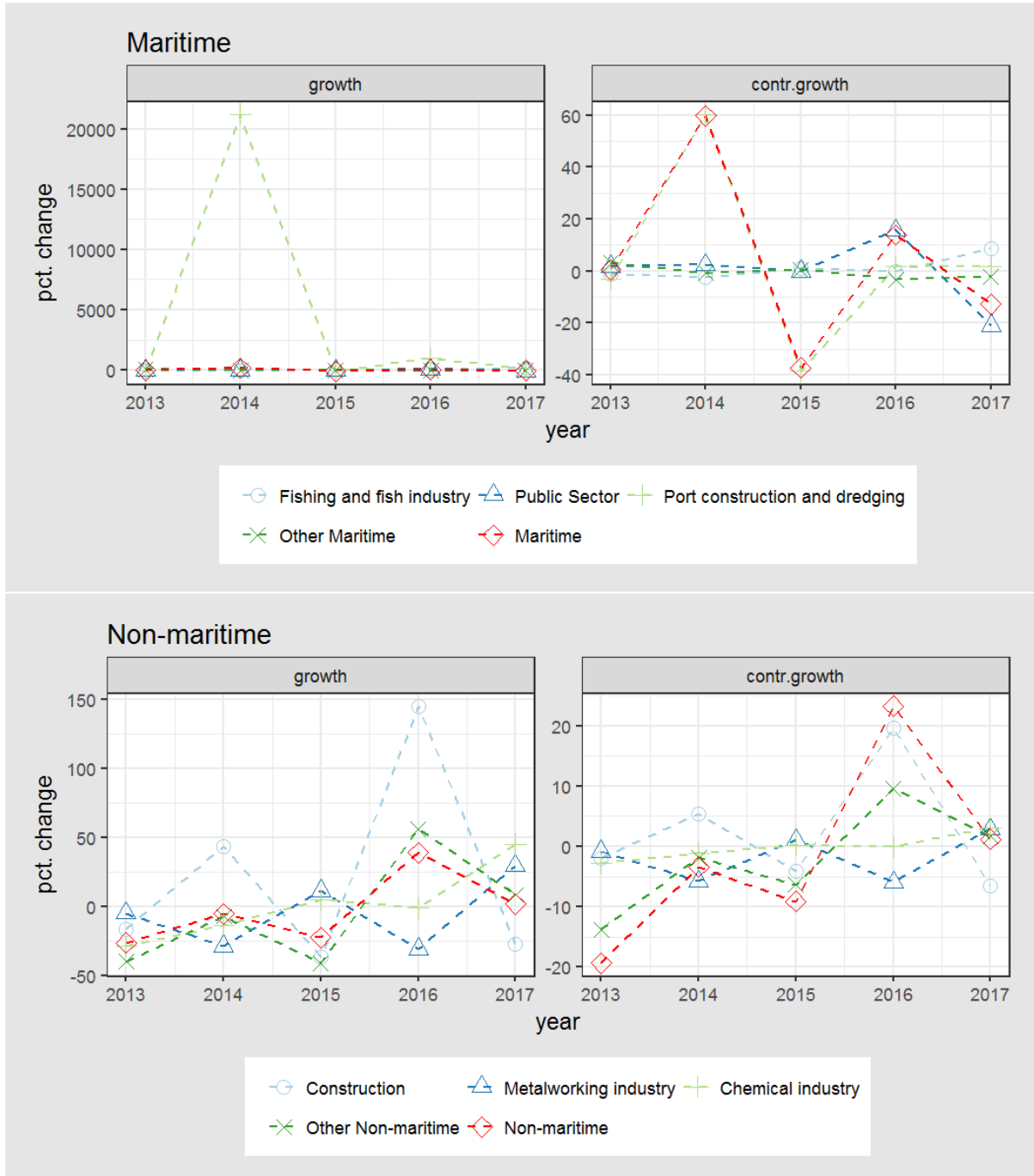
Source: NBB

Table 2.27: Investment at the port of Ostend (million €)

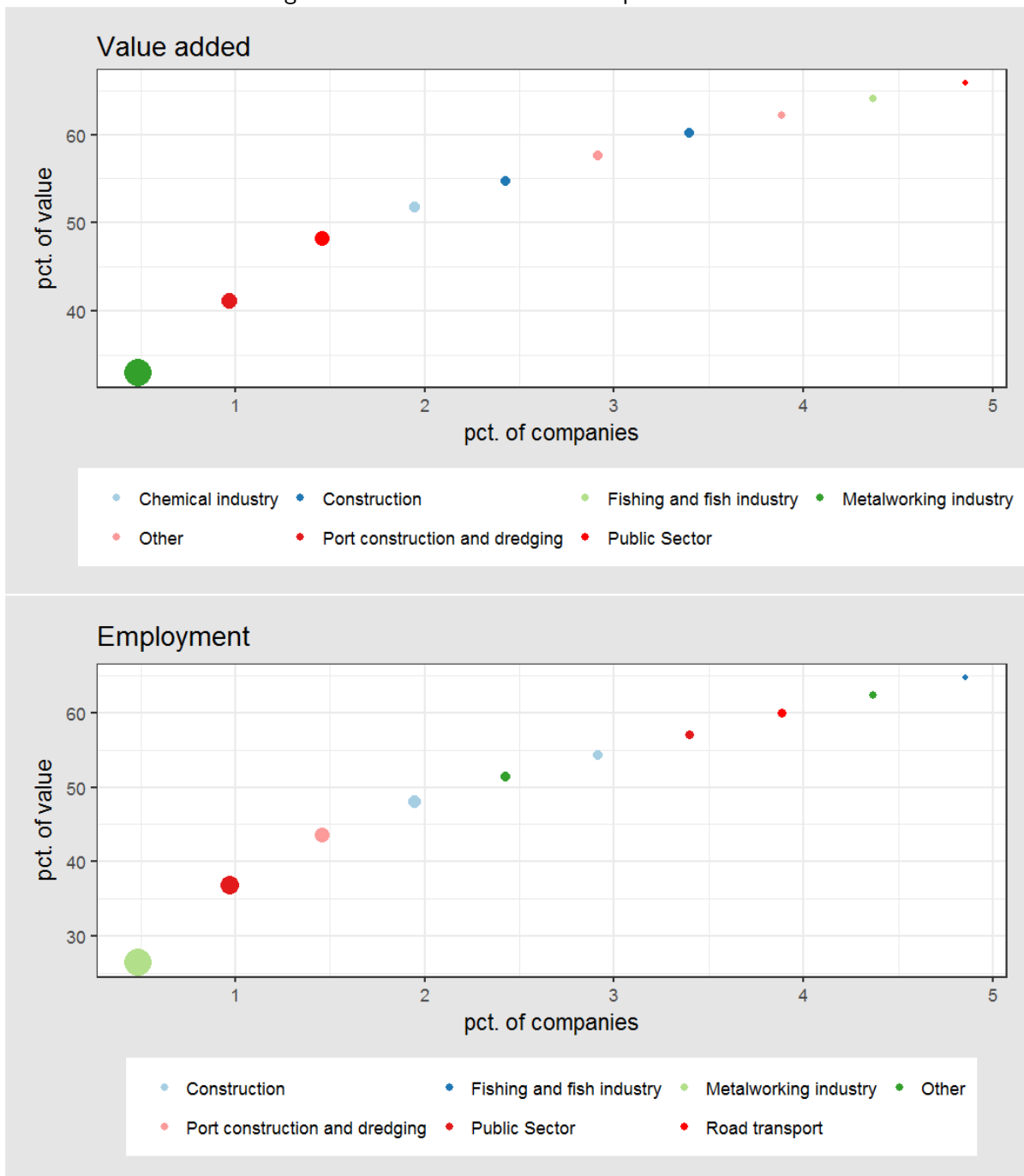|	2012	2013	2014	2015	2016	2017	Contr.gr (%)
Fishing and fish industry	7	6	4	5	5	13	8.6
Public Sector	10	12	14	14	24	5	-21.0
Port construction and dredging	3	0	46	0	1	3	1.8
Other Maritime	4	7	6	7	5	3	-2.2
Maritime	24	25	71	26	35	24	-12.8
Construction	11	9	14	9	21	16	-6.5
Metalworking industry	16	16	11	12	9	11	2.9
Chemical industry	9	7	6	6	6	9	3.1
Other Non-maritime	33	20	18	11	17	19	1.7
Non-maritime	70	52	49	38	53	54	1.2
Direct	94	76	119	64	88	78	-11.6

Source: NBB

Table 2.28: Top 10 Investment, Ostend

Rank	Name	Sector
1	Algemene Ondernemingen Soetaert	Construction
2	Daikin Europe	Metalworking industry
3	Proviron Functional Chemicals	Chemical industry
4	Public Sector	Public Sector
5	Fides Petfood	Food industry
6	Ldcwood	Trade
7	Verhelst Machines	Metalworking industry
8	Baggerwerken Decloedt & Zoon	Port construction and dredging
9	Verhelst Aannemingen	Construction
10	Topan	Construction

Source: NBB

2.5 Liège Port complex

2.5.1 Port developments

The volume of waterborne cargo transshipped in the Liège port complex increased by 3.1% in 2017. Traffic in Europe's third largest inland port grew for the fourth consecutive year. Container traffic posted growth of 31%, a new record. The main categories of cargo handled are building materials, coke and petroleum products, and secondary raw materials. The waterborne cargo traffic in the Liège port area has to offset the loss of cargo related to the scaling down of the local steel industry.

In 2018, the volume of freight shipped via the Liège port complex stabelized at 16.0 tonnes.

Development of Trilogiport continued in 2017, with the establishment of Tempo Log Belgium, the first company to move in. DP World Liège, a tri-modal platform manager, has also launched its business activities for its container terminal. Various installation and capital projects were also carried out, in the ports of Monsin and Wandre in particular. Finally, management of the port of Chertal was officially handed over to the Liège Port Authority.

Table 2.29: Maritime traffic at the Liège Port complex (million tonnes)

	2015	2016	2017	Change 2016-17 (%)
Total	14.6	15.5	15.9	3.1

Source: Port Authority

2.5.2 Value added

Table 2.30 shows direct and indirect value added at the Liège port complex over the 2012-2017 period. Between 2016 and 2017, direct value added fell by 2.4%, from € 1 168 million to € 1 140 million.

Table D.13 in Annex D shows value added at the Liège port complex in detail, together with the respective shares of the component economic sectors and their changes over the years. Direct value added is broken down into a maritime and a non-maritime cluster, each of which is further subdivided into the contributing sectors. In terms of value added, the Liège port complex is mainly non-maritime, this cluster's share remaining stable at 97.7%. Value added contracted in both the maritime and the non-maritime cluster, by 1.7% and 2.4% respectively.

In 2017, the metalworking industry once again overtook the energy sector as the largest economic sector at the port, with a 26.6% share of value added. In fact, the fall in value added at the Liège port complex was largely due to the biggest company in the energy sector. Together, these two sectors generated almost half of all value added at the Liège port complex in 2017.

The value added shares of the individual components of the maritime cluster remained fairly stable between 2012 and 2017. In the non-maritime cluster, however, the shares of the energy sector and the metalworking industry were quite volatile during the period. Meanwhile, chemical, construction, fuel production industries, and 'other industries' all saw their share of value added increase.

The last column in Table 2.30 shows the contribution made by each component to total growth in value added over the 2016-2017 period. As the non-maritime cluster contributes the predominant share, this cluster was almost entirely responsible for the overall decline. Meanwhile, the contribution of the maritime cluster to total growth was almost zero. The sectors contributing most to total value added growth in 2017 were the metalworking and fuel production industries.

Note that the contributions to total growth in this table differ from each components' own growth[21]. This is illustrated in Figure 2.17. The left-hand panel shows the sector's own growth for the 2012-2017 period, while the right-hand panel shows the sector's contribution to the port's total growth for this period. The latter takes into account the sector's own growth and its share in the port's activity (see Annex A.1 for details).

The figure shows that the maritime cluster's contribution to growth in value added appears to be driven by the shipping agents and forwarders, while the non-maritime cluster's contribution appears to be moving in step with value added growth in the energy sector.

Changes in commodity prices and sales prices can impact the evolution of value added in a given sector. Other determinants are mergers, restructuring, failures, business relocation and the establishment of new companies. Higher depreciation due to investment programmes or the recording, reversal of impairments and provisions in the annual accounts can also influence the evolution of value added. Steel company ArcelorMittal achieved higher sales prices. Electrabel reduced allocations for nuclear provisions in its 2017 annual account. Meanwhile, both Electrabel and EDF Luminus felt the impact of the diminished availability of their nuclear power generation units.

Direct value added at the Liège port complex shows a rather high degree of concentration: 5% of the companies accounted for 71% of direct value added, while just three companies generated half of all value added. This is illustrated in Figure 2.19. The top 10 companies in terms of value added are listed in Table 2.31.

Table 2.30: Liège Port complex, value added (million €)

	2012	2013	2014	2015	2016	2017	Contr.gr (%)[(*)]
Cargo handling	14.4	14.5	13.1	14.2	15.1	15.2	0.0
Shipping companies	4.0	3.0	3.6	4.2	3.8	4.5	0.1
Shipping agents and forwarders	8.7	4.0	3.6	3.7	4.5	3.2	-0.1
Other Maritime	3.1	3.3	3.2	3.1	3.3	3.3	0.0
Maritime	30.2	24.7	23.5	25.1	26.7	26.2	-0.0
Metalworking industry	338.5	333.5	274.6	275.0	278.9	302.9	2.1
Energy	388.0	382.6	324.7	252.1	326.6	261.6	-5.6
Chemical industry	99.4	118.7	143.1	132.4	149.4	150.3	0.1
Other Non-maritime	363.0	375.7	399.6	374.6	386.5	399.4	1.1
Non-maritime	1 189.0	1 210.4	1 142.0	1 034.0	1 141.4	1 114.1	-2.3
Direct	1 219.2	1 235.1	1 165.5	1 059.1	1 168.0	1 140.4	-2.4
Indirect	1 216.5	1 289.8	1 122.2	1 074.7	1 181.5	1 193.8	
Total	2 435.7	2 524.9	2 287.7	2 133.8	2 349.5	2 334.1	

[(*)] *For details, see Annex A.1*
Source: NBB

Table 2.31: Top 10 Value added, Liège Port complex

Rank	Name	Sector
1	Arcelormittal Belgium	Metalworking industry
2	Electrabel	Energy
3	Prayon	Chemical industry
4	Biowanze	Fuel production
5	N. et B. Knauf et Cie	Construction
6	Carrières et Fours à Chaux Dumont-Wautier	Construction
7	Association Intercommunale de Traitement des Déchets Liégeois	Other industries
8	Cockerill Maintenance & Ingenierie	Metalworking industry
9	Imerys Mineraux Belgique	Chemical industry
10	Cimenteries CBR Cementbedrijven	Construction

Source: NBB

---

[21]The contribution of a sector to the total growth equals its share in 2016 times the sectoral growth over 2016-2017 period. See Annex A.1

Figure 2.17: Value added at the port of the Liège Port complex
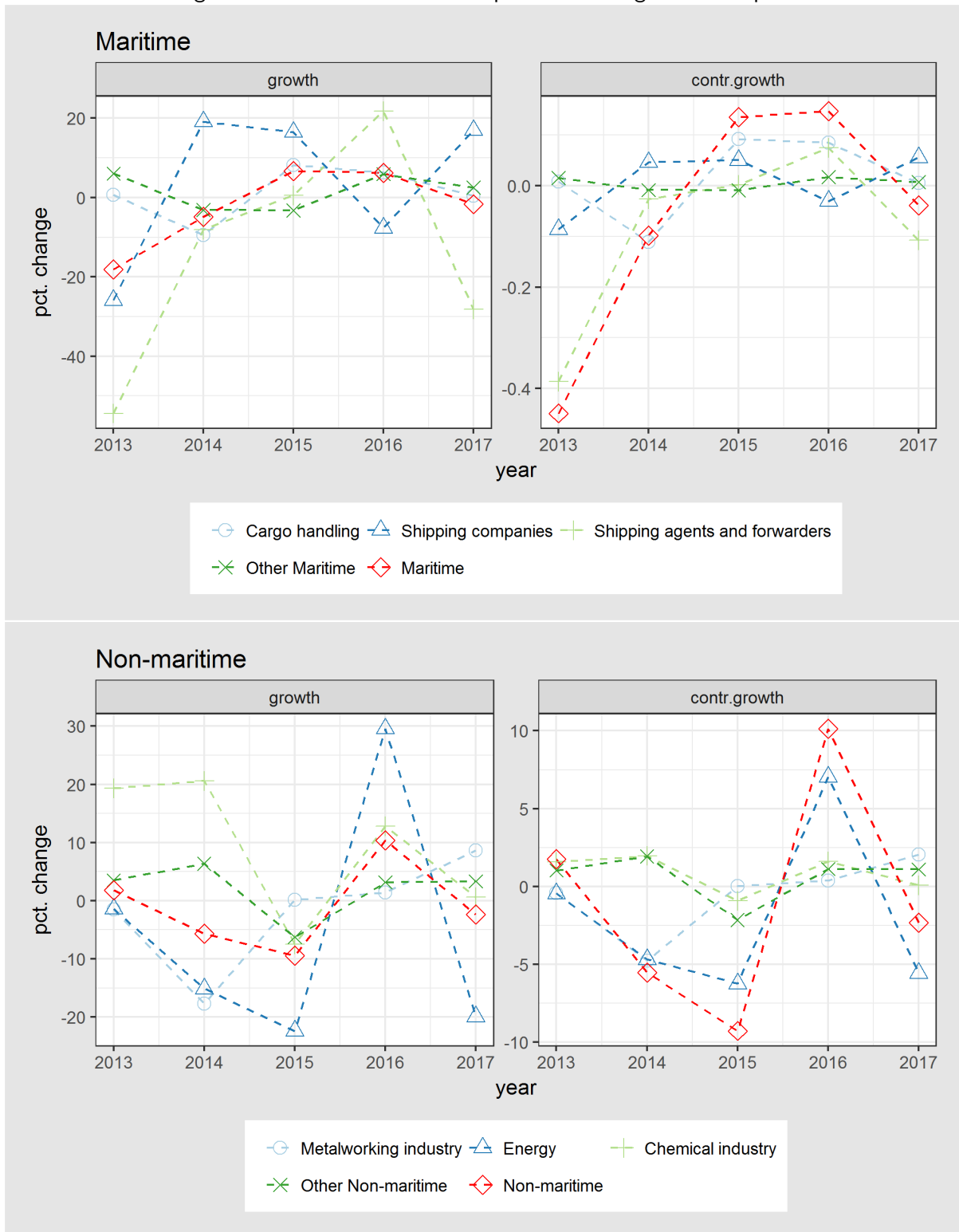
Source: NBB

2.5.3 Employment

Table 2.32 shows direct and indirect employment at the Liège port complex over the 2012-2017 period. Between 2016 and 2017, the number of direct full-time equivalent jobs rose by 0.4%, from 7 814 to 7 843 FTE.

Table D.14 in Annex D shows employment at the Liège port complex in detail, together with the respective shares of the component economic sectors and their changes over the years. Direct employment is broken down into a maritime and a non-maritime cluster, each of which is further subdivided into the contributing sectors. In terms of full-time equivalent jobs, the Liège port complex is mainly non-maritime, this cluster's share of employment remaining stable at 95.8% during the period. Employment was up in both the maritime and the non-maritime cluster, by 3.3% and 0.3% respectively.

In 2017, the metalworking industry provided over 2 300 full-time equivalent jobs, making this industry the leading employer at the Liège port complex, a 29.6% share of direct employment. Other major creators of employment were the energy, chemical and construction industries. Together, these four sectors generated 71% of direct employment at the Liège port complex in 2017. However, the limited rise in employment was mainly due to the 'other non-maritime' group.

The maritime cluster's share of employment grew in the latter years of the 2012-2017 period, driven by the cargo handling sector. Due to job losses arising from the restructuring of steel company ArcelorMittal, the metalworking industry's share of employment declined from about 40% to 30%. This sector lost about 2 000 jobs between 2012 and 2017. Meanwhile, the shares of the 'other non-maritime' group increased, mainly because of the downward trend in total employment. The number of jobs in the 'other industries' remained relatively stable over the period.

The last column in Table 2.32 shows the contribution of each component to total employment growth over the 2016-2017 period. As the non-maritime cluster contributes the predominant share, this cluster's 0.3% rise in employment was almost entirely responsible for the overall increase. In fact, the maritime cluster's contribution to total growth was almost zero. The sectors contributing most to total growth in 2017 were 'other logistic services', road transport and the metalworking industry.

Note that the contributions to total growth in this table differ from each components' own growth[22]. This is illustrated in Figure 2.18. The left-hand panel shows the sector's own growth for the 2012-2017 period, while the right-hand panel shows the sector's contribution to the port's total growth for this period. The latter takes into account the sector's own growth and its share in the port's activities (see Annex A.1 for details).

The figure shows that the maritime's cluster to growth in employment appears to be driven by the shipping agents and forwarders at the beginning and by cargo handling in the latter part of the period. Meanwhile, the non-maritime cluster's contribution to growth appears to be moving in step with employment growth in the metalworking industry.

Mergers, restructuring, business relocation, failures and the establishment of new companies have an impact on the evolution of employment in a given sector. Road transport and 'other industries' accounted for the biggest increase in jobs in absolute numbers, as a result of aggregation of the somewhat limited job creation at a number of companies.

Direct employment at the Liège port complex shows a rather high degree of concentration: 5% of the companies accounted for 63% of direct employment, while just five companies employed more

---

[22]The contribution of a sector to the total growth equals its share in 2016 times the sectoral growth over 2016-2017 period. See Annex A.1

than half of the personnel working at the port complex. This is illustrated in Figure 2.19. The top 10 companies in terms of employment are listed in Table 2.33.

Table 2.32: Employment at the port of the Liège Port complex (FTE)

	2012	2013	2014	2015	2016	2017	Contr.gr (%)[*]
Cargo handling	166	153	153	157	174	185	0.1
Shipping companies	54	51	52	54	55	52	-0.0
Shipping agents and forwarders	94	56	47	43	45	48	0.0
Other Maritime	47	45	44	43	45	44	-0.0
Maritime	361	305	296	296	318	329	0.1
Metalworking industry	4 327	3 718	2 783	2 440	2 307	2 322	0.2
Energy	1 215	1 246	1 293	1 293	1 251	1 225	-0.3
Chemical industry	1 090	1 020	996	1 011	1 036	1 036	-0.0
Other Non-maritime	2 771	2 786	2 924	2 974	2 901	2 932	0.4
Non-maritime	9 403	8 770	7 996	7 718	7 495	7 514	0.2
Direct	9 763	9 076	8 292	8 014	7 814	7 843	0.4
Indirect	14 090	13 191	11 258	11 650	11 381	10 980	
Total	23 853	22 267	19 550	19 664	19 195	18 823	

[*] *For details, see Annex A.1*
Source: NBB

Table 2.33: Top 10 Employment, Liège Port complex

Rank	Name	Sector
1	Arcelormittal Belgium	Metalworking industry
2	Electrabel	Energy
3	Cockerill Maintenance & Ingenierie	Metalworking industry
4	Prayon	Chemical industry
5	Association Intercommunale de Traitement des Déchets Liégeois	Other industries
6	N. et B. Knauf et Cie	Construction
7	Carrières et Fours à Chaux Dumont-Wautier	Construction
8	Arjemo	Other logistic services
9	Cimenteries CBR Cementbedrijven	Construction
10	Segal	Metalworking industry

Source: NBB

Figure 2.18: Employment at the port of the Liège Port complex
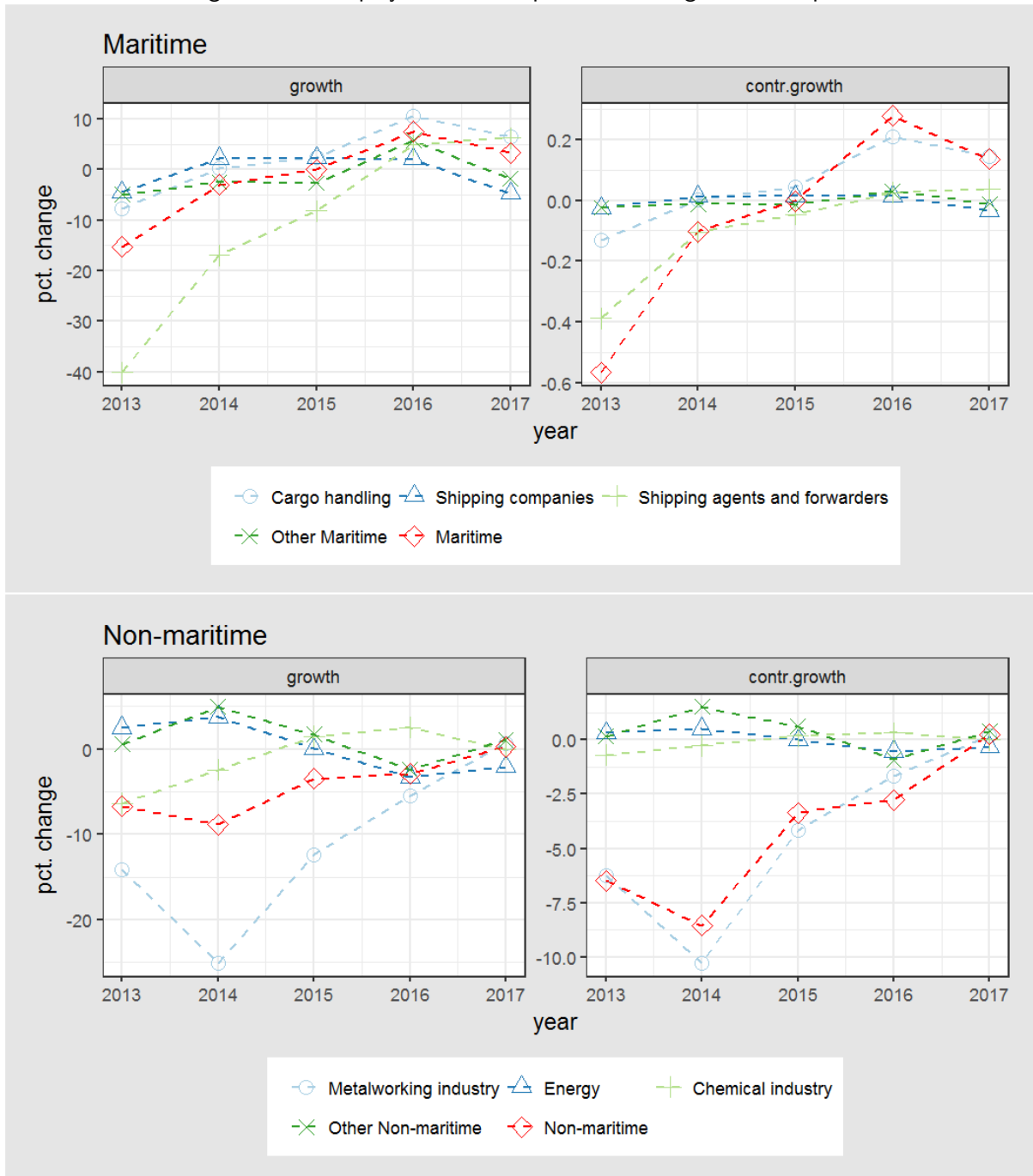
Source: NBB

Figure 2.19: Concentration in the port of the Liège Port complex
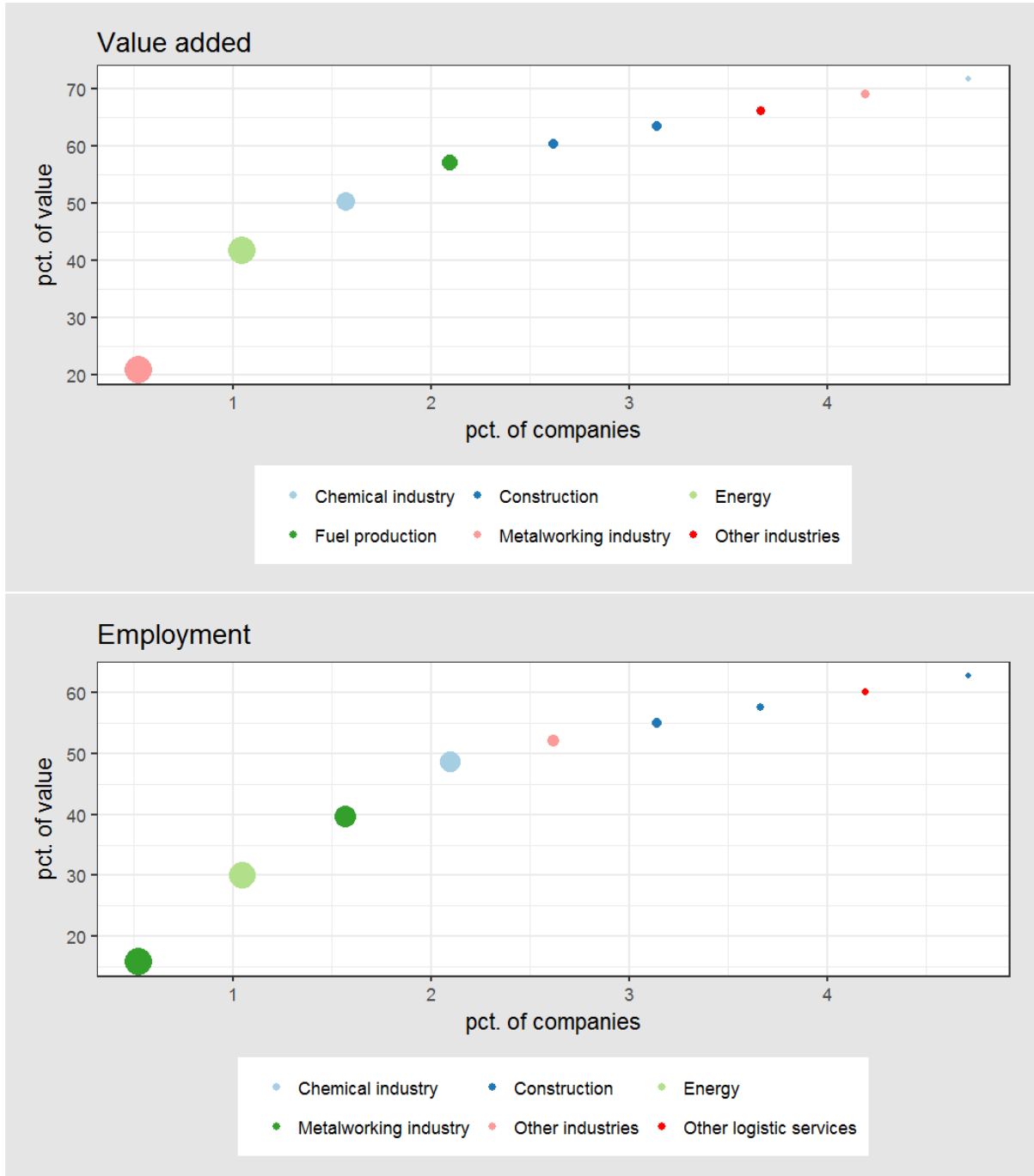
Source: NBB

2.5.4 Investment

Table 2.34 shows direct investment at the Liège port complex over the 2012-2017 period. Between 2016 and 2017, investment was up by 16.2%, from € 196 to € 228 million.

Table D.15 in Annex D shows investment at the Liège port complex in detail, together with the respective shares of the component economic sectors and their changes over the years. Investment is broken down into a maritime and a non-maritime cluster, each of which is further subdivided into the contributing sectors. In terms of investment, the Liège port complex is mainly (97.8%) non-maritime. Following strong growth in 2016, investment in the maritime cluster returned to the level prior to that year. In contrast, investment in the non-maritime cluster rose by 18.7%.

In 2017, the energy sector remained the largest investor at the Liège port complex with a 27.9% share. However, the increase in investment at the port was largely due to the metal working industry, whose investment was up 55.8%. These two sectors were together responsible for over half of all investment at the Liège port complex in 2017.

The evolution of the various shares in investment in the maritime cluster during the 2012-2017 period was dominated by the cargo handling sector, the largest sector in this cluster. In the non-maritime cluster, the amounts invested in the various economic sectors showed considerable volability between 2012 and 2017. Three sectors were responsible for around two thirds of the annual investment. Investment in the construction sector halved during the last three years of the period. Conversely, investment by 'other industries' and 'other logistic services' more than doubled in 2017.

The last column in Table 2.34 shows the contribution of each component to total growth in investment over the 2016-2017 period. As the non-maritime cluster contributes the predominant share, this cluster's 17.9% rise in investment was almost entirely responsible for the overall increase. Meanwhile, the maritime cluster's contribution to total growth was negative. The sectors contributing the most to total investment growth in 2017 were the metalworking industry, 'other industries' and 'other logistic services'.

Note that the contributions to total growth in this table differ from each components' own growth[23]. This is illustrated in Figure 2.20. The left-hand panel shows the sector's own growth for the 2012-2017 period, while the right-hand panel shows the sector's contribution to the port's total growth for this period. The latter takes into account the sector's own growth and its share in the port's activity (see Annex A.1 for details).

The figure shows that the maritime cluster's contribution to investment growth appears to be driven by the shipping agents and forwarders at the beginning of the period and by cargo handling at the end of the period. Meanwhile, the non-maritime cluster's contribution to growth appears to be moving in step with investment growth in the energy sector. However, the metalworking industry is also making an impact.

The pattern of investment is closely linked to projects and is therefore highly volatile, so that the figures require a nuanced interpretation. The remarkable increase in investment in 'other industries' was due to an energy project run by waste management company Intradel. Meanwhile, the energy sector benefited from the maintenance investments by the electricity producers. Prayon was the main investor in the chemical industry with its rechargeable batteries project. In the cargo handling sector, there were a number of investments relating to the new developed Trilogiport site. The top 10 companies in terms of investment are listed in Table 2.35.

---

[23]The contribution of a sector to the total growth equals its share in 2016 times the sectoral growth over 2016-2017 period. See Annex A.1

Figure 2.20: Investment at the port of the Liège Port complex
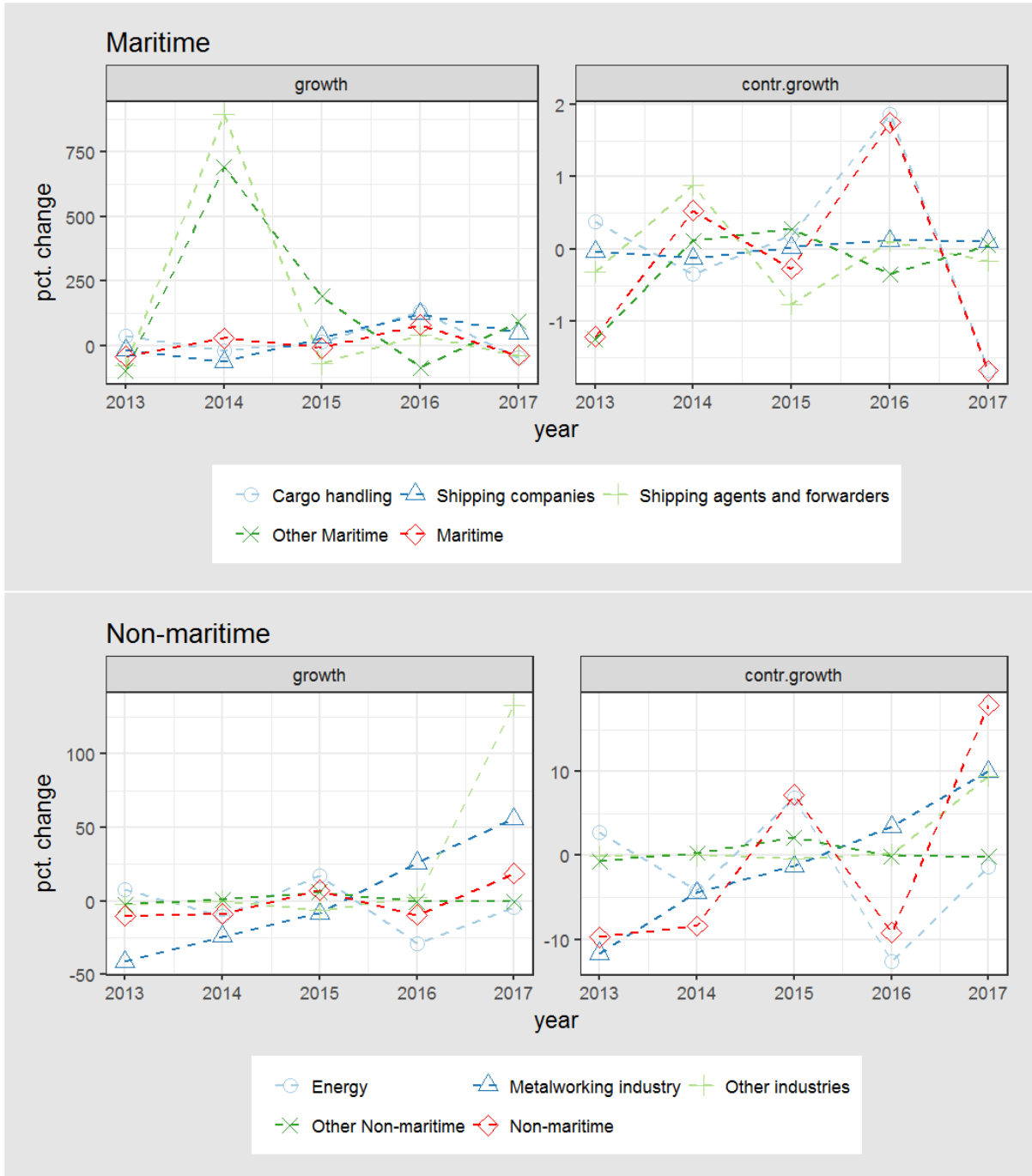
Source: NBB

Table 2.34: Investment at the port of the Liège Port complex (million €)

	2012	2013	2014	2015	2016	2017	Contr.gr (%)
Cargo handling	2	3	3	3	7	4	-1.7
Shipping companies	1	0	0	0	0	1	0.1
Shipping agents and forwarders	1	0	2	1	1	1	-0.2
Other Maritime	3	0	0	1	0	0	0.1
Maritime	7	4	5	5	8	5	-1.7
Energy	82	89	80	93	66	64	-1.4
Metalworking industry	68	40	30	28	35	55	10.0
Other industries	15	14	14	14	14	33	9.5
Other Non-maritime	69	68	68	73	72	72	-0.1
Non-maritime	235	211	193	207	188	223	17.9
Direct	242	215	198	212	196	228	16.2

Source: NBB

Table 2.35: Top 10 Investment, Liège Port complex

Rank	Name	Sector
1	Electrabel	Energy
2	Arcelormittal Belgium	Metalworking industry
3	Prayon	Chemical industry
4	Association Intercommunale de Traitement des Déchets Liégeois	Other industries
5	Cockerill Maintenance & Ingenierie	Metalworking industry
6	EDF Luminus	Energy
7	Biowanze	Fuel production
8	Renewi Belgium	Other industries
9	D.l. Trilogiport Belgium	Other logistic services
10	Segal	Metalworking industry

Source: NBB

2.6 Port of Brussels

2.6.1 Port developments

The port of Brussels is the second largest Belgian inland port. In 2017, waterborne traffic for the port of Brussels was up by 8.8%. The main categories of cargo handled in 2017 were once again building materials and petroleum products, together representing three-quarters of the total volume. Container traffic increased by 4% expressed in TEU, another new record.

In 2018, traffic grew by 7.7%. Among others, a result of increased earthmoving operations by ship. The volume of 5.2 million tonnes of handled cargo was an all-time record.

Two projects forming the main focus of attention for the Brussels Port Authority were the Cruise Terminal and the Construction Village project. The port also wants to intensify the transport of pallets by waterway.

Table 2.36: Maritime traffic at the port of Brussels (million tonnes)

	2015	2016	2017	Change 2016-17 (%)
Total	4.4	4.5	4.8	8.8

Source: Port Authority

2.6.2 Value added

Table 2.37 shows direct and indirect value added at the port of Brussels over the 2012-2017 period. Between 2016 and 2017, direct value added rose by 16.0%, from € 719 million to € 834 million.

Table D.16 in Annex D shows value added at the port of Brussels in detail, together with the respective shares of the component economic sectors and their changes over the years. Direct value added is broken down into a maritime and a non-maritime cluster, each of which is further subdivided into the contributing sectors. In terms of value added, the port of Brussels is mainly (97.6%) non-maritime.

In 2017, 'other logistic services' accounted for 62.9% of value added at the port of Brussels. Trade was the second largest sector at the port with a 17.7% share. Together, these sectors accounted for more than four fifths of value added at the port.

The maritime cluster's share of value added showed a downward trend during 2012-2017 period, mainly due to of the fast-growing non-maritime cluster, whose share grew further from the year 2015, underpinned by 'other logistic services'. In the maritime cluster, shipping agents and forwarders constitute the most important sector, but their share has been diminishing continuously over the period. In contrast, value added created by the Brussels Port Authority has since 2015 been gaining share in the maritime cluster's value added.

The last column in Table 2.37 shows the contribution of each component to growth in value added over the 2016-2017 period. Value added created by the non-maritime cluster rose considerably, and as its share of value added is many times larger than the maritime cluster, it made a very significant (+16.2%) contribution to overall growth. Conversely, as the maritime cluster saw its value added decline, its contribution to growth was negative (-0.2%). The sector making the biggest contribution to the increase was the main component of the non-maritime cluster, namely 'other logistic services' (+18.9%).

Note that the contributions to total growth in this table differ from each components' own growth[24]. This is illustrated in Figure 2.21. The left-hand panel shows the sector's own growth for the 2012-2017 period, while the right-hand panel shows the sector's contribution to the port's total growth for this period. The latter takes into account the sector's own growth and its share in the port's activity (see Annex A.1 for details).

The figure shows that the maritime cluster's contribution to growth in value added appears to be driven by the Brussels Port Authority. Meanwhile the non-maritime cluster's contribution to growth appears to be moving in step with growth in the 'other logistics' sector.

Changes in commodity prices and sales prices can impact the evolution of value added in a given sector. Other determinants are mergers, restructuring, failures, business relocation and the establishment of new companies. Higher depreciation due to investment programmes or the recording, reversal of impairments and provisions in the annual accounts can also influence the evolution of value added. The operating income of Solvay, the principal player at the port, is mainly composed of 'other operating income'. Among other factors, changes in this revenue source generated higher profits. Inovyn Belgium moved its research and development centre out of the port area. The Aquiris waste treatment plant drew economic benefits from synergies within the Veolia group. Logistics contractor Logistics & Packaging Solutions moved part of its business to the port of Ghent. Meanwhile, energy supplier Belpower International ceased to operate.

Value added at the port of Brussels shows a rather high degree of concentration: 5% of the companies accounted for 80% of direct value added, while just one company generated half of direct value added. This is illustrated in Figure 2.23. The top 10 companies in terms of value added are listed in Table 2.38.

Table 2.37: Brussels, value added (million €)

	2012	2013	2014	2015	2016	2017	Contr.gr (%)[(*)]
Shipping agents and forwarders	16.6	14.6	13.2	12.4	10.6	9.2	-0.2
Port authority	-0.9	3.1	-1.9	6.0	4.7	5.5	0.1
Cargo handling	6.8	5.8	6.4	6.3	6.5	5.5	-0.1
Other Maritime	1.7	1.7	1.3	-2.3	-0.1	-0.1	0.0
Maritime	24.2	25.3	19.0	22.3	21.7	20.2	-0.2
Other logistic services	158.1	186.8	187.6	441.4	388.4	524.2	18.9
Trade	217.5	158.0	173.7	196.2	178.5	147.8	-4.3
Other industries	59.4	56.3	45.3	47.8	57.8	61.4	0.5
Other Non-maritime	89.1	64.0	62.3	64.1	72.2	80.0	1.1
Non-maritime	524.1	465.1	468.9	749.5	697.0	813.4	16.2
Direct	548.3	490.4	487.9	771.9	718.7	833.6	16.0
Indirect	389.2	344.0	332.1	482.2	439.4	497.9	
Total	937.5	834.3	820.0	1 254.1	1 158.1	1 331.5	

[(*)] *For details, see Annex A.1*
Source: NBB

---

[24]The contribution of a sector to the total growth equals its share in 2016 times the sectoral growth over 2016-2017 period. See Annex A.1

Figure 2.21: Value added at the port of Brussels
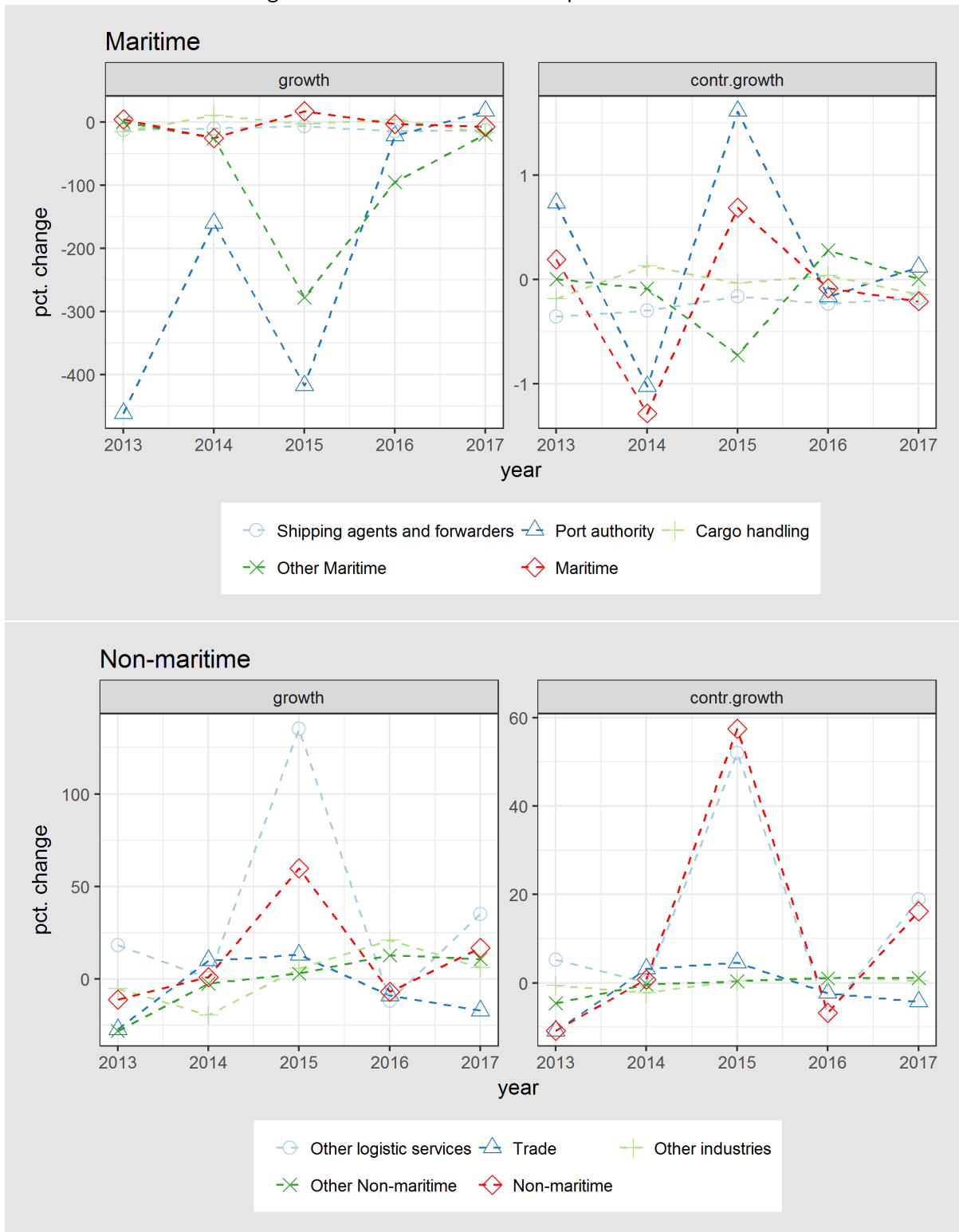
Source: NBB

Table 2.38: Top 10 Value added, Brussels

Rank	Name	Sector
1	Solvay	Other logistic services
2	Plastic Omnium Advanced Innovation And Research	Other logistic services
3	Aquiris	Other industries
4	Ineos Services Belgium	Other logistic services
5	Solvay Chemicals International	Trade
6	Bruxelles Energie - Brussel Energie	Other industries
7	Ineos Sales Belgium	Trade
8	Ceres	Food industry
9	Scania Belgium	Trade
10	Corden Pharma Brussels	Chemical industry

Source: NBB

2.6.3 Employment

Table 2.39 shows employment at the port of Brussels over the 2012-2017 period. Between 2016 and 2017 the number of full-time equivalent jobs shrank by 4.2%, from 4 024 to 3 856 FTE.

Table D.17 in Annex D shows employment at the port of Brussels in detail, together with the respective shares of the component economic sectors and their changes over the years. Direct employment is broken down into a maritime and a non-maritime cluster, each of which is further subdivided into the contributing sectors. 92% of the workforce at the port was employed in the non-maritime cluster (compared to 97.6% of value added).

The largest employers at the port are the non-maritime sectors 'other logistic services' and trade, with a 32.2% and 29.6% share respectively. Meanwhile, the Brussels Port Authority has become the largest employer in the maritime cluster.

The maritime cluster's share of employment is gradually decreasing, due to the changes taking place in the 'shipping agents and forwarders' sector. The workforce of the 'other logistic services' is relatively stable in absolute figures. However, its share of employment continues to grow as the workforce in the trade and road transport sectors are decreasing.

The last column in Table 2.39 shows the contribution of each component to total growth over the 2016-2017 period. The maritime cluster's contribution to growth decreased less sharply (-1.5%) than the contribution of the non-maritime cluster (-2.6%). The contributions of the main individual components of the maritime cluster are quite low. Meanwhile trade, a main component of the non-maritime cluster, made a more substantial contribution (-3.6%) to the overall decline in employment. This is the first time in five years that the number of full-time equivalent jobs in this sector has fallen below 1 200 FTE. The main employer at the port, 'other logistic services', contributed 1.3% to growth, while the 'other industries' sector contributed somewhat less to growth at the port of Brussels in 2017 (-0.5%).

Note that the contributions to total growth in this table differ from each components' own growth[25]. This is illustrated in Figure 2.22. The left-hand panel shows the sector's own growth for the 2012-2017 period, while the right-hand panel shows the sector's contribution to the port's total growth for this period. The latter takes into account the sector's own growth and its share in the port's activities (see Annex A.1 for details).

The figure shows that the maritime cluster's contribution to employment growth appears to be driven by the shipping agents and forwarders. Meanwhile, the non-maritime cluster's contribution to growth appears to be moving in step with growth in the trade sector.

Mergers, restructuring, business relocation, failures and the establishment of new companies have an impact on the evolution of employment in a given sector. Inovyn Belgium moved its research and development centre out of the port area. Logistics contractor Logistics & Packaging Solutions moved part of its business to the port of Ghent. Meanwhile, Interfashion Trade Belgium and energy supplier Belpower International ceased to operate and T.M. Lux went bankrupt.

Employment in Brussels shows a rather high degree of concentration: 5% of the companies accounted for 55% of direct employment and 14 companies provided half of all employment. This is illustrated in Figure 2.23. The top 10 companies in terms of employment are listed in Table 2.40.

---

[25]The contribution of a sector to the total growth equals its share in 2016 times the sectoral growth over 2016-2017 period. See Annex A.1

Figure 2.22: Employment at the port of Brussels
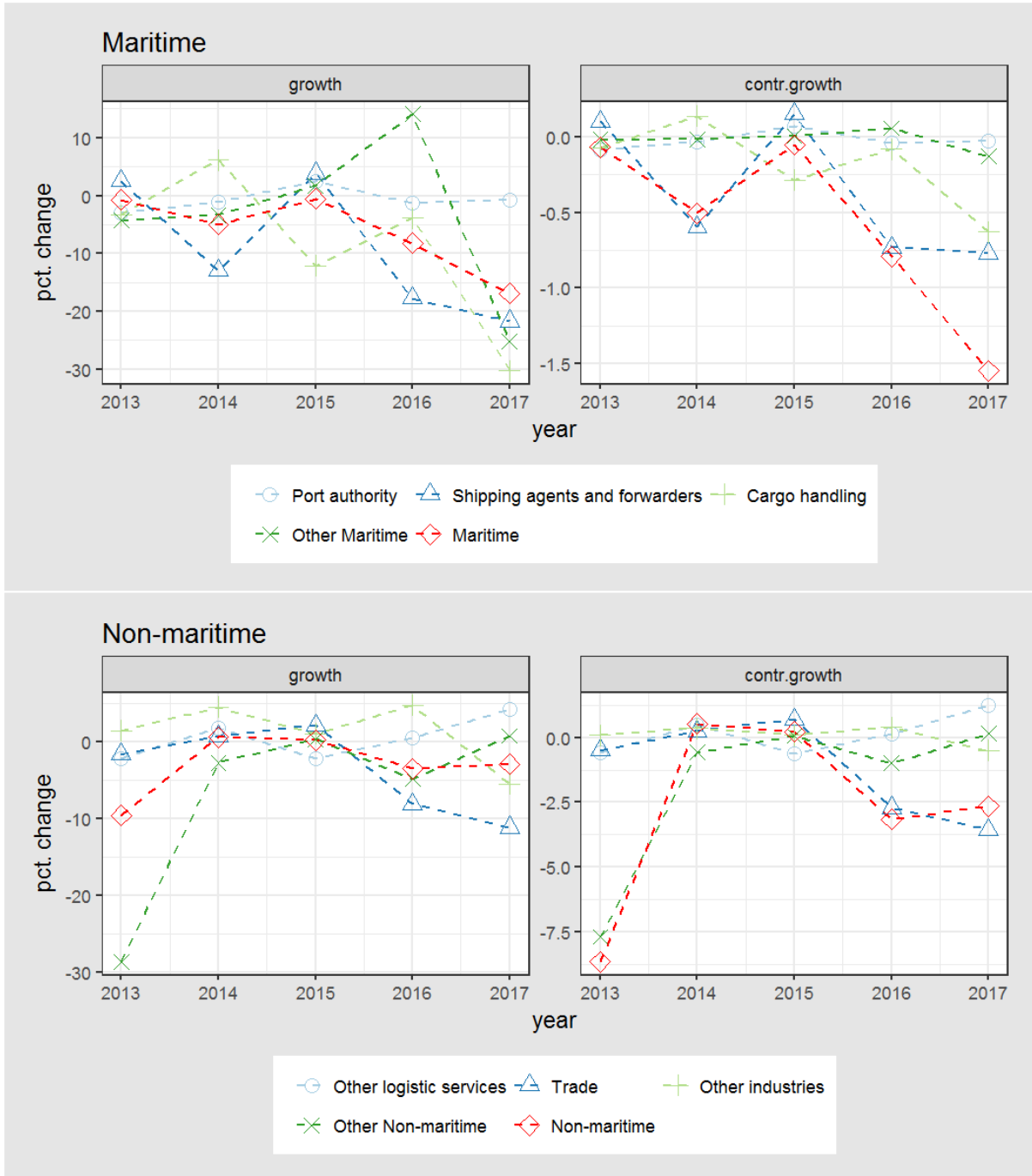
Source: NBB

Figure 2.23: Concentration in the port of Brussels
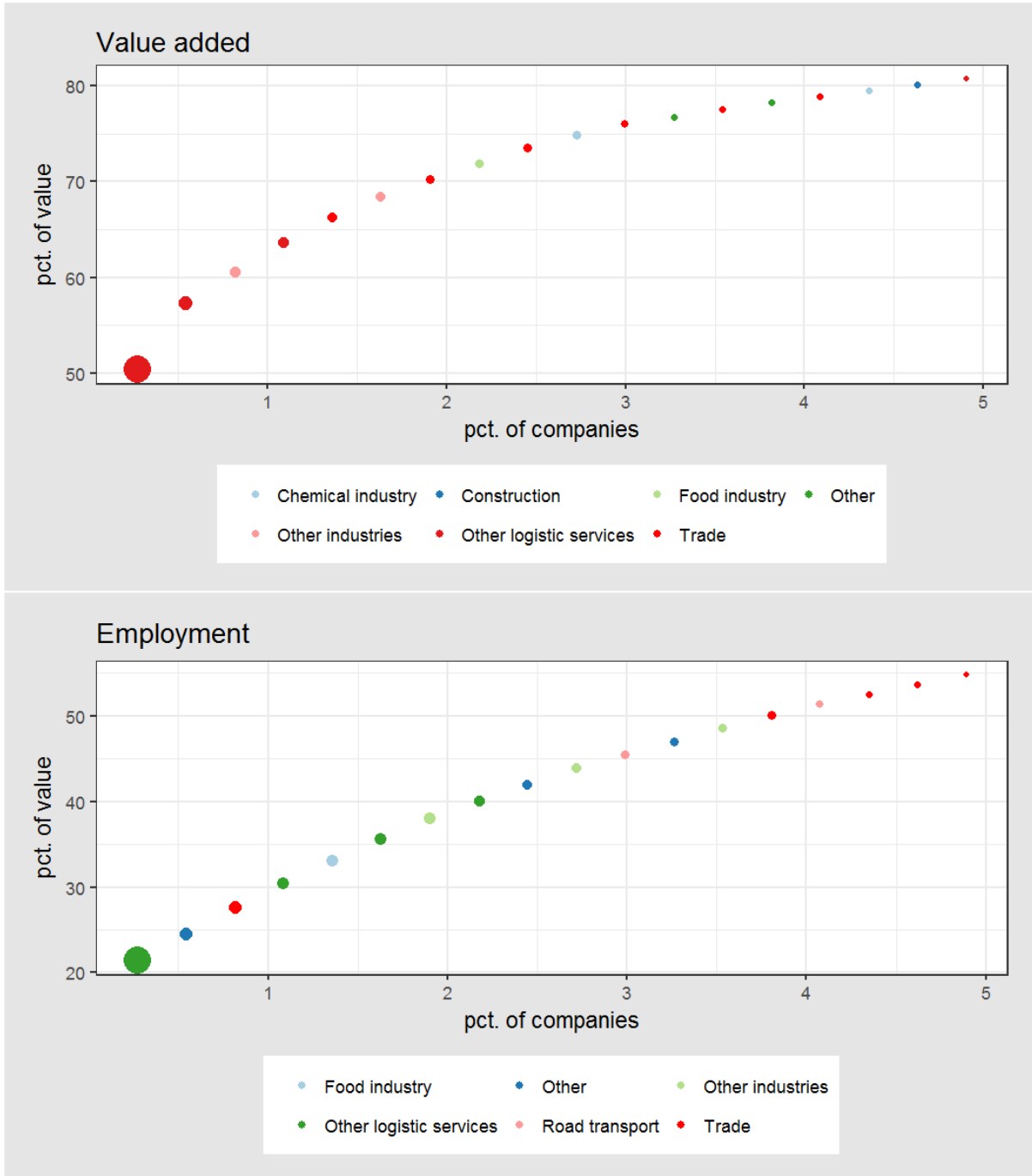
Source: NBB

Table 2.39: Employment at the port of Brussels (FTE)

	2012	2013	2014	2015	2016	2017	Contr.gr (%)[*]
Port authority	127	123	122	125	123	122	-0.0
Shipping agents and forwarders	187	192	167	174	143	112	-0.8
Cargo handling	96	93	99	87	84	58	-0.6
Other Maritime	19	18	17	18	20	15	-0.1
Maritime	429	426	405	403	370	308	-1.5
Other logistic services	1 218	1 191	1 212	1 186	1 192	1 243	1.3
Trade	1 381	1 359	1 369	1 399	1 285	1 142	-3.6
Other industries	324	328	343	347	364	344	-0.5
Other Non-maritime	1 228	876	852	855	813	820	0.2
Non-maritime	4 151	3 754	3 777	3 786	3 654	3 548	-2.6
Direct	4 580	4 181	4 182	4 189	4 024	3 856	-4.2
Indirect	4 222	3 840	3 711	3 950	3 791	3 576	
Total	8 802	8 021	7 893	8 140	7 815	7 432	

[*] *For details, see Annex A.1*
Source: NBB

Table 2.40: Top 10 Employment, Brussels

Rank	Name	Sector
1	Solvay	Other logistic services
2	Brussels Port Authority	Port authority
3	Scania Belgium	Trade
4	Plastic Omnium Advanced Innovation And Research	Other logistic services
5	Ceres	Food industry
6	Ineos Services Belgium	Other logistic services
7	Suez R&R Be North	Other industries
8	Loomis Belgium	Other logistic services
9	Feneko	Metalworking industry
10	Bruxelles Energie - Brussel Energie	Other industries

Source: NBB

2.6.4 Investment

Table 2.41 shows investment at the port of Brussels over the 2012-2017 period. Between 2016 and 2017, investment declined by 7.1%, from € 66 million to € 62 million.

Table D.18 in Annex D shows investment at the port of Brussels in detail, together with the respective shares of the component economic sectors and their changes over the years. Investment is broken down into a maritime and a non-maritime cluster, each of which is further subdivided into the contributing sectors. In terms of investment, the port of Brussels is mainly (81.2%) non-maritime. In 2017, investment in the maritime cluster rose by 3%. Conversely, investment in the non-maritime cluster was down 9.1%.

The 'other logistic services' sector was the biggest investor in 2017, with a 46.3% share. Second largest was the non-maritime trade sector, with an investment share of 20.3%.

The last column in Table 2.41 shows the contribution of each component to total growth over the 2016-2017 period. The maritime cluster made a positive (+0.5%) contribution to total growth of investment, whereas investment growth in the non-maritime cluster was negative (-7.6%). Investment by the Brussels Port Authority, the main investor in the maritime cluster, remained at almost the same level. The other components of this cluster contributed positively to growth. Among the non-maritime sectors, the contribution to growth made by 'other logistic services' was extremely positive (+25.3%), in contrast to trade (- 10.6%) and the 'other non-maritime' group (-22.0%).

Note that the contributions to total growth in this table differ from each components' own growth[26]. This is illustrated in Figure 2.24. The left-hand panel shows the sector's own growth for the 2012-2017 period, while the right-hand panel shows the sector's contribution to the port's total growth for this period. The latter takes into account the sector's own growth and its share in the port's activity (see Annex A.1 for details).

The figure shows that the maritime cluster's contribution to growth appears to be driven by shipping agents and forwarders. Meanwhile, the non-maritime cluster's contribution to investment growth appears to be moving in step with trade. However, the 'other non-maritime' group is also having an impact.

The top 10 companies in terms of investment at the port of Brussels are listed in Table 2.42.

Table 2.41: Investment at the port of Brussels (million €)

	2012	2013	2014	2015	2016	2017	Contr.gr (%)
Port authority	5	11	5	8	9	9	-0.0
Cargo handling	1	1	2	3	1	1	0.2
Shipping agents and forwarders	7	13	1	5	1	1	0.1
Other Maritime	1	0	0	0	0	0	0.2
Maritime	13	24	8	16	11	12	0.5
Other logistic services	17	21	19	18	12	29	25.3
Trade	10	15	14	16	20	13	-10.6
Construction	3	3	2	2	3	2	-0.3
Other Non-maritime	8	6	10	9	21	7	-22.0
Non-maritime	39	44	45	44	55	50	-7.6
Direct	52	69	53	60	66	62	-7.1

Source: NBB

---

[26]The contribution of a sector to the total growth equals its share in 2016 times the sectoral growth over 2016-2017 period. See Annex A.1

Figure 2.24: Investment at the port of Brussels
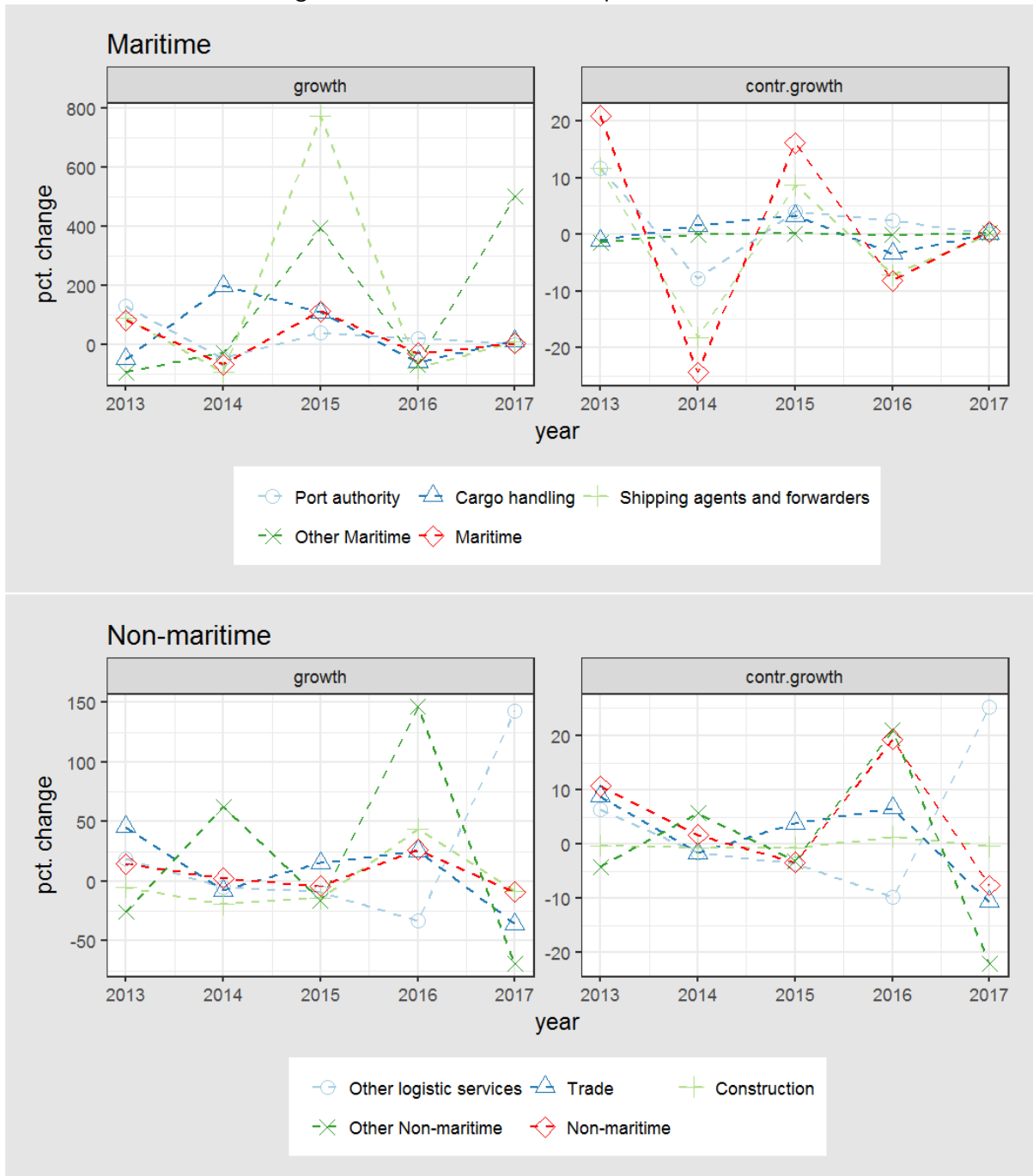
Source: NBB

Table 2.42: Top 10 Investment, Brussels

Rank	Name	Sector
1	Plastic Omnium Advanced Innovation And Research	Other logistic services
2	Brussels Port Authority	Port authority
3	Solvay	Other logistic services
4	Amadeus	Other logistic services
5	Etablissements Van Damme	Trade
6	Loxam	Other logistic services
7	Diamond Europe	Trade
8	Scania Belgium	Trade
9	Boxing Day	Other logistic services
10	Ceres	Food industry

Source: NBB

3 Summary

Direct value added at the Belgian ports rose by 7.3% in 2017 to € 19.4 billion (current prices). Indirect value added was around 82% of direct value added, at € 15.9 billion. After the decline between 2012 and 2015, direct employment at the Belgian ports was up for the second year in a row. In 2017, the number of direct full-time equivalent jobs (FTE) rose by 0.8% to 116 311. Indirect employment is 1.2 times the direct employment figure, at 138 468 FTE.

3.1 Flemish Seaports

In 2017, direct value added increased by 7.6% at the Flemish seaports from € 16 165 million to € 17 394 million. Direct value added increased significantly at the ports of Antwerp and Ghent, by € 662 million and € 518 million respectively. The increase of direct value added at the ports of Zeebrugge (€ +32 million) and Ostend (€ +17 million) was also substantial.

The chemical industry, which accounted for 32% of direct value added at the port of Antwerp, was mainly responsible for the increase at this port. Nevertheless, the contribution to value added growth by the fuel production and cargo handling sectors was also significant. The increase at the port of Ghent was attributable to higher amount in the metalworking industry which generated 24.2% of direct value added at this port. Value added growth at the port of Zeebrugge was driven by the road transport and the 'port construction and dredging' sectors. The metalworking industry, which accounted for 36.2% of direct value added at the port of Ostend, was mainly responsible for the increase at this port.

In 2017, direct employment increased by 1% at the Flemish seaports, from 103 563 to 104 612 full-time equivalent jobs. The ports of Antwerp (+721 FTE), Ghent (+285 FTE) and Zeebrugge (+101 FTE) recorded an increase, while the port of Ostend showed a small decline (-59 FTE).

In terms of direct employment, the cargo handling sector and the chemical industry were the largest sectors at the port of Antwerp, with a share of 24.9% and 17.8% respectively. In the port of Ghent, the car manufacturing (33.2%) and metalworking (21.4%) industries were the largest employers. In the port of Zeebrugge, cargo handling and the public sector were the biggest employers, with shares of 31.4% and 14.4% respectively. In the port of Ostend, the metalworking industry and the public sector were the leading employers, with a share of 29.4% and 15.7% respectively.

3.2 Inland Ports

In 2017, direct value added increased by 4.6% at the inland ports as a whole, from € 1 887 million to € 1 974 million. Direct value added increased by € 115 million at the port of Brussels, while the Liège port complex registered a decrease of € 28 million.

The increase at the port of Brussels is attributable to the 'other logistic services' sector, which accounted for 62.9% of direct value added. The fall at the Liège port complex was largely due to the energy sector.

In 2017, direct employment at the inland ports as a whole fell by 1.2%, from 11 838 to 11 699 full-time equivalent jobs. The Liège port complex recorded a limited increase (+29 FTE), while the port of Brussels showed a decline (-168 FTE).

The limited rise in employment at the Liège port complex was mainly due to the other logistic services sector. The reduction in employment at the port of Brussels was attributable to the trade sector.

3.3 Increased direct investment

In 2017, direct investment at the Belgian ports increased by 2.4%, from € 4 711 million to € 4 825 million. There is no information on the nature of these investments, so their indirect effects are difficult to estimate. The port of Ghent and, to a lesser extent, the Liège port complex where the only contributors to investment growth in the Belgian ports.

Delving deeper into the data and trying to explain the above trends in terms of the structural composition of the Belgian ports shows that all ports are concentrated on a few sectors, and within those sectors often on just a handful of companies.

.

References

AG Haven Oostende (2018). *Jaarverslag 2017.*

Bollen, J.C., G.W. Meijerinck, and H. Rojas-Romagosa (2016). "Brexit costs for the Netherlands arise from reduced trade". In: *CPB Policy brief* July.

Brexit High Level Group Belge sous la presidence du Comte Paul Buysse (2017a). *Preparing for all possible Brexit-scenario's – a strategy for the Belgian economy.*

Brexit High Level Group Belge sous la presidence du Comte Paul Buysse (2017b). *Towards a Belgian Economic Brexit Strategy.*

Carlino, L. et al. (2017). "Decomposition techniques for financial ratios of European non-financial listed groups". In: *ECB Statistics Paper Series* 21.

Centre for European Reform (2016). "The economic consequences of the Brexit: the final report of the CER commission on Brexit 2016". In: *Centre for European Reform.*

Chaney, T. (2013). "The gravity equation in international trade: an explanation". In: *NBER Working papers* 19285.

Coens, J. (2017). "ESCB Brexit task force presentation".

Copenhagen Economics. (2014). "The impact of trade liberalisation on the EU automotive industry: trends and prospects". In: *Copenhagen Economics on the request of the European Commission, DG Trade* July.

Coppens, F. et al. (2007). "Economic impact of port activity: a disaggregate analysis, the case of Antwerp". In: *NBB Working paper series* 110.

De Doncker, H. (2017). "Economic importance of the logistics sector in Belgium". In: *NBB Working paper series* 325.

De Mesnard, L. (2002). "More On Multipliers". In: *Journal of the Regional Science* 42.3, pp. 545–548.

Dietzenbacher, E. (2002). "Note about the concept of 'Net Multipliers'". In: *Journal of the Regional Science* 45.2, pp. 421–426.

Dhyne E. and Duprez C. (2017) "Its a small, small world A guided tour of the Belgian production network". In: *International Productivity Monitor* 32, pp 84-96

Fitzmaurice, G., N. Laird, and J. Ware (2011). *Applied longitudinal data analysis.* 2nd ed. John Wiley and Sons.

Flemish Port Commission. *Maritieme overslag in de Europese havens: Nederland - Amsterdam Noordzeekanaalgebied.* URL: http://www.vlaamsehavencommissie.be/vhc/pagina/maritieme-overslag-europese-havens-nederland-amsterdam-noordzeekanaalgebied

Flemish Port Commission. *Maritieme overslag in de Europese havens.* URL: http://www.vlaamsehavencommissie.be/vhc/thema/informatie-en-statistiek/statistiek-europese-havens (visited on 14/01/2019).

Fogelberg, S. and Lazarczyk, E. (2015). "Wind power volatility and the impact on failure rates in the Nordic electricity market ". In: *IFN Working Paper volume 1065*

Haropa (2018). *Rapport d'activite 2017 Port de Paris et Port du Havre.*

Imbs, J. and I. Mejean (2017). "Trade elasticities". In: *Review of international economics* 25(2).

Lagneaux, F. (2006). "Economic importance of the Belgian ports: Flemish maritime ports and Liège port complex - Report 2004". In: *NBB Working paper series* 86.

Lev, B. and S. Sunder (1979). "Methodological issues in the use of financial ratios". In: *Journal of accounting and economics* 1.

Maatschappij Linkerscheldeoever (2018). *Jaarverslag 2017.*

Maatschappij van de Brugse Zeehaven (2018). *Jaarverslag 2017.*

Mathys, C. (2017). "Economic importance of the Belgian ports: Flemish maritime ports, Liège port complex and the port of Brussels - Report 2015". In: *NBB Working paper series* 321.

McLeavy, S. and S. Fielsend (1987). "Sector and size effects in ratio analysis: an indirect test of ratio proportionality". In: *Accounting and business research* 17, No 66.

Merckx, J.-P. (2018). *De Vlaamse havens - Feiten, statistieken en indicatoren voor 2017.*

Miller, R.A. and P.D. Blair (1985). *Input-output analysis Foundations and extensions.* Ed. by Prentice Hall.

Ministere de l'economie et des finances (2017). *Port et Brexit : les enjeux pour le Royaume-Uni, la Belgique, l'Irlande et les Pays-Bas, et discussions sur les consequences pour les ports francais.*

NBB Central Balance Sheet Office (2012-2018). *Annual accounts submitted to the Central Balance Sheet Office.* Ed. by NBB Central Balance Sheet Office.

NBB. *NBB Online statistics.* URL: http://stat.nbb.be/

National Accounts Institute (2014). *Classifications.* Ed. by National Accounts Institute.

National Accounts Institute (2018). *Gross National Income, Methodological inventory Belgium.* Ed. by National Accounts Institute.

Oosterhaven, J. and D. Stelder (2002). "Net multipliers avoid exaggerating impacts: with a bi-regional illustration for the Dutch Transportation Sector". In: *Journal of the Regional Science* 42.3, pp. 533–543.

Port Autonome de Liège (2018). *Rapport Annuel 2017.*

Port de Bruxelles (2018). *Rapport annuel 2017.*

Port of Zeebrugge (2018). *Jaarverslag 2017.*

Rojas-Romagosa, H. (2016). "Trade effects of Brexit for the Netherlands". In: *CPB Background document* June.

Strassert, G. (1968). "Zur Bestimmung Strategischer Sektoren mit Hilfe von Input-Output Modellen". In: *Jahrbucher fur Nationalokonomie und Statistik* 182, pp. 211–215.

Troy, N., Denny, E., O'Malley, M. (2010) "Base-load cycling on a system with significant wind penetration". *IEEE Transactions on power systems.*

United Nations Conference on Trade and Development (2018). *Review of maritime transport 2018.*

Van Wymeersch, C., H. Ooghe, and H. Vander Bauwhede (2017). *Financiële analyse van de onderneming.* Ed. by Intersentia.

Vandenbussche, H., W. Connel, and W. Simons (2017). "Global Value Chains, Jobs and Trade Shocks. An application to Brexit". In: *Discussion paper series, KU Leuven, CEPR* September.

Vansteelandt, Stijn, James Carpenter, and Michael G Kenward (2010). "Analysis of incomplete data using inverse probability weighting and doubly robust estimators". In: *Methodology -European Journal of Research Methods for the Behavioral and Social Sciences* 6.1, pp. 37– 48.

Vennix, S. (2017). "Economic importance of air transport and airport activities in Belgium -Report 2015". In: *NBB Working paper series* June.

Whittington, G. (1980). "Some basic properties of accounting ratios". In: *Journal of business finance and accounting* 7,2.

WindEurope (2018)."Financing and investment trends, The European wind industry in 2017" URL: https://windeurope.org/wp-content/uploads/files/about-wind/reports/Financing-and-Investment-Trends-2017.pdf (visited on 13/12/2018).

A Technical annexes

A.1 Contribution to growth

Let s be a sector in port p and let $v_{sp}(y)$ be the value of some variable for that that sector s in port p in year y. v could be value added, employment, ... Then the total for for p for that variable is just the sum of the values for all the sectors in that port or $v_{*p}(y) = \sum_{s \in p} v_{sp}(y)$.

The growth of the value for the port between $y-1$ and y is equal to the change in value, divided by the value in the first year or $g_{*p}(y) = \frac{v_{*p}(y) - v_{*p}(y-1)}{v_{*p}(y-1)}$ and similar for the growth of the sector in that port : $g_{sp}(y) = \frac{v_{sp}(y) - v_{sp}(y-1)}{v_{sp}(y-1)}$.

It follows from this that:

$$
\begin{aligned}
g_{*p}(y) &= \frac{v_{*p}(y) - v_{*p}(y-1)}{v_{*p}(y-1)} \\
&= \sum_{s \in p} \frac{v_{sp}(y) - v_{sp}(y-1)}{v_{*p}(y-1)} \\
&= \sum_{s \in p} \frac{v_{sp}(y) - v_{sp}(y-1)}{v_{*p}(y-1)} \underbrace{\frac{v_{sp}(y-1)}{v_{sp}(y-1)}}_{=1 \text{ if } v_{sp}(y-1) \neq 0} \\
&= \sum_{s \in p} \overbrace{\underbrace{\frac{v_{sp}(y) - v_{sp}(y-1)}{v_{sp}(y-1)}}_{=g_{sp}(y),\ \text{see supra}} \underbrace{\frac{v_{sp}(y-1)}{v_{*p}(y-1)}}_{\alpha_{sp}(y-1)}}^{\text{sectoral contribution}}
\end{aligned}
$$

where $\alpha_{sp}(y-1) = \frac{v_{sp}(y-1)}{v_{*p}(y-1)}$ is the value for the sector divided by the total for the port, or it is the share of te sector for that port (if $\forall s \in p, v_{sp}(y-1) \geq 0$).

So we find that[27] the growth of v in the port p is the sum of sectoral contributions to that growth, each sector's contribution is equal to that sector's share in the previous year times the own-growth of the sector. This is equivalent to saying that the growth for the port is the weighted average of the growths of the sectors in that port, the weights are the shares of the sectors in $y-1$.

A.2 Decomposition of the globalised ratio

A (company) ratio is by definition a division of a variable for a company (the numerator, n_c) by another variable for that company (the denominator, d_c). or $r_c = \frac{n_c}{d_c}$.

The globalised ratio for a sector is then the sum of the numerators divided by the sum of the denominators or $r_s = \frac{\sum_{c \in s} n_c}{\sum_{c \in s} d_c}$. Using some basic properties of addition and multiplication we find that[28]:

---

[27] If $\forall s \in p, v_{sp}(y-1) > 0$.
[28] For more detail see (Carlino et al. 2017, see (M2) on p. 16)

$$
\begin{aligned}
r_s &= \frac{\sum_{c \in s} n_c}{\sum_{c \in s} d_c} \\
&= \frac{\sum_{c \in s} n_c}{D_s}, \text{ (where } D_s = \sum_{c \in s} d_c) \\
&= \frac{\sum_{c \in s} n_c \frac{d_c}{d_c}}{D_s}, \text{ (if } d_c \neq 0) \\
&= \frac{\sum_{c \in s} d_c \frac{n_c}{d_c}}{D_s} \\
&= \sum_{c \in s} \frac{d_c}{D_s} \frac{n_c}{d_c} \\
&= \sum_{c \in s} \omega_c \frac{n_c}{d_c}, \text{ (where } \omega_c = \frac{d_c}{D_s}) \\
&= \sum_{c \in s} \omega_c r_c
\end{aligned}
$$

So we find that:

$$
r_s = \sum_{c \in s} \overbrace{\underbrace{\omega_c r_c}_{\text{contribution of company } c}}^{\text{sum of individual contributions}}
$$

where $\omega_c = \frac{d_c}{D_s}$ is the share of the company c in sector s measured in terms of the denominator.

So we find that the globalised ratio for a sector is a weighted sum of the ratio's of the individual companies in that sector. The weight for a company is the share of the company in the sector, measured in terms of the ratio's denominator.

B Definition of financial ratios

Ratio		Items used in annual accounts
Return on equity after tax		
	Numerator (N)	9904
	Denominator (D)	10/15
	Ratio	$N/D \times 100$
Liquidity in the broad sense		
	Numerator (N)	3+40/41+50/53+54/58+490/1
	Denominator (D)	42/48+492/3
	Ratio	N/D
Solvency		
	Numerator (N)	10/15
	Denominator (D)	10/49
	Ratio	$N/D \times 100$

C Cost approach to value added

Component	Items used in annual accounts
Staff costs	62
Depreciations	630
Other charges	631/4+635/8+640/8+649
Recurrent operating profit	9901-740+66A-76A

D Detailed tables by port area

D.1 Port of Antwerp

D.1.1 Value added

Table D.1: Value added in Antwerp (million €)

	2012	2013	2014	2015	2016	2017	$\sigma_{2017,s}$	$\alpha_{2017,s}$	$\bar{\alpha}_s$
Cargo handling	1 481.2	1 563.3	1 604.8	1 665.0	1 697.7	1 803.9	15.8	6.3	4.0
Shipping agents and forwarders	591.3	631.6	593.1	632.8	603.0	607.8	5.3	0.8	0.6
Shipping companies	558.1	368.0	438.8	739.8	661.6	451.8	3.9	-31.7	-4.1
Port construction and dredging	247.1	272.9	236.2	308.3	278.6	288.6	2.5	3.6	3.1
Port authority	256.0	243.5	251.0	252.4	247.9	258.9	2.3	4.4	0.2
Public Sector	148.7	151.3	150.8	143.6	145.0	147.4	1.3	1.7	-0.2
Shipbuilding and repair	37.3	32.0	35.9	31.9	31.3	35.6	0.3	13.7	-1.0
Port trade	18.7	17.7	11.0	12.2	10.2	8.7	0.1	-15.0	-14.2
Fishing and fish industry	0.8	0.9	1.4	1.2	1.8	1.2	0.0	-36.5	7.1
Maritime	3 339.2	3 281.2	3 323.0	3 787.3	3 677.2	3 603.8	31.5	-2.0	1.5
Chemical industry	2 946.1	2 944.2	3 113.2	3 421.9	3 165.2	3 653.5	31.9	15.4	4.4
Fuel production	970.8	806.2	824.9	1 064.5	1 066.4	1 182.4	10.3	10.9	4.0
Trade	903.6	855.1	917.0	908.1	997.9	1 065.8	9.3	6.8	3.4
Other logistic services	485.8	505.5	502.1	537.3	559.3	606.4	5.3	8.4	4.5
Energy	418.9	393.6	321.8	281.5	342.6	310.9	2.7	-9.3	-5.8
Metalworking industry	252.4	248.7	250.3	248.5	235.0	251.4	2.2	6.9	-0.1
Other industries	133.7	139.4	144.5	149.8	164.4	169.7	1.5	3.2	4.9
Construction	136.7	154.0	160.0	158.9	158.1	166.6	1.5	5.4	4.0
Road transport	151.7	141.3	141.6	143.7	140.7	145.1	1.3	3.1	-0.9
Other land transport	155.3	166.9	155.0	147.9	135.1	139.1	1.2	3.0	-2.2
Car manufacturing	103.4	93.3	86.5	77.1	77.3	82.2	0.7	6.4	-4.5
Food industry	47.5	63.1	59.3	61.6	61.3	63.5	0.6	3.5	6.0
Electronics	10.6	8.3	10.1	10.1	10.4	12.4	0.1	19.0	3.1
Non-maritime	6 716.6	6 519.6	6 686.2	7 210.9	7 113.7	7 849.0	68.5	10.3	3.2
Direct	10 055.9	9 800.7	10 009.2	10 998.2	10 790.9	11 452.7	100.0	6.1	2.6
Indirect	9 029.9	8 525.2	8 478.5	9 222.4	8 647.6	9 284.3			
Total	19 085.8	18 326.0	18 487.7	20 220.6	19 438.6	20 737.0			

Source: NBB

Where $\sigma_{2017,s} = 100 \times \frac{v_{2017,s}}{v_{2017,Direct}}$ is the share of sector s (in %) in 2017, $\alpha_{2017,s} = 100 \times \frac{v_{2017}-v_{2016}}{v_{2016}}$ is the growth of sector s (in %) between 2016 en 2017, $\bar{\alpha}_s = 100 \times \left(\left(\frac{v_{2017}}{v_{2012}} \right)^{1/5} - 1 \right)$ is the (geometric) average growth of sector s (in %) between 2012 en 2017.

D.1.2 Employment

Table D.2: Employment in Antwerp (FTE)

	2012	2013	2014	2015	2016	2017	$\sigma_{2017,s}$	$\alpha_{2017,s}$	$\bar{\alpha}_s$
Cargo handling	14 462	14 558	14 581	14 760	14 886	15 362	24.9	3.2	1.2
Shipping agents and forwarders	6 947	6 868	6 701	6 748	6 653	6 622	10.7	-0.5	-1.0
Public Sector	1 822	1 867	1 828	1 745	1 740	1 714	2.8	-1.4	-1.2
Port authority	1 698	1 703	1 606	1 564	1 584	1 570	2.5	-0.9	-1.6
Port construction and dredging	1 475	1 513	1 260	1 313	1 420	1 466	2.4	3.2	-0.1
Shipping companies	968	915	929	902	925	807	1.3	-12.7	-3.6
Shipbuilding and repair	540	410	371	353	360	370	0.6	2.7	-7.3
Port trade	115	115	92	89	82	66	0.1	-18.8	-10.5
Fishing and fish industry	14	13	14	13	13	11	0.0	-11.0	-4.1
Maritime	28 041	27 961	27 381	27 488	27 662	27 989	45.3	1.2	-0.0
Chemical industry	10 889	10 982	10 936	10 794	10 874	10 990	17.8	1.1	0.2
Other logistic services	3 974	4 061	4 180	4 324	4 617	4 791	7.8	3.8	3.8
Metalworking industry	3 656	3 687	3 579	3 554	3 560	3 563	5.8	0.1	-0.5
Fuel production	2 678	2 607	2 626	2 706	2 752	2 754	4.5	0.1	0.6
Trade	2 328	2 260	2 403	2 210	2 157	2 172	3.5	0.7	-1.4
Other land transport	2 435	2 506	2 439	2 317	2 087	2 032	3.3	-2.6	-2.6
Road transport	2 148	2 049	2 154	2 039	1 927	1 903	3.1	-1.3	-2.4
Construction	1 354	1 703	1 723	1 670	1 751	1 800	2.9	2.8	5.9
Other industries	1 133	1 179	1 200	1 231	1 247	1 271	2.1	1.9	2.3
Energy	1 030	993	946	920	1 019	1 060	1.7	4.1	0.6
Car manufacturing	1 080	1 020	1 004	941	846	867	1.4	2.5	-4.3
Food industry	416	403	407	405	381	406	0.7	6.4	-0.5
Electronics	133	127	133	133	137	138	0.2	0.8	0.7
Non-maritime	33 253	33 578	33 731	33 244	33 355	33 748	54.7	1.2	0.3
Direct	61 294	61 539	61 112	60 732	61 016	61 737	100.0	1.2	0.1
Indirect	82 579	82 375	79 900	83 981	84 193	82 447			
Total	143 873	143 914	141 012	144 713	145 209	144 183			

Source: NBB

Where $\sigma_{2017,s} = 100 \times \frac{v_{2017,s}}{v_{2017,Direct}}$ is the share of sector s (in %) in 2017, $\alpha_{2017,s} = 100 \times \frac{v_{2017}-v_{2016}}{v_{2016}}$ is the growth of sector s (in %) between 2016 en 2017, $\bar{\alpha}_s = 100 \times \left(\left(\frac{v_{2017}}{v_{2012}} \right)^{1/5} - 1 \right)$ is the (geometric) average growth of sector s (in %) between 2012 en 2017.

D.1.3 Investment

Table D.3: Investment in Antwerp (million €)

	2012	2013	2014	2015	2016	2017	$\sigma_{2017,s}$	$\alpha_{2017,s}$	$\bar{\alpha}_s$
Cargo handling	618.6	493.1	578.6	611.9	675.3	699.6	20.3	3.6	2.5
Shipping companies	383.5	432.7	1 009.8	589.5	736.8	404.8	11.8	-45.0	1.1
Port construction and dredging	93.2	14.8	27.4	70.6	34.4	334.9	9.7	873.3	29.2
Port authority	194.8	196.3	154.2	131.0	141.1	79.6	2.3	-43.6	-16.4
Shipping agents and forwarders	48.2	29.5	32.7	35.1	48.0	51.4	1.5	7.1	1.3
Public Sector	44.5	58.5	26.5	19.8	29.3	15.6	0.5	-46.7	-18.9
Shipbuilding and repair	4.6	6.0	1.3	1.9	2.4	1.3	0.0	-47.7	-22.5
Port trade	0.6	0.5	0.4	0.3	0.5	1.1	0.0	134.3	13.0
Fishing and fish industry	0.0	0.0	0.0	0.0	0.0	0.6	0.0	7 904.9	191.5
Maritime	1 387.9	1 231.5	1 831.0	1 460.2	1 667.8	1 588.9	46.2	-4.7	2.7
Chemical industry	489.9	576.9	737.3	691.9	791.9	812.4	23.6	2.6	10.6
Fuel production	127.3	239.0	417.8	525.3	616.7	419.8	12.2	-31.9	27.0
Energy	76.0	74.5	108.4	166.9	142.1	249.2	7.2	75.4	26.8
Other logistic services	81.2	78.7	69.8	85.2	121.3	135.3	3.9	11.5	10.8
Other industries	28.5	28.1	19.6	23.2	25.0	83.2	2.4	233.3	23.9
Trade	54.1	54.1	56.1	53.8	48.7	56.5	1.6	16.0	0.9
Other land transport	14.6	15.7	12.2	4.8	13.7	22.1	0.6	61.4	8.6
Road transport	27.1	22.4	33.9	24.8	32.2	20.2	0.6	-37.3	-5.7
Metalworking industry	13.7	15.6	11.4	13.0	14.2	18.6	0.5	30.5	6.2
Construction	13.1	11.4	8.7	15.1	12.6	18.3	0.5	45.0	6.8
Food industry	15.3	15.7	12.9	23.1	13.3	13.1	0.4	-1.7	-3.1
Car manufacturing	7.9	8.5	0.6	5.7	2.7	4.1	0.1	52.8	-12.2
Electronics	0.9	1.0	0.0	0.0	0.0	0.4	0.0	4 910.0	
Non-maritime	949.7	1 141.5	1 488.7	1 632.8	1 834.4	1 853.3	53.8	1.0	14.3
Direct	2 337.6	2 373.0	3 319.6	3 093.0	3 502.2	3 442.2	100.0	-1.7	8.0

Source: NBB

Where $\sigma_{2017,s} = 100 \times \frac{v_{2017,s}}{v_{2017,Direct}}$ is the share of sector s (in %) in 2017, $\alpha_{2017,s} = 100 \times \frac{v_{2017}-v_{2016}}{v_{2016}}$ is the growth of sector s (in %) between 2016 en 2017, $\bar{\alpha}_s = 100 \times \left(\left(\frac{v_{2017}}{v_{2012}} \right)^{1/5} - 1 \right)$ is the (geometric) average growth of sector s (in %) between 2012 en 2017.

D.2 Port of Ghent

D.2.1 Value added

Table D.4: Value added in Ghent (million €)

	2012	2013	2014	2015	2016	2017	$\sigma_{2017,s}$	$\alpha_{2017,s}$	$\bar{\alpha}_s$
Cargo handling	254.4	244.9	247.6	224.5	236.7	249.2	5.7	5.3	-0.4
Shipping agents and forwarders	30.1	31.0	33.0	34.8	34.1	41.9	1.0	22.8	6.9
Port authority	23.6	23.4	24.8	23.9	32.2	30.5	0.7	-5.2	5.3
Public Sector	21.3	21.1	21.1	21.4	22.2	21.0	0.5	-5.1	-0.2
Shipping companies	5.6	4.7	7.4	3.8	3.4	4.8	0.1	42.2	-2.9
Shipbuilding and repair	3.8	3.4	4.1	4.0	3.9	4.2	0.1	6.3	1.8
Port trade	0.2	0.2	0.3	0.4	0.4	0.4	0.0	0.8	17.5
Fishing and fish industry	-0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Maritime	338.9	328.6	338.2	312.9	332.9	352.1	8.0	5.8	0.8
Metalworking industry	406.3	529.3	641.0	774.3	835.6	1 056.6	24.2	26.5	21.1
Trade	780.9	771.6	805.9	846.4	906.3	950.0	21.7	4.8	4.0
Car manufacturing	649.6	735.4	713.5	722.6	711.5	741.9	17.0	4.3	2.7
Chemical industry	319.1	323.7	384.5	428.5	372.5	489.5	11.2	31.4	8.9
Construction	107.3	104.3	122.0	118.1	124.6	145.0	3.3	16.4	6.2
Other industries	171.5	162.5	178.1	146.2	149.3	140.6	3.2	-5.8	-3.9
Other logistic services	126.3	138.9	141.8	138.3	113.5	112.1	2.6	-1.2	-2.4
Food industry	74.3	91.9	104.4	112.4	104.3	108.6	2.5	4.1	7.9
Fuel production	50.5	54.7	41.4	38.6	36.6	106.6	2.4	191.2	16.1
Road transport	62.6	63.4	66.4	70.7	72.0	78.3	1.8	8.7	4.6
Energy	66.5	53.8	36.2	38.1	57.6	45.8	1.0	-20.5	-7.2
Electronics	27.4	28.5	34.1	35.5	30.0	37.1	0.8	23.6	6.3
Other land transport	12.7	11.6	10.1	9.7	9.7	10.0	0.2	3.4	-4.7
Non-maritime	2 855.1	3 069.7	3 279.4	3 479.3	3 523.4	4 022.1	92.0	14.2	7.1
Direct	3 194.0	3 398.3	3 617.6	3 792.2	3 856.3	4 374.2	100.0	13.4	6.5
Indirect	3 259.9	3 565.2	3 735.5	4 020.9	4 041.7	4 610.2			
Total	6 453.9	6 963.5	7 353.1	7 813.1	7 898.0	8 984.4			

Source: NBB

Where $\sigma_{2017,s} = 100 \times \frac{v_{2017,s}}{v_{2017,Direct}}$ is the share of sector s (in %) in 2017, $\alpha_{2017,s} = 100 \times \frac{v_{2017}-v_{2016}}{v_{2016}}$ is the growth of sector s (in %) between 2016 en 2017, $\bar{\alpha}_s = 100 \times \left(\left(\frac{v_{2017}}{v_{2012}} \right)^{1/5} - 1 \right)$ is the (geometric) average growth of sector s (in %) between 2012 en 2017.

D.2.2 Employment

Table D.5: Employment in Ghent (FTE)

	2012	2013	2014	2015	2016	2017	$\sigma_{2017,s}$	$\alpha_{2017,s}$	$\bar{\alpha_s}$
Cargo handling	2 370	2 361	2 407	1 883	2 058	2 069	7.3	0.6	-2.7
Shipping agents and forwarders	332	338	360	354	360	415	1.5	15.3	4.6
Public Sector	243	242	235	228	211	214	0.8	1.6	-2.5
Port authority	156	156	148	148	148	143	0.5	-3.3	-1.7
Shipbuilding and repair	61	58	52	53	51	48	0.2	-6.4	-4.8
Port trade	1	1	3	3	3	4	0.0	12.9	31.3
Shipping companies	27	25	18	5	4	4	0.0	7.5	-32.6
Fishing and fish industry	0	0	0	0	0	0	0.0		
Maritime	3 191	3 181	3 223	2 673	2 835	2 897	10.3	2.2	-1.9
Car manufacturing	8 762	9 033	9 088	9 544	9 391	9 373	33.2	-0.2	1.4
Metalworking industry	5 677	5 836	6 057	6 018	6 152	6 043	21.4	-1.8	1.3
Chemical industry	2 130	2 109	2 102	2 109	2 145	2 186	7.7	1.9	0.5
Construction	1 252	1 240	1 460	1 452	1 539	1 682	6.0	9.3	6.1
Trade	2 246	2 106	2 072	1 841	1 603	1 602	5.7	-0.1	-6.5
Other logistic services	1 061	1 101	1 159	1 166	1 155	1 200	4.2	3.8	2.5
Other industries	963	968	1 019	991	926	982	3.5	6.0	0.4
Road transport	709	749	783	749	760	792	2.8	4.2	2.2
Food industry	590	601	632	650	636	684	2.4	7.5	3.0
Electronics	245	235	253	267	258	252	0.9	-2.4	0.5
Fuel production	36	39	42	42	228	231	0.8	1.3	45.2
Energy	166	170	180	185	197	191	0.7	-3.2	2.9
Other land transport	200	174	160	153	151	147	0.5	-2.7	-6.0
Non-maritime	24 038	24 358	25 006	25 168	25 142	25 365	89.7	0.9	1.1
Direct	27 229	27 539	28 229	27 841	27 977	28 262	100.0	1.0	0.7
Indirect	33 527	33 987	34 307	36 318	38 264	36 233			
Total	60 756	61 526	62 537	64 159	66 241	64 495			

Source: NBB

Where $\sigma_{2017,s} = 100 \times \frac{v_{2017,s}}{v_{2017,Direct}}$ is the share of sector s (in %) in 2017, $\alpha_{2017,s} = 100 \times \frac{v_{2017}-v_{2016}}{v_{2016}}$ is the growth of sector s (in %) between 2016 en 2017, $\bar{\alpha_s} = 100 \times \left(\left(\frac{v_{2017}}{v_{2012}} \right)^{1/5} - 1 \right)$ is the (geometric) average growth of sector s (in %) between 2012 en 2017.

D.2.3 Investment

Table D.6: Investment in Ghent (million €)

	2012	2013	2014	2015	2016	2017	$\sigma_{2017,s}$	$\alpha_{2017,s}$	$\bar{\alpha_s}$
Cargo handling	72.6	81.5	48.9	45.5	90.5	142.3	20.0	57.3	14.4
Port authority	6.7	6.4	6.6	8.5	8.6	11.7	1.6	35.6	11.6
Public Sector	7.8	11.0	3.0	10.3	17.7	8.6	1.2	-51.4	2.0
Shipping companies	1.0	1.3	1.0	0.2	0.8	2.1	0.3	181.7	16.1
Shipping agents and forwarders	2.3	1.8	1.9	1.8	4.4	2.0	0.3	-53.6	-2.4
Shipbuilding and repair	0.4	0.2	0.4	0.9	0.6	1.3	0.2	105.4	24.1
Port trade	0.0	0.0	0.1	0.0	0.1	0.0	0.0	-72.7	-1.6
Fishing and fish industry	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Maritime	90.9	102.2	61.8	67.2	122.7	168.0	23.6	37.0	13.1
Car manufacturing	71.3	34.1	50.6	53.4	116.0	191.7	26.9	65.3	21.9
Metalworking industry	68.1	67.9	75.2	86.3	122.1	159.1	22.3	30.2	18.5
Chemical industry	70.1	56.6	70.3	52.4	54.3	70.3	9.9	29.6	0.0
Trade	29.1	35.2	43.6	31.8	33.9	30.7	4.3	-9.3	1.1
Other logistic services	15.3	20.3	26.5	15.4	18.9	19.9	2.8	5.0	5.4
Food industry	16.2	17.3	15.1	22.7	24.0	19.6	2.7	-18.5	3.8
Other industries	20.2	24.5	19.3	21.4	18.1	16.2	2.3	-10.6	-4.3
Construction	18.6	12.3	10.7	14.4	10.4	13.5	1.9	30.4	-6.2
Road transport	9.5	17.5	14.6	9.7	9.6	10.6	1.5	9.9	2.2
Energy	35.6	27.2	5.9	4.4	6.3	4.0	0.6	-35.8	-35.3
Electronics	1.1	0.9	1.8	2.2	1.8	3.3	0.5	81.3	23.9
Other land transport	23.9	17.3	16.5	0.8	2.4	3.2	0.4	33.2	-33.1
Fuel production	3.0	3.0	2.2	1.7	2.2	2.3	0.3	6.6	-5.1
Non-maritime	382.1	334.0	352.3	316.6	420.0	544.4	76.4	29.6	7.3
Direct	473.0	436.2	414.1	383.8	542.7	712.4	100.0	31.3	8.5

Source: NBB

Where $\sigma_{2017,s} = 100 \times \frac{v_{2017,s}}{v_{2017,Direct}}$ is the share of sector s (in %) in 2017, $\alpha_{2017,s} = 100 \times \frac{v_{2017}-v_{2016}}{v_{2016}}$ is the growth of sector s (in %) between 2016 en 2017, $\bar{\alpha_s} = 100 \times \left(\left(\frac{v_{2017}}{v_{2012}} \right)^{1/5} - 1 \right)$ is the (geometric) average growth of sector s (in %) between 2012 en 2017.

D.3 Port of Zeebrugge

D.3.1 Value added

Table D.7: Value added in Zeebrugge (million €)

	2012	2013	2014	2015	2016	2017	$\sigma_{2017,s}$	$\alpha_{2017,s}$	$\bar{\alpha}_s$
Cargo handling	193.2	194.7	205.4	219.2	244.2	246.8	23.8	1.0	5.0
Public Sector	107.8	109.9	107.1	103.3	103.1	102.6	9.9	-0.4	-1.0
Shipping agents and forwarders	58.5	69.8	68.9	84.5	66.5	68.2	6.6	2.6	3.1
Fishing and fish industry	42.0	40.5	43.5	47.0	51.8	53.1	5.1	2.5	4.8
Shipping companies	43.8	50.0	50.0	48.3	53.9	47.4	4.6	-12.0	1.6
Port authority	34.1	32.5	36.7	35.8	35.0	37.7	3.6	7.7	2.0
Port construction and dredging	20.0	24.6	18.6	30.4	19.6	28.3	2.7	44.5	7.2
Shipbuilding and repair	11.1	10.8	10.1	9.4	11.1	10.8	1.0	-3.0	-0.7
Port trade	0.6	0.7	1.1	1.0	1.1	1.0	0.1	-9.5	10.6
Maritime	511.2	533.5	541.4	578.9	586.3	595.8	57.4	1.6	3.1
Energy	95.0	92.5	98.4	91.3	89.6	93.4	9.0	4.2	-0.3
Trade	114.7	88.1	85.7	88.1	90.5	86.9	8.4	-4.0	-5.4
Road transport	61.6	57.5	47.7	45.6	50.1	59.1	5.7	18.0	-0.8
Other industries	34.1	38.6	43.3	39.9	38.2	42.5	4.1	11.1	4.5
Chemical industry	25.4	30.7	36.1	34.0	33.2	37.2	3.6	12.2	8.0
Other logistic services	19.6	24.5	26.6	26.6	34.3	36.8	3.5	7.2	13.5
Food industry	27.7	32.4	35.7	33.8	35.7	34.6	3.3	-3.2	4.6
Construction	22.1	24.1	23.8	25.3	31.7	33.0	3.2	4.0	8.4
Metalworking industry	5.6	4.0	5.1	4.9	5.5	6.6	0.6	20.6	3.3
Other land transport	9.5	7.2	6.7	6.2	6.2	6.4	0.6	3.4	-7.6
Electronics	23.6	54.5	3.0	3.3	3.5	4.1	0.4	16.0	-29.6
Car manufacturing	0.9	1.1	1.3	1.5	1.4	1.7	0.2	23.9	13.1
Non-maritime	439.7	455.0	413.4	400.5	420.0	442.3	42.6	5.3	0.1
Direct	951.0	988.5	954.9	979.4	1 006.3	1 038.2	100.0	3.2	1.8
Indirect	743.2	785.7	753.1	823.8	865.1	816.1			
Total	1 694.2	1 774.3	1 708.0	1 803.2	1 871.3	1 854.3			

Source: NBB

Where $\sigma_{2017,s} = 100 \times \frac{v_{2017,s}}{v_{2017,Direct}}$ is the share of sector s (in %) in 2017, $\alpha_{2017,s} = 100 \times \frac{v_{2017}-v_{2016}}{v_{2016}}$ is the growth of sector s (in %) between 2016 en 2017, $\bar{\alpha}_s = 100 \times \left(\left(\frac{v_{2017}}{v_{2012}} \right)^{1/5} - 1 \right)$ is the (geometric) average growth of sector s (in %) between 2012 en 2017.

D.3.2 Employment

Table D.8: Employment in Zeebrugge (FTE)

	2012	2013	2014	2015	2016	2017	$\sigma_{2017,s}$	$\alpha_{2017,s}$	$\bar{\alpha}_s$
Cargo handling	2 608	2 588	2 630	2 711	2 863	3 038	31.4	6.1	3.1
Public Sector	1 595	1 600	1 563	1 478	1 445	1 396	14.4	-3.4	-2.6
Shipping agents and forwarders	632	652	658	658	642	637	6.6	-0.8	0.1
Fishing and fish industry	550	516	533	525	527	524	5.4	-0.5	-1.0
Port construction and dredging	176	168	213	194	185	196	2.0	5.5	2.2
Shipping companies	211	191	212	173	147	171	1.8	16.3	-4.1
Shipbuilding and repair	153	149	136	128	141	152	1.6	8.2	-0.1
Port authority	132	134	135	133	136	132	1.4	-2.8	0.1
Port trade	10	9	14	13	15	14	0.1	-5.3	7.2
Maritime	6 067	6 007	6 092	6 012	6 101	6 260	64.6	2.6	0.6
Trade	799	816	803	851	889	827	8.5	-7.0	0.7
Road transport	910	806	662	581	670	668	6.9	-0.4	-6.0
Other industries	417	399	447	417	400	394	4.1	-1.3	-1.1
Construction	341	351	336	346	359	354	3.7	-1.3	0.8
Food industry	273	293	300	310	337	291	3.0	-13.7	1.3
Chemical industry	237	246	263	234	248	281	2.9	13.4	3.4
Other logistic services	193	206	169	190	215	239	2.5	11.3	4.4
Energy	129	125	134	126	124	123	1.3	-1.4	-1.0
Other land transport	149	108	107	97	97	94	1.0	-2.7	-8.8
Metalworking industry	93	76	85	78	75	76	0.8	1.1	-4.0
Electronics	351	306	43	46	55	62	0.6	12.8	-29.3
Car manufacturing	12	11	13	13	14	17	0.2	16.6	8.0
Non-maritime	3 905	3 742	3 361	3 290	3 483	3 426	35.4	-1.7	-2.6
Direct	9 971	9 749	9 453	9 301	9 585	9 686	100.0	1.1	-0.6
Indirect	10 238	10 002	9 952	10 282	10 537	10 377			
Total	20 210	19 751	19 405	19 583	20 121	20 062			

Source: NBB

Where $\sigma_{2017,s} = 100 \times \frac{v_{2017,s}}{v_{2017,Direct}}$ is the share of sector s (in %) in 2017, $\alpha_{2017,s} = 100 \times \frac{v_{2017}-v_{2016}}{v_{2016}}$ is the growth of sector s (in %) between 2016 en 2017, $\bar{\alpha}_s = 100 \times \left(\left(\frac{v_{2017}}{v_{2012}} \right)^{1/5} - 1 \right)$ is the (geometric) average growth of sector s (in %) between 2012 en 2017.

Table D.9: Investment in Zeebrugge (million €)

	2012	2013	2014	2015	2016	2017	$\sigma_{2017,s}$	$\alpha_{2017,s}$	$\bar{\alpha}_s$
Cargo handling	29.2	16.8	50.7	28.1	43.2	60.4	19.9	39.7	15.7
Public Sector	20.0	16.4	13.4	9.0	7.5	30.6	10.1	306.2	8.9
Port authority	34.0	28.3	22.0	13.4	24.2	22.7	7.5	-6.1	-7.7
Shipping companies	1.6	0.2	0.8	0.2	13.0	16.8	5.5	28.7	60.1
Shipping agents and forwarders	7.3	4.6	14.7	15.1	19.5	9.4	3.1	-52.0	5.2
Fishing and fish industry	15.2	7.7	8.8	12.7	6.0	6.4	2.1	6.7	-15.9
Port construction and dredging	1.1	1.6	1.3	3.0	3.6	2.7	0.9	-23.9	19.6
Shipbuilding and repair	1.5	1.0	2.5	3.7	5.0	2.1	0.7	-57.9	6.6
Port trade	0.0	0.2	0.0	0.0	0.2	0.1	0.0	-29.3	29.2
Maritime	109.9	76.8	114.1	85.1	122.2	151.2	49.9	23.7	6.6
Energy	24.4	44.0	31.7	85.4	105.5	65.0	21.4	-38.4	21.7
Other land transport	25.2	16.5	10.4	19.8	21.4	21.0	6.9	-1.9	-3.6
Road transport	8.7	12.0	10.8	16.6	35.6	17.6	5.8	-50.6	15.2
Trade	14.1	12.6	10.6	11.9	10.1	15.5	5.1	52.8	1.9
Other logistic services	3.3	8.6	6.2	6.3	5.3	8.5	2.8	58.8	20.8
Other industries	19.8	9.6	6.3	6.0	4.1	7.4	2.5	81.2	-17.8
Chemical industry	3.3	3.1	4.3	3.6	3.4	5.8	1.9	71.1	12.3
Food industry	15.2	4.7	5.9	3.7	4.3	4.4	1.5	3.8	-21.9
Construction	5.3	3.3	2.6	2.5	3.1	3.9	1.3	26.2	-6.2
Metalworking industry	0.5	0.3	0.3	0.3	0.2	2.9	1.0	1 235.0	41.0
Electronics	4.6	5.5	0.5	0.4	0.2	0.1	0.0	-35.4	-52.8
Car manufacturing	0.1	0.3	0.0	0.1	0.2	0.1	0.0	-73.7	-7.7
Non-maritime	124.5	120.5	89.7	156.7	193.4	152.1	50.1	-21.4	4.1
Direct	234.4	197.3	203.8	241.7	315.7	303.3	100.0	-3.9	5.3

Source: NBB

Where $\sigma_{2017,s} = 100 \times \frac{v_{2017,s}}{v_{2017,Direct}}$ is the share of sector s (in %) in 2017, $\alpha_{2017,s} = 100 \times \frac{v_{2017} - v_{2016}}{v_{2016}}$ is the growth of sector s (in %) between 2016 en 2017, $\bar{\alpha}_s = 100 \times \left(\left(\frac{v_{2017}}{v_{2012}} \right)^{1/5} - 1 \right)$ is the (geometric) average growth of sector s (in %) between 2012 en 2017.

D.4 Port of Ostend

D.4.1 Value added

Table D.10: Value added in Ostend (million €)

	2012	2013	2014	2015	2016	2017	$\sigma_{2017,s}$	$\alpha_{2017,s}$	$\bar{\alpha}_s$
Public Sector	50.1	49.9	51.7	51.5	58.1	58.9	11.1	1.4	3.3
Fishing and fish industry	33.8	37.2	39.8	38.8	40.5	43.5	8.2	7.3	5.2
Port construction and dredging	57.0	59.4	57.6	70.5	57.1	42.6	8.1	-25.3	-5.6
Shipbuilding and repair	13.4	14.3	14.0	14.2	12.9	13.3	2.5	2.8	-0.2
Shipping agents and forwarders	7.0	4.5	2.9	5.0	4.0	5.0	0.9	24.6	-6.4
Port authority	3.6	2.3	2.4	2.7	2.9	3.5	0.7	21.9	-0.4
Cargo handling	3.2	2.2	3.1	2.7	2.5	1.3	0.2	-49.3	-16.9
Shipping companies	0.2	0.7	0.9	0.7	0.6	0.5	0.1	-4.4	23.0
Port trade	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-29.9	8.0
Maritime	168.3	170.5	172.4	186.1	178.6	168.6	31.9	-5.6	0.0
Metalworking industry	153.7	161.5	169.6	168.3	164.6	191.1	36.2	16.1	4.5
Construction	37.3	33.1	31.7	32.6	30.9	39.1	7.4	26.7	1.0
Chemical industry	36.0	38.3	36.7	34.2	38.4	36.6	6.9	-4.7	0.3
Road transport	23.7	25.0	22.8	25.0	26.0	27.1	5.1	4.0	2.7
Energy	19.0	13.4	18.8	16.6	19.6	20.0	3.8	1.8	1.0
Food industry	12.2	12.3	11.6	14.5	16.7	16.9	3.2	1.1	6.6
Other logistic services	14.3	12.1	13.5	11.8	14.4	15.5	2.9	7.7	1.6
Trade	15.3	15.6	14.3	12.1	13.4	8.6	1.6	-35.7	-10.9
Other industries	4.7	4.3	7.2	7.0	8.0	3.6	0.7	-54.4	-5.0
Car manufacturing	2.1	2.2	0.8	2.7	0.8	1.4	0.3	63.1	-8.2
Other land transport	0.6	0.0	0.0	0.0	0.0	0.0	0.0		
Non-maritime	319.0	317.8	327.1	324.8	332.8	359.9	68.1	8.1	2.4
Direct	487.4	488.3	499.5	510.8	511.4	528.5	100.0	3.3	1.6
Indirect	371.3	372.5	366.3	393.4	384.8	375.7			
Total	858.7	860.8	865.8	904.2	896.2	904.2			

Source: NBB

Where $\sigma_{2017,s} = 100 \times \frac{v_{2017,s}}{v_{2017,Direct}}$ is the share of sector s (in %) in 2017, $\alpha_{2017,s} = 100 \times \frac{v_{2017} - v_{2016}}{v_{2016}}$ is the growth of sector s (in %) between 2016 en 2017, $\bar{\alpha}_s = 100 \times \left(\left(\frac{v_{2017}}{v_{2012}} \right)^{1/5} - 1 \right)$ is the (geometric) average growth of sector s (in %) between 2012 en 2017.

D.4.2 Employment

Table D.11: Employment in Ostend (FTE)

	2012	2013	2014	2015	2016	2017	$\sigma_{2017,s}$	$\alpha_{2017,s}$	$\bar{\alpha}_s$
Public Sector	723	726	740	732	788	772	15.7	-2.1	1.3
Fishing and fish industry	410	413	409	424	413	426	8.6	3.2	0.7
Port construction and dredging	428	426	381	364	345	332	6.7	-3.7	-4.9
Shipbuilding and repair	212	223	221	218	207	225	4.6	8.6	1.2
Port authority	44	42	38	37	34	34	0.7	-0.6	-4.9
Shipping agents and forwarders	53	12	20	31	28	27	0.6	-3.6	-12.5
Cargo handling	52	51	63	50	33	9	0.2	-72.5	-29.3
Shipping companies	1	1	2	1	2	4	0.1	68.3	24.1
Port trade	0	0	0	0	0	0	0.0		
Maritime	1 924	1 894	1 875	1 857	1 852	1 830	37.1	-1.2	-1.0
Metalworking industry	1 338	1 391	1 450	1 431	1 388	1 449	29.4	4.4	1.6
Construction	476	439	413	404	432	437	8.9	1.3	-1.7
Road transport	406	418	406	419	417	432	8.8	3.7	1.2
Chemical industry	320	311	312	309	304	299	6.1	-1.4	-1.4
Food industry	135	130	142	143	135	130	2.6	-3.7	-0.8
Other logistic services	170	127	96	105	119	108	2.2	-9.6	-8.7
Trade	182	193	197	208	202	108	2.2	-46.5	-10.0
Other industries	50	56	79	68	75	78	1.6	3.3	9.4
Energy	62	55	56	46	36	30	0.6	-17.8	-13.5
Car manufacturing	29	30	32	29	26	26	0.5	1.6	-2.3
Other land transport	9	0	0	0	0	0	0.0		
Non-maritime	3 179	3 152	3 184	3 164	3 134	3 097	62.9	-1.2	-0.5
Direct	5 103	5 046	5 058	5 021	4 986	4 927	100.0	-1.2	-0.7
Indirect	4 481	4 385	4 336	4 491	4 409	4 246			
Total	9 584	9 431	9 395	9 512	9 395	9 173			

Source: NBB

Where $\sigma_{2017,s} = 100 \times \frac{v_{2017,s}}{v_{2017,Direct}}$ is the share of sector s (in %) in 2017, $\alpha_{2017,s} = 100 \times \frac{v_{2017} - v_{2016}}{v_{2016}}$ is the growth of sector s (in %) between 2016 en 2017, $\bar{\alpha}_s = 100 \times \left(\left(\frac{v_{2017}}{v_{2012}} \right)^{1/5} - 1 \right)$ is the (geometric) average growth of sector s (in %) between 2012 en 2017.

D.4.3 Investment

Table D.12: Investment in Ostend (million €)

	2012	2013	2014	2015	2016	2017	$\sigma_{2017,s}$	$\alpha_{2017,s}$	$\bar{\alpha}_s$
Fishing and fish industry	7.1	5.8	4.0	5.2	5.0	12.6	16.2	149.6	12.1
Public Sector	10.3	12.0	13.9	13.8	23.8	5.4	7.0	-77.4	-12.2
Port construction and dredging	3.2	0.2	46.4	0.1	1.3	2.8	3.6	122.8	-2.3
Port authority	2.0	1.5	2.9	1.1	0.4	2.0	2.5	390.3	-0.6
Shipping agents and forwarders	0.4	1.9	0.6	2.5	3.8	0.4	0.5	-90.7	-2.6
Shipping companies	0.0	0.1	0.2	0.0	0.0	0.3	0.4	3 376.7	95.6
Shipbuilding and repair	0.9	2.0	1.6	2.9	0.5	0.1	0.2	-69.9	-31.0
Cargo handling	0.4	1.3	0.9	0.3	0.0	0.1	0.1	45.2	-31.2
Port trade	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-100.0	
Maritime	24.4	24.8	70.5	26.0	34.9	23.6	30.4	-32.3	-0.6
Construction	11.3	9.4	13.6	8.7	21.3	15.6	20.1	-26.7	6.6
Metalworking industry	16.4	15.6	11.2	12.5	8.7	11.2	14.5	29.6	-7.3
Chemical industry	9.2	6.6	5.7	6.0	5.9	8.6	11.1	45.3	-1.3
Trade	5.6	4.7	7.4	3.6	3.3	4.8	6.2	46.3	-2.8
Road transport	6.6	5.6	1.8	2.4	2.5	4.4	5.7	77.8	-7.7
Food industry	0.9	1.4	3.7	1.3	1.9	4.1	5.2	109.5	34.4
Other logistic services	16.8	6.4	3.8	2.7	1.7	2.3	3.0	33.6	-32.8
Other industries	0.6	1.2	1.4	0.6	6.4	2.2	2.8	-66.2	28.2
Energy	2.1	0.2	0.2	0.2	1.1	0.7	0.9	-39.0	-19.8
Other land transport	0.0	0.1	0.0	0.0	0.0	0.0	0.0	Inf	
Car manufacturing	0.2	0.2	0.1	0.0	0.1	0.0	0.0	-80.8	-44.8
Non-maritime	69.8	51.5	48.9	38.0	52.9	54.0	69.6	2.0	-5.0
Direct	94.1	76.3	119.5	64.0	87.8	77.6	100.0	-11.6	-3.8

Source: NBB

Where $\sigma_{2017,s} = 100 \times \frac{v_{2017,s}}{v_{2017,Direct}}$ is the share of sector s (in %) in 2017, $\alpha_{2017,s} = 100 \times \frac{v_{2017} - v_{2016}}{v_{2016}}$ is the growth of sector s (in %) between 2016 en 2017, $\bar{\alpha}_s = 100 \times \left(\left(\frac{v_{2017}}{v_{2012}} \right)^{1/5} - 1 \right)$ is the (geometric) average growth of sector s (in %) between 2012 en 2017.

D.5 Liège port complex

D.5.1 Value added

Table D.13: Value added in Liege (million €)

	2012	2013	2014	2015	2016	2017	$\sigma_{2017,s}$	$\alpha_{2017,s}$	$\bar{\alpha}_s$
Cargo handling	14.4	14.5	13.1	14.2	15.1	15.2	1.3	0.5	1.1
Shipping companies	4.0	3.0	3.6	4.2	3.8	4.5	0.4	17.0	2.1
Shipping agents and forwarders	8.7	4.0	3.6	3.7	4.5	3.2	0.3	-28.1	-18.1
Port authority	2.6	2.7	2.6	2.6	2.6	2.8	0.2	6.4	1.2
Shipbuilding and repair	0.5	0.6	0.6	0.5	0.6	0.6	0.0	-13.5	3.5
Maritime	30.2	24.7	23.5	25.1	26.7	26.2	2.3	-1.7	-2.8
Metalworking industry	338.5	333.5	274.6	275.0	278.9	302.9	26.6	8.6	-2.2
Energy	388.0	382.6	324.7	252.1	326.6	261.6	22.9	-19.9	-7.6
Chemical industry	99.4	118.7	143.1	132.4	149.4	150.3	13.2	0.6	8.6
Construction	136.3	137.5	175.8	143.5	133.2	135.8	11.9	2.0	-0.1
Fuel production	34.6	59.7	39.2	40.4	69.6	75.5	6.6	8.6	16.9
Other industries	57.5	59.6	61.3	63.9	69.5	71.9	6.3	3.4	4.6
Trade	87.5	67.4	66.0	60.0	61.7	57.5	5.0	-6.9	-8.1
Other logistic services	11.6	11.8	19.4	27.1	27.2	29.0	2.5	6.5	20.1
Food industry	23.1	29.4	26.9	28.4	15.4	17.4	1.5	12.4	-5.5
Electronics	4.6	3.3	4.2	6.1	4.8	6.7	0.6	40.4	8.1
Road transport	6.5	5.7	5.3	4.3	4.0	4.5	0.4	12.1	-6.9
Other land transport	0.9	1.0	1.1	0.6	0.6	0.7	0.1	3.4	-6.4
Car manufacturing	0.4	0.4	0.4	0.3	0.4	0.4	0.0	4.5	-2.2
Non-maritime	1 189.0	1 210.4	1 142.0	1 034.0	1 141.4	1 114.1	97.7	-2.4	-1.3
Direct	1 219.2	1 235.1	1 165.5	1 059.1	1 168.0	1 140.4	100.0	-2.4	-1.3
Indirect	1 216.5	1 289.8	1 122.2	1 074.7	1 181.5	1 193.8			
Total	2 435.7	2 524.9	2 287.7	2 133.8	2 349.5	2 334.1			

Source: NBB

Where $\sigma_{2017,s} = 100 \times \frac{v_{2017,s}}{v_{2017,Direct}}$ is the share of sector s (in %) in 2017, $\alpha_{2017,s} = 100 \times \frac{v_{2017} - v_{2016}}{v_{2016}}$ is the growth of sector s (in %) between 2016 en 2017, $\bar{\alpha}_s = 100 \times \left(\left(\frac{v_{2017}}{v_{2012}} \right)^{1/5} - 1 \right)$ is the (geometric) average growth of sector s (in %) between 2012 en 2017.

D.5.2 Employment

Table D.14: Employment in Liege (FTE)

	2012	2013	2014	2015	2016	2017	$\sigma_{2017,s}$	$\alpha_{2017,s}$	$\bar{\alpha}_s$
Cargo handling	166	153	153	157	174	185	2.4	6.4	2.2
Shipping companies	54	51	52	54	55	52	0.7	-4.8	-0.6
Shipping agents and forwarders	94	56	47	43	45	48	0.6	6.2	-12.7
Port authority	38	36	35	34	35	34	0.4	-2.9	-2.2
Shipbuilding and repair	9	9	9	9	10	10	0.1	1.6	2.0
Maritime	361	305	296	296	318	329	4.2	3.3	-1.8
Metalworking industry	4 327	3 718	2 783	2 440	2 307	2 322	29.6	0.6	-11.7
Energy	1 215	1 246	1 293	1 293	1 251	1 225	15.6	-2.1	0.2
Chemical industry	1 090	1 020	996	1 011	1 036	1 036	13.2	-0.0	-1.0
Construction	1 075	1 058	1 017	1 038	1 011	1 031	13.1	2.0	-0.8
Other industries	739	737	729	716	750	704	9.0	-6.1	-1.0
Other logistic services	123	175	345	359	366	409	5.2	11.6	27.1
Trade	387	386	395	401	382	384	4.9	0.4	-0.2
Fuel production	122	122	125	125	125	122	1.6	-2.3	0.0
Food industry	98	99	111	154	101	106	1.4	5.7	1.6
Electronics	73	68	71	74	73	80	1.0	10.0	2.0
Road transport	130	115	105	91	76	76	1.0	0.6	-10.1
Other land transport	14	15	17	9	10	10	0.1	-2.7	-7.6
Car manufacturing	10	9	9	7	8	10	0.1	21.8	-0.8
Non-maritime	9 403	8 770	7 996	7 718	7 495	7 514	95.8	0.3	-4.4
Direct	9 763	9 076	8 292	8 014	7 814	7 843	100.0	0.4	-4.3
Indirect	14 090	13 191	11 258	11 650	11 381	10 980			
Total	23 853	22 267	19 550	19 664	19 195	18 823			

Source: NBB

Where $\sigma_{2017,s} = 100 \times \frac{v_{2017,s}}{v_{2017,Direct}}$ is the share of sector s (in %) in 2017, $\alpha_{2017,s} = 100 \times \frac{v_{2017} - v_{2016}}{v_{2016}}$ is the growth of sector s (in %) between 2016 en 2017, $\bar{\alpha}_s = 100 \times \left(\left(\frac{v_{2017}}{v_{2012}} \right)^{1/5} - 1 \right)$ is the (geometric) average growth of sector s (in %) between 2012 en 2017.

D.5.3 Investment

<div align="center">

Table D.15: Investment in Liege (million €)

	2012	2013	2014	2015	2016	2017	$\sigma_{2017,s}$	$\alpha_{2017,s}$	$\bar{\alpha}_s$
Cargo handling	2.4	3.4	2.6	3.0	7.0	3.6	1.6	-47.5	8.4
Shipping companies	0.5	0.4	0.2	0.2	0.5	0.7	0.3	47.9	5.3
Shipping agents and forwarders	1.0	0.2	2.1	0.6	0.8	0.5	0.2	-37.9	-11.5
Port authority	3.0	0.0	0.3	0.8	0.1	0.2	0.1	160.2	-41.9
Shipbuilding and repair	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-36.0	-10.0
Maritime	7.0	4.0	5.2	4.6	8.4	5.1	2.2	-39.5	-6.2
Energy	82.3	88.9	79.8	93.4	66.4	63.7	27.9	-4.2	-5.0
Metalworking industry	68.3	40.1	30.5	27.9	35.2	54.8	24.0	55.8	-4.3
Other industries	14.8	14.5	14.5	13.6	14.0	32.6	14.3	133.3	17.1
Chemical industry	26.6	21.6	18.4	31.4	31.8	29.7	13.0	-6.6	2.2
Construction	17.8	31.2	30.5	15.7	15.9	14.5	6.4	-9.0	-4.1
Fuel production	7.6	5.9	7.2	7.2	7.7	7.7	3.4	0.1	0.4
Other logistic services	7.7	1.9	1.9	4.3	3.6	7.7	3.4	114.1	-0.2
Trade	4.5	2.7	6.7	7.0	5.9	7.0	3.1	18.5	9.1
Food industry	1.7	1.9	1.9	4.2	4.2	3.0	1.3	-28.4	12.2
Electronics	2.4	0.5	0.6	0.7	1.6	1.8	0.8	8.6	-5.7
Road transport	0.5	1.2	0.5	1.7	1.2	0.6	0.3	-47.3	5.2
Car manufacturing	0.0	0.1	0.0	0.0	0.0	0.0	0.0	-47.8	-25.4
Other land transport	0.5	0.9	0.7	0.3	0.3	0.0	0.0	-100.0	-100.0
Non-maritime	234.8	211.3	193.2	207.5	187.9	223.1	97.8	18.7	-1.0
Direct	241.8	215.3	198.4	212.1	196.3	228.1	100.0	16.2	-1.2

Source: NBB

</div>

Where $\sigma_{2017,s} = 100 \times \frac{v_{2017,s}}{v_{2017,Direct}}$ is the share of sector s (in %) in 2017, $\alpha_{2017,s} = 100 \times \frac{v_{2017} - v_{2016}}{v_{2016}}$ is the growth of sector s (in %) between 2016 en 2017, $\bar{\alpha}_s = 100 \times \left(\left(\frac{v_{2017}}{v_{2012}} \right)^{1/5} - 1 \right)$ is the (geometric) average growth of sector s (in %) between 2012 en 2017.

D.6 Port of Brussels

D.6.1 Value added

<div align="center">

Table D.16: Value added in Brussels (million €)

	2012	2013	2014	2015	2016	2017	$\sigma_{2017,s}$	$\alpha_{2017,s}$	$\bar{\alpha}_s$
Shipping agents and forwarders	16.6	14.6	13.2	12.4	10.6	9.2	1.1	-12.5	-11.0
Port authority	-0.9	3.1	-1.9	6.0	4.7	5.5	0.7	17.9	
Cargo handling	6.8	5.8	6.4	6.3	6.5	5.5	0.7	-16.1	-4.3
Port trade	0.0	0.0	0.0	0.1	0.1	0.1	0.0	21.6	
Shipbuilding and repair	0.0	0.0	0.1	0.1	0.1	0.1	0.0	-13.9	
Public Sector	0.2	0.2	0.2	0.1	0.1	0.1	0.0	-0.1	-19.8
Shipping companies	1.5	1.5	1.0	-2.5	-0.3	-0.3	-0.0	-3.7	
Maritime	24.2	25.3	19.0	22.3	21.7	20.2	2.4	-7.0	-3.6
Other logistic services	158.1	186.8	187.6	441.4	388.4	524.2	62.9	35.0	27.1
Trade	217.5	158.0	173.7	196.2	178.5	147.8	17.7	-17.2	-7.4
Other industries	59.4	56.3	45.3	47.8	57.8	61.4	7.4	6.2	0.7
Construction	34.8	16.0	15.6	14.3	19.3	21.0	2.5	9.2	-9.6
Chemical industry	9.8	8.5	4.9	9.2	14.9	16.4	2.0	10.1	10.8
Food industry	14.8	13.8	14.8	12.9	13.0	16.1	1.9	23.9	1.7
Road transport	21.6	17.1	18.2	18.1	14.5	16.0	1.9	10.1	-5.9
Metalworking industry	6.3	7.3	8.1	7.8	9.6	9.9	1.2	2.7	9.5
Energy	1.5	1.1	0.7	1.6	0.8	0.5	0.1	-44.5	-21.2
Other land transport	0.2	0.1	0.1	0.1	0.1	0.1	0.0	3.4	-18.6
Electronics	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Non-maritime	524.1	465.1	468.9	749.5	697.0	813.4	97.6	16.7	9.2
Direct	548.3	490.4	487.9	771.9	718.7	833.6	100.0	16.0	8.7
Indirect	389.2	344.0	332.1	482.2	439.4	497.9			
Total	937.5	834.3	820.0	1 254.1	1 158.1	1 331.5			

Source: NBB

</div>

Where $\sigma_{2017,s} = 100 \times \frac{v_{2017,s}}{v_{2017,Direct}}$ is the share of sector s (in %) in 2017, $\alpha_{2017,s} = 100 \times \frac{v_{2017} - v_{2016}}{v_{2016}}$ is the growth of sector s (in %) between 2016 en 2017, $\bar{\alpha}_s = 100 \times \left(\left(\frac{v_{2017}}{v_{2012}} \right)^{1/5} - 1 \right)$ is the (geometric) average growth of sector s (in %) between 2012 en 2017.

D.6.2 Employment

Table D.17: Employment in Brussels (FTE)

	2012	2013	2014	2015	2016	2017	$\sigma_{2017,s}$	$\alpha_{2017,s}$	$\bar{\alpha}_s$
Port authority	127	123	122	125	123	122	3.2	-0.8	-0.7
Shipping agents and forwarders	187	192	167	174	143	112	2.9	-21.7	-9.8
Cargo handling	96	93	99	87	84	58	1.5	-30.3	-9.6
Shipping companies	16	15	14	15	18	13	0.3	-28.0	-3.7
Port trade	0	0	0	1	1	1	0.0	0.0	
Public Sector	3	3	3	2	1	1	0.0	0.0	-19.7
Shipbuilding and repair	0	0	0	0	0	0	0.0		
Maritime	429	426	405	403	370	308	8.0	-16.9	-6.4
Other logistic services	1 218	1 191	1 212	1 186	1 192	1 243	32.2	4.3	0.4
Trade	1 381	1 359	1 369	1 399	1 285	1 142	29.6	-11.2	-3.7
Other industries	324	328	343	347	364	344	8.9	-5.5	1.2
Road transport	350	280	286	305	244	245	6.4	0.3	-6.9
Construction	549	263	247	239	233	243	6.3	4.1	-15.1
Food industry	148	150	140	128	122	123	3.2	1.1	-3.6
Metalworking industry	87	86	89	87	106	110	2.9	3.5	4.8
Chemical industry	70	74	69	79	91	83	2.2	-9.1	3.4
Energy	22	20	20	16	15	15	0.4	-4.5	-7.5
Other land transport	3	2	1	1	1	1	0.0	-2.7	-19.7
Electronics	0	0	0	0	0	0	0.0		
Non-maritime	4 151	3 754	3 777	3 786	3 654	3 548	92.0	-2.9	-3.1
Direct	4 580	4 181	4 182	4 189	4 024	3 856	100.0	-4.2	-3.4
Indirect	4 222	3 840	3 711	3 950	3 791	3 576			
Total	8 802	8 021	7 893	8 140	7 815	7 432			

Source: NBB

Where $\sigma_{2017,s} = 100 \times \frac{v_{2017,s}}{v_{2017,Direct}}$ is the share of sector s (in %) in 2017, $\alpha_{2017,s} = 100 \times \frac{v_{2017} - v_{2016}}{v_{2016}}$ is the growth of sector s (in %) between 2016 en 2017, $\bar{\alpha}_s = 100 \times \left(\left(\frac{v_{2017}}{v_{2012}} \right)^{1/5} - 1 \right)$ is the (geometric) average growth of sector s (in %) between 2012 en 2017.

D.6.3 Investment

Table D.18: Investment in Brussels (million €)

	2012	2013	2014	2015	2016	2017	$\sigma_{2017,s}$	$\alpha_{2017,s}$	$\bar{\alpha}_s$
Port authority	4.6	10.7	5.4	7.5	9.0	9.0	14.6	-0.3	14.1
Cargo handling	1.1	0.5	1.6	3.3	1.3	1.5	2.4	10.9	6.5
Shipping agents and forwarders	7.0	13.1	0.6	5.2	0.9	1.0	1.6	7.9	-32.4
Port trade	0.0	0.0	0.0	0.1	0.0	0.1	0.2	994.9	
Shipbuilding and repair	0.0	0.0	0.0	0.0	0.0	0.0	0.1	Inf	
Shipping companies	0.8	0.0	0.0	0.0	0.0	0.0	0.1	76.3	-45.6
Public Sector	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Maritime	13.4	24.4	7.6	16.2	11.3	11.6	18.8	3.0	-2.9
Other logistic services	17.2	20.5	19.4	17.6	11.8	28.6	46.3	143.1	10.7
Trade	10.1	14.6	13.5	15.6	19.5	12.5	20.3	-35.9	4.5
Construction	2.9	2.7	2.2	1.9	2.7	2.5	4.0	-8.5	-2.9
Other industries	2.3	1.0	3.4	1.5	13.0	2.1	3.4	-83.8	-1.8
Food industry	1.2	1.8	1.3	2.3	4.6	1.6	2.5	-65.8	5.6
Road transport	2.1	2.3	3.5	2.7	1.9	1.5	2.5	-22.0	-6.1
Chemical industry	0.8	0.4	0.4	0.4	0.5	0.9	1.4	78.8	1.4
Metalworking industry	1.9	0.7	1.4	1.4	1.1	0.4	0.7	-58.1	-25.4
Energy	0.1	0.0	0.1	0.3	0.0	0.0	0.0	Inf	
Electronics	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Other land transport	0.1	0.1	0.0	0.0	0.0	0.0	0.0	-100.0	-100.0
Non-maritime	38.6	44.2	45.4	43.6	55.1	50.1	81.2	-9.1	5.4
Direct	52.0	68.5	53.0	59.7	66.4	61.7	100.0	-7.1	3.5

Source: NBB

Where $\sigma_{2017,s} = 100 \times \frac{v_{2017,s}}{v_{2017,Direct}}$ is the share of sector s (in %) in 2017, $\alpha_{2017,s} = 100 \times \frac{v_{2017} - v_{2016}}{v_{2016}}$ is the growth of sector s (in %) between 2016 en 2017, $\bar{\alpha}_s = 100 \times \left(\left(\frac{v_{2017}}{v_{2012}} \right)^{1/5} - 1 \right)$ is the (geometric) average growth of sector s (in %) between 2012 en 2017.

NATIONAL BANK OF BELGIUM - WORKING PAPERS SERIES

The Working Papers are available on the website of the Bank: http://www.nbb.be.

317. "An estimated two-country EA-US model with limited exchange rate pass-through", by G. de Walque, Ph. Jeanfils, T. Lejeune, Y. Rychalovska and R. Wouters, *Research series,* March 2017.
318. "Using bank loans as collateral in Europe: The role of liquidity and funding purposes", by F. Koulischer and P. Van Roy, *Research series*, April 2017.
319. "The impact of service and goods offshoring on employment: Firm-level evidence", by C. Ornaghi, I. Van Beveren and S. Vanormelingen, *Research series*, May 2017.
320. "On the estimation of panel fiscal reaction functions: Heterogeneity or fiscal fatigue?", by G. Everaert and S. Jansen, *Research series*, June 2017.
321. "Economic importance of the Belgian ports: Flemish maritime ports, Liège port complex and the port of Brussels - Report 2015", by C. Mathys, *Document series*, June 2017.
322. "Foreign banks as shock absorbers in the financial crisis?", by G. Barboni, *Research series*, June 2017.
323. "The IMF and precautionary lending: An empirical evaluation of the selectivity and effectiveness of the flexible credit line", by D. Essers and S. Ide, *Research series*, June 2017.
324. "Economic importance of air transport and airport activities in Belgium – Report 2015", by S. Vennix, *Document series*, July 2017.
325. "Economic importance of the logistics sector in Belgium", by H. De Doncker, *Document series*, July 2017.
326. "Identifying the provisioning policies of Belgian banks", by E. Arbak, *Research series*, July 2017.
327. "The impact of the mortgage interest and capital deduction scheme on the Belgian mortgage market", by A. Hoebeeck and K. Inghelbrecht, *Research series,* September 2017.
328. "Firm heterogeneity and aggregate business services exports: Micro evidence from Belgium, France, Germany and Spain", by A. Ariu, E. Biewen, S. Blank, G. Gaulier, M.J. González, Ph. Meinen, D. Mirza, C. Martín and P. Tello, *Research series*, September 2017.
329. "The interconnections between services and goods trade at the firm-level", by A. Ariu, H. Breinlichz, G. Corcosx, G. Mion, *Research series,* October 2017.
330. "Why do manufacturing firms produce services? Evidence for the servitization paradox in Belgium", by P. Blanchard, C. Fuss and C. Mathieu, *Research series,* November 2017.
331. "Nowcasting real economic activity in the euro area: Assessing the impact of qualitative surveys", by R. Basselier, D. de Antonio Liedo and G. Langenus, *Research series,* December 2017.
332. "Pockets of risk in the Belgian mortgage market: Evidence from the Household Finance and Consumption Survey (HFCS)", by Ph. Du Caju, *Research series,* December 2017.
333. "The employment consequences of SMEs' credit constraints in the wake of the great recession" by D. Cornille, F. Rycx and I. Tojerow, *Research series*, December 2017.
334. "Exchange rate movements, firm-level exports and heterogeneity", by A. Berthou and E. Dhyne, *Research series*, January 2018.
335. "Nonparametric identification of unobserved technological heterogeneity in production", by L. Cherchye, T. Demuynck, B. De Rock and M. Verschelde, *Research series*, February 2018.
336. "Compositional changes in aggregate productivity in an era of globalisation and financial crisis", by C. Fuss and A. Theodorakopoulos, *Research series*, February 2018.
337. "Decomposing firm-product appeal: How important is consumer taste?", by B. Y. Aw, Y. Lee and H. Vandenbussche, *Research series*, March 2018.
338. "Sensitivity of credit risk stress test results: Modelling issues with an application to Belgium", by P. Van Roy, S. Ferrari and C. Vespro, *Research series*, March 2018.
339. "Paul van Zeeland and the first decade of the US Federal Reserve System: The analysis from a European central banker who was a student of Kemmerer", by I. Maes and R. Gomez Betancourt, *Research series*, March 2018.
340. "One way to the top: How services boost the demand for goods", by A. Ariu, F. Mayneris and M. Parenti, *Research series*, March 2018.
341 "Alexandre Lamfalussy and the monetary policy debates among central bankers during the Great Inflation", by I. Maes and P. Clement, *Research series*, April 2018.
342. "The economic importance of the Belgian ports: Flemish maritime ports, Liège port complex and the port of Brussels – Report 2016", by F. Coppens, C. Mathys, J.-P. Merckx, P. Ringoot and M. Van Kerckhoven, *Document series*, April 2018.
343. "The unemployment impact of product and labour market regulation: Evidence from European countries", by C. Piton, *Research series,* June 2018.
344. "Trade and domestic production networks", by F. Tintelnot, A. Ken Kikkawa, M. Mogstad, E. Dhyne, *Research series*, September 2018.
345. "Review essay: Central banking through the centuries", by I. Maes, *Research series,* October 2018.

346. "IT and productivity: A firm level analysis", by E. Dhyne, J. Konings, J. Van den Bosch, S. Vanormelingen, *Research series*, October 2018.

347. "Identifying credit supply shocks with bank-firm data: methods and applications", by H. Degryse, O. De Jonghe, S. Jakovljević, Klaas Mulier, Glenn Schepens, *Research series*, October 2018.

348. "Can inflation expectations in business or consumer surveys improve inflation forecasts?", by R. Basselier, D. de Antonio Liedo, J. Jonckheere and G. Langenus, *Research series*, October 2018.

349. "Quantile-based inflation risk models", by E. Ghysels, L. Iania and J. Striaukas, *Research series*, October 2018.

350. "International food commodity prices and missing (dis)inflation in the euro area", by G. Peersman, *Research series*, October 2018.

351. "Pipeline pressures and sectoral inflation dynamics", by F. Smets, J. Tielens and J. Van Hove, *Research series*, October 2018.

352. "Price updating in production networks", by C. Duprez and G. Magerman, *Research series*, October 2018.

353. "Dominant currencies. How firms choose currency invoicing and why it matters", by M. Amiti, O. Itskhoki and J. Konings, *Research series*, October 2018.

354. "Endogenous forward guidance", by B. Chafwehé, R. Oikonomou, R. Priftis and L. Vogel, *Research series*, October 2018.

355. "Is euro area lowflation here to stay? Insights from a time-varying parameter model with survey data", by A. Stevens and J. Wauters, *Research series*, October 2018.

356. "A price index with variable mark-ups and changing variety", by T. Demuynck and M. Parenti, *Research series*, October 2018.

357. "Markup and price dynamics: Linking micro to macro", by J. De Loecker, C. Fuss and J. Van Biesebroeck, *Research series*, October 2018.

358. "Productivity, wages and profits: Does firms' position in the value chain matter?", by B. Mahy, F. Rycx, G. Vermeylen and M. Volral, *Research series*, October 2018.

359. "Upstreamness, social upgrading and gender: Equal benefits for all?", by N. Gagliardi, B. Mahy and F. Rycx, *Research series*, December 2018.

360. "A macro-financial analysis of the corporate bond market", by H. Dewachter, L. Iania, W. Lemke and M. Lyrio, *Research series*, December 2018.

361. "Some borrowers are more equal than others: Bank funding shocks and credit reallocation", by O. De Jonghe, H. Dewachter, K. Mulier, S. Ongena and G. Schepens, *Research series*, December 2018.

362. "The origins of firm heterogeneity: A production network approach", by A. B. Bernard, E. Dhyne, G. Magerman, K. Manova and A. Moxnes, *Research series*, January 2019.

363. "Imperfect competition in firm-to-firm trade", by A. Ken Kikkawa, G. Magerman and E. Dhyne, *Research series*, January 2019.

364. "Forward guidance with preferences over safe assets", by A. Rannenberg, *Research series*, January 2019.

365. "The distinct effects of information technologies and communication technologies on the age-skill composition of labour demand", by S. Blanas, *Research series*, January 2019.

366. "A survey of the long-term impact of Brexit on the UK and the EU27 economies", by P. Bisciari, *Document series*, January 2019.

367. "A macroeconnomic model with heterogeneous and financially-constrained intermediaries", by Th. Lejeune and R. Wouters, *Research series*, February 2019.

368. "The economic importance of the Belgian ports: Flemish maritime ports, Liège port complex and the port of Brussels – Report 2017", by E. Gueli, P. Ringoot and M. Van Kerckhoven, *Document series*, March 2019.

Editor

Pierre Wunsch

Governor of the National Bank of Belgium