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## Resumen

Tomando como punto de partida la falta de estudios portuarios verdaderamente comparativos, el artículo examina la competencia entre puertos de mar utilizando una metodología apropiada y series temporales compatibles. En primer lugar se aborda el análisis tradicional de la productividad del transporte marítimo, al igual que un análisis alternativo del valor añadido creado por la carga y descarga de artículos de consumo en los puertos. En segundo lugar se comentan brevemente las fuentes necesarias para ambos análisis. En el tercer apartado se aplican las dos técnicas citadas a los puertos de Amberes y Rotterdam para el período posterior a la Segunda Guerra Mundial. Concluye que los dos métodos producen resultados divergentes y que resulta preferible un análisis del valor añadido. Mientras que los flujos de transporte marítimo de mercancías crecen continuamente sobre una base anual, el valor añadido se estanca en ambos puertos. El artículo también pone de manifiesto que el liderazgo de Amberes en términos de valor añadido ha sido desafiado con éxito por el puerto de Rotterdam.

**Palabras clave:** Historia portuaria; competencia entre puertos; valor añadido; Amberes; Rotterdam.

## Abstract

Taking the lack of truly comparative port studies as a starting point, the article examines the competition between seaports based on a proper methodology and compatible time-series. The article firstly discusses the traditional analysis of seaborne throughput as well as an alternative analysis of the value added created by handling the commodities in the ports. Secondly, the sources necessary for both analyses are briefly commented. The third paragraph applies both of these techniques to the ports of Antwerp and Rotterdam for the post-war period. It concludes that the two methods yield diverging results and that an analysis of value added is preferable. Whereas seaborne throughput continuously rises on a year-by-year basis, value added stagnates in both seaports. The article also makes it clear that the Antwerp lead in terms of value added has been challenged successfully by the Rotterdam port.

**Key words:** Port history; port competition; value added; Antwerp; Rotterdam.

# Port competition and how to measure it: the case of Antwerp and Rotterdam (1950-2000)

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## 1. Introduction

Over the years the competition between seaports has inspired a lot of historians and economists. Yet, only a handful of studies have approached port competition in a truly comparative way<sup>1</sup>. The present article therefore examines the competition between seaports based on a proper methodology, using extensive and - more importantly - compatible time-series. After discussing the various types of port competition, the article firstly indicates which methodology has been used. Two ways of measuring port competition are considered here. On the one hand, the article presents the traditional analysis of seaborne throughput using the well-known technique of strategic positioning analysis. On the other hand, the article proposes to analyse port competition by means of the value added created by loading and unloading seagoing vessels in seaports. Secondly, the sources are briefly lined out. The third paragraph applies both of these techniques to the ports of Antwerp and Rotterdam for the post-war period. The article concludes that the two methods yield diverging results. It strongly argues in favour of measuring competition by means of value added and not by means of seaborne throughput. Whereas the amounts of seaborne throughput continuously rise on a year-by-year basis, the amounts of value added stagnate in both seaports. On top of that the figures make it clear that the traditional Antwerp lead in terms of value added has apparently been challenged successfully by the Rotterdam port.

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<sup>1</sup> de Goey, Loyen & Van Driel (2004).

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To begin with, it is important to establish which kind of port competition the article intends to study. Verhoeff situated port competition on four levels: competition between port companies, ports, port clusters, and port ranges. The difference between port clusters and port ranges lies in the fact that a port cluster includes a number of ports with similar geographical characteristics, located very close to each other. A port range groups ports located on the same coast with a more or less common hinterland. Antwerp and Rotterdam should be positioned in what is known as the Hamburg-Le Havre range. In recent literature the seaports of Amsterdam, Antwerp, Bremen, Dunkerque, Gent, Hamburg, Le Havre, Rotterdam and Zeebrugge have been known to compete intensively, and are therefore counted in the Hamburg-Le Havre port range<sup>2</sup>. However, Verhoeff added that these levels of competition interact with each other, and should not be studied separately<sup>3</sup>. Recently an increasing number of port economists have exchanged this traditional system for a model with competition between logistical chains rather than ports<sup>4</sup>. As generalised transport cost (all transport and handling costs from origin to user) play a major role in this new approach, commercial and industrial services are nowadays also taken into account (apart from the classical transport links to the hinterland). Hence economists speak of port competition in terms of competition between port operators (defined as organisers of transport chains). They discern three levels of competition. First of all there is the rivalry between port operators trying to acquire a certain cargo flow within one port (intra-port competition). An operator can handle more than one cargo flow, and can be present in several ports simultaneously. A second kind of competition concerns the competition between port operators belonging to different ports (inter-port competition on the operator level). Thirdly, a struggle between port authorities can be identified (inter-port competition on the policy level)<sup>5</sup>.

Verhoeff's definition has retained much of its attraction, however. After all, one could easily object to the undifferentiated implementation of a new port competition typology based on the historical reality. In Verhoeff's terminology the present article looks at competition between ports: in this case, Antwerp and Rotterdam. Both seaports, located close to each other and sharing virtually the same hinterland, have a strong tradition in competing with each other (much like Bremen and Hamburg). Since the nineteenth century both ports have been watching each other, closely and incessantly. Each port, backed up by its national government, continuously tried to outsmart and obstruct the other, throughout the nineteenth and twentieth century. The list of mutual reproaches is long and distinguished, even after half a century of European unification. Conversely, jealousy and a healthy spirit of competition kept both sides on their toes. It should be noted

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<sup>2</sup> The composition of the range can however vary over time, and often depends on the cargo flow in question. Hence ports like Flushing, Terneuzen or Wilhelmshafen can be added to the Hamburg-Le Havre range. Huybrechts et al. (2002) 6.

<sup>3</sup> Verhoeff (1977). Verhoeff (1981). Winkelmanns (1979), pp. 179-217.

<sup>4</sup> New definitions: Slack (1985). Hayuth (1993) Heaver (1995). Coeck et al. (1997).

<sup>5</sup> Huybrechts et al. (2002) 9-13. Haezendonck (2001), pp. 12-17.

that Antwerp and Rotterdam do not simply compete with each other in a vacuum. The ports also fight other competitors in the Hamburg-Le Havre range. For practical purposes the article, however, only demonstrates both analyses for the ports of Antwerp and Rotterdam.

## 2. Methodology

This approach implies that specific and direct rivalry between port authorities (on a political level for example) and port companies (such as forwarders, ship agents and terminal operators) will largely be ignored. Indirectly, competition at these levels will inevitably be touched upon during the analysis. However, this does not answer the question of the way in which competition between ports should be examined. Most ports (and their authorities and companies) regard growth and market share as the two most important indicators of their competitive position. Traditionally, the competitiveness of a port in a specific cargo flow determines the evolution of these indicators. That is why this article firstly measures competitiveness in terms of throughput<sup>6</sup>.

### 2.1. Seaborne throughput

Transport economists have developed a special technique in order to study port competition, called strategic positioning analysis (SPA). It allows one to assess the strengths and weaknesses and - therefore - the strategic position of a port versus that of its competitor(s). SPA relies on a number of methods that initially originated in marketing or in regional economics<sup>7</sup>. Although several variations on SPA exist, it traditionally consists of a product portfolio analysis (PPA), a shift share analysis (SSA) and a product diversification analysis (PDA)<sup>8</sup>. A product portfolio analysis (basically) consists of a growth/share analysis and a growth/growth analysis. The growth/share analysis combines average growth and share of the cargo flows in the total throughput of each port. The combination of both indicators gives a better picture of the composition of throughput in each of the ports, than simply a look at market shares. The results of this analysis are visualised using a special matrix with four market positions. A growth/growth analysis plots the growth of the port in question against the growth of all the ports under consideration. This method also yields graphs, and reveals which commodities contributed most markedly to overall traffic growth in the port in question.

A shift-share analysis allows one to attribute the growth (or decline) of a port's throughput to three factors, namely overall growth (share effect), the right special-

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<sup>6</sup> De Lombaerde & Verbeke (1989). Goss (1990) 274. Coeck et al. (1997).

<sup>7</sup> For an in-depth discussion and background literature: Haezendonck (2001), pp. 41-54.

<sup>8</sup> De Lombaerde & Verbeke (1989). Winkelmans & Coeck (1993). Notteboom & Coeck (1994). Verbeke, Peeters & Declercq (1995). Tuerelinkx, (2000).

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isation (specialisation effect), or a good competitive position (competitiveness effect). The latter two effects together constitute the shift effect (hence shift-share analysis). The share effect indicates the theoretical growth of a port's throughput, presupposing a constant market share of the port in the range. The share effect describes the change in throughput that would have taken place in the event that all commodities accrued in the same way to the average evolution of throughput in the port range. The difference between the real recorded growth and the calculated share effect reveals an increase (or decrease) in market share, and is represented by the shift effect. The specialisation effect reveals the degree of specialisation of a port in the best performing cargo flows in the range. A positive specialisation shift reflects the fact that the port in question is specialised in the best growing commodities. The competitiveness effect echoes a port's particular competitive position. A positive competitiveness effect implies that the port did better than expected, i.e., it outperformed its rivals in the commodities on which it is concentrated.

A product diversification analysis is the third and final component of a SPA. It examines the diversification of a port's throughput. Using a Hirshman-Herfindahl index, it reflects the degree of concentration of the different cargo flows within the port in question: the higher the index, the lower the diversification. Where the port only handles one commodity, the index will be equal to 1. In the opposite case, involving a port with an equal part of all the ten commodities in the total amount handled, the index will be 1/10 (or 0.10).

In view of the scope of the present article, the analysis has been limited to a small-scale product portfolio analysis<sup>9</sup>.

## **2.2. Value added creation: top-down or bottom-up?**

One example of a top-down estimation, is the work of the Nederlands Economisch Instituut (NEI). Since 1996 NEI has been executing studies to the order of the Dutch Ministry of Transport and the Dutch National Port Board<sup>10</sup>. NEI combines geographical (i.e., port location) and sectoral (i.e., maritime activities) criteria in order to select the relevant activities. The Institute estimates value added in four stages. (1) NEI calculates value added of 'activities bound by location' by means of employment data for the port area. The 'maritime employment per port' multiplied by the 'maritime value added per employee' yields the value added of the activities bound by location. Maritime value added per employee is derived from national production statistics compiled by the Central Bureau for Statistics (CBS). (2) In the case of 'activities not bound by location', NEI takes transport performance as its starting point. Here port-related haulage, which might partly have taken place outside the port area, is considered. NEI uses CBS statis-

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<sup>9</sup> For a complete SPA, cfr: Loyen (2004a).

<sup>10</sup> NEI (2002).

tics dealing with Dutch cargo traffic via rail, road and canal. Firstly, the port-related maritime share in the 'total ton-kilometer performance' of the professional Dutch transport sector is assessed. The 'maritime ton kilometer' multiplied by the value added per ton kilometer (per transport modus) results in a value-added figure for hinterland transport per seaport. The employment is computed by dividing the value added per transport mode by the value added per employee (derived from CBS statistics). (3) The direct value added per seaport equals the sum of the value added of activities bound by location and the value added of hinterland transport. Direct value added contains all activities dealing with the throughput and industrial function, supplemented by port-related wholesalers and services. (4) Indirect value added and employment is computed by means of a multiplication factor (derived from input-output tables), which included 'forward and backward economic' linkages. NEI, however, limits its study to backward connections with suppliers of the direct actors.

An example of the bottom-up estimation has been published by the National Bank of Belgium (NBB). Since 1985, NBB has been producing an annual report titled 'Economic importance of the port of Antwerp'<sup>11</sup>. In its report, NBB used a 'casuistic' definition of the port of Antwerp. A company or public body belongs to the port if it is directly involved with the port and/or if it fulfils a geographical criterion (stipulated in the Royal Decree of 02-02-1993). NBB splits the selected companies into three groups: port services, port industry and port-related public sector. When estimating value added, NBB relies on the annual accounts of all of these companies. The methodology for private companies boils down to adding the following entries from the company's annual accounts: staff costs, depreciation, other costs, operating profit (minus subsidies). Companies that only perform a part of their activities within the port area communicated a 'distribution formula' to NBB<sup>12</sup>. Value added for the public sector was calculated as the sum of staff costs, office rents and depreciations. The respective civil services communicated staff costs to NBB, who added a surcharge for rents and depreciations. In the case of the Antwerp Port Authority, the value-added calculation was also based on the annual accounts<sup>13</sup>.

Using balance sheet data in a bottom-up reconstruction, as proposed by NBB, is probably the most reliable method to estimate value added of port activities. From a historical perspective, however, it is also the least realistic one. The accounting legislation is of relatively recent date, so that prior to the 1970s balance sheets were not produced in a uniform way which poses serious problems of interpretation<sup>14</sup>. In addition, most stevedores – to name but one type of activity – were not required to publish balance sheet data because their firms were usually

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<sup>11</sup> NBB (1985-2002). Similar studies also exist for the seaports of Gent (1985-2002), Brugge-Zeebrugge and Oostende (1991-2002). Since 2002 NBB publishes an extended edition of its study, which also takes indirect effects into account: Lagneaux (2005).

<sup>12</sup> This formula remains secret however. NBB (1998), pp. 27-28.

<sup>13</sup> NBB (1998), pp. 28-29.

<sup>14</sup> van Meerten (2004).

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not incorporated. As most port-related firms did not preserve archival material to compensate for the lack of published data, the bottom-up approach is simply not feasible.

Therefore the present article computes value added by means of a top-down approach covering the second half of the twentieth century (five-year intervals). The 'output' or revenue of the ports of Rotterdam and Antwerp is calculated by focusing on four relatively broad categories: cargo handling and storage, ship handling (i.e. pilotage and towage), land and infrastructure leasing, and a residual category. Next, value added is computed by means of special input/output ratios<sup>15</sup>. Value added has been estimated in Belgian Francs abbreviated as BEF (1 EURO = 40.3399 BEF)<sup>16</sup>. Two important limitations have to be taken into account. First, the estimates only include 'pure' or 'classical' port activities. Throughput, transshipment, pilotage, towage, and activities of shipping agents etcetera. are included, whereas the petroleum, chemical and ship-building industries are not. Second, only sea-borne throughput has been considered. The option to exclude land-borne throughput (train, barge or truck) has been inspired by the lack of reliable hinterland handling rates and the lack of domestic hinterland transport statistics for Rotterdam.

### 3. Sources

#### 3.1. Seaborne throughput

For both ports, published government statistics offer detailed time-series on international cargo flows passing through the respective ports. They list the imported and exported amounts per commodity. The advantage of these statistics, compared to those of the port authorities, is that they have been assembled by neutral organisations for statistical purposes, in a more or less uniform fashion that complies with Benelux or EU guidelines<sup>17</sup>. They are linked to the trade statistics and thus entail the interpretative problems typical of trade statistics<sup>18</sup>. Unlike trade statistics, port authority statistics serve the interests of the port authority, and are often used in public-relations efforts. Since they like to stress the strong points of their port, each authority will put forward a methodology that emphasizes its strengths and camouflages its weaknesses. This has resulted in as many methodologies and classifications as there are port authorities. Hence, consistency is scarcely to be found, and comparisons continue to be problematic.

In the case of Antwerp the data on seaborne throughput stem from the official port statistics published by the Belgian National Institute for Statistics (NIS). The series stops in 1995 because of the disappearance of internal borders and customs

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<sup>15</sup> NBB (1999), table 5.6.

<sup>16</sup> For a fully-fledged methodology: Loyen (2004b).

<sup>17</sup> De Lombaerde (1994). Coeck et al (1995).

<sup>18</sup> Horlings (2002). Federico & Tena (1989).

documents in the European Union. On top of that, the figures for 1988-1994 have proved to be extremely unreliable. Therefore new time series for the 1988-2000 time span were extrapolated by means of port authority statistics<sup>19</sup>.

The Rotterdam data also originate from the trade statistics published by the Dutch CBS. As these statistics are a nationwide survey, they do not contain all local data. Therefore, the Rotterdam data published by Rotterdam Chamber of Commerce and Industry were used for the period 1946-1987. The Chamber received the data directly from CBS and (re)issued them. In 1988 the publication of the Chamber's annual reports was discontinued. By then, the national transport statistics published by CBS were more informative on the Rotterdam port. Like NIS, CBS stopped the publication in 1995 because of the disappearance of internal borders. In the years prior to 1995, CBS also started to experience difficulties with its data. Most regrettably, a solution similar to Antwerp's turned out to be technically unworkable, since CBS and the Rotterdam Municipal Port Management (RMPM) used two completely different nomenclatures. Hence for the sake of consistency, this article continues to use the CBS series.

The comparability and compatibility of Antwerp and Rotterdam sources should also be treated briefly. First of all both sources define the weight of the goods differently. The Antwerp statistics use net weights, whereas the Rotterdam statistics are in gross weight. Additionally, the official border of the port area proves to be a minor problem. Both Antwerp and Rotterdam statistics contain all throughputs within the boundaries of the port area. In Rotterdam, some smaller ports in the New Waterway area still handle their own traffic. This might have been a problem in the inter-war years, but for the post-war period this does not result in a serious distortion. A final remark pertains to 'unauthentic throughput'. Unauthentic throughput includes ship's provisions, ship's fuel (coal/oil), passengers' luggage, equipment, and so on. Apart from ship's fuel, the unauthentic throughput may be ignored because of its quantitative marginality. On average ship's fuel, however, accounted for approximately 10% of outgoing seaborne cargo in Antwerp as well as in Rotterdam. Ship's fuel has been included in the Antwerp and Rotterdam post-war statistics. Unfortunately, CBS and NIS classified ship's fuel wrongly in NSTR category 9 (instead of category 2 or 3) in some years. This gives a very misleading picture of the volume of 'all other goods' handled in both ports – the category that is usually associated with general cargo or break bulk cargo (including containers). This has of course been adjusted accordingly.

In order to compare throughput in Antwerp and Rotterdam, time series for both ports need to be expressed in exactly the same nomenclature or goods classification systems. Prior to 1967, several completely different nomenclatures were used in Antwerp and Rotterdam. However, after 1967 both central statistical institutions (NIS and CBS) complied with a European guideline and introduced the 'Nomenclature des Statistiques de Transports Révisés' (NSTR). The problem

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<sup>19</sup> A problem of dramatic under-registration persisted in the late 1980s and early 1990s. Cfr.: Loyen (2003), pp. 129-134.



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therefore lies in the 1950-1966 time-span. Here, the nomenclatures were converted to NSTR<sup>20</sup>.

## 2.2. Value added creation

When estimating value added creation by means of a top-down approach, calculating the output proves to be the biggest problem in terms of sources. Sometimes it is necessary to include a series of assumptions in order to estimate the income from a certain activity. The following activities should be considered: income from cargo handling, ship handling, land (and other infrastructure) leasing, and maritime services providers.

The income from cargo handling has been estimated by means of handling charges published in typical port handbooks and publications<sup>21</sup>. For goods unloaded in Antwerp e.g. the reception fee (89%) and the stevedore tariff was multiplied by the amount of general cargo handled. For the outward-bound general cargo in Antwerp, the basic (ABAS) loading tariff serves as a base rate (published by ABAS). In the case of the Rotterdam port, the general cargo rates also feature prominently in the approximation of seaborne throughput. The unloading and loading general-cargo handling rates have been multiplied by the respective amounts of general cargo. Next, these general cargo rates, published by VRS, were applied to the total seaborne throughput by means of special weighing rules. Regarding the income from container handling in Antwerp and Rotterdam, the container-handling rates published in (often) confidential studies, drawn up by well-known international consultants, have been applied<sup>22</sup>.

Additionally, the income from cargo handling includes income from cargo storage. The Antwerp city accounts include the municipal income from the letting of storage space<sup>23</sup>. By relating the income from municipal warehouses to the capacity of the municipal warehouses, it has been possible to estimate a price per square meter for the period 1960-1985. This price was then multiplied by the private storage capacity, and yielded the income from private warehouses. In the Rotterdam case, the covered warehouse capacity (sheds, warehouses and cold storages) as published by the port authority, has been multiplied by the Antwerp price per square meter<sup>24</sup>.

A second entry regards income from ship handling activity. Ship-handling activities include the piloting and towing of seagoing ships. Sea, river and dock pilots lead the seagoing vessels safely from/to the port, whereas the boatmen fix the ship's lines. Where sea and river piloting in Antwerp is concerned, the statis-

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<sup>20</sup> The exact conversion procedures can be found in Loyen (2003) and via <http://www.fhk.eur.nl/websites/ra/> for Rotterdam.

<sup>21</sup> Cfr. e.g. the series of port handbooks and calendars published by Lloyd Anversois called *Annuaire maritime*.

<sup>22</sup> Kindly provided by the Antwerp Port Authority.

<sup>23</sup> Stad Antwerpen (1950-1994). GHA (1995-2001).

<sup>24</sup> Blonk (1974), p. 67. RMPM (2000), p. 9.

tics on the number of ships calling at the port was multiplied by the published pilotage rate (North Sea-Vlissingen + Vlissingen-Antwerp) and doubled in order to include the journey back to sea. The income of the Antwerp dock pilots and boatmen, organised in one central pool, has been estimated by using their published rates for a representative ship's tonnage or length. A composite rate, which consists of an average piloting distance and a representative ship's tonnage, has been multiplied by the register tonnage calling in the port. The income from a separate municipal dock towage service also needs to be considered. It features in the annual city accounts and was adopted as such<sup>25</sup>. On the other hand, towage on the river Schelde has always been in private hands and hardly any tariffs have been published. Only by means of a number of assumptions regarding the average ship size and the towage distance has it been possible to estimate the income from towage.

In the Rotterdam case, the organisation of the Dutch pilots ('Loodswezen') published a number of data on their income from pilotage in the Netherlands<sup>26</sup>. These data also include specific figures pertaining to the 'Rijnmond' area (dominated by Rotterdam). Concerning the earlier years (1950-1980), for want of better data, the pilotage rates were applied to the total number of seagoing vessels calling at Rotterdam. Apart from the sea and river pilots, dock pilots assisted seagoing vessels in the Rotterdam docks. Blonk mentions income from port pilotage for 1950-1972<sup>27</sup>. From 1975 onwards the income has been reconstructed using the 1970 number of ships/income ratio. By 1988 the Rotterdam port pilotage was privatised. This privatisation also entailed a merger of all piloting services in the port. Hence, the income from pilotage can be found in the annual reports mentioned earlier. On the other hand, a proper reconstruction of income from towage in Rotterdam poses a good many methodological problems. Therefore it has been assumed that the Rotterdam prices amount to one-third of the Antwerp prices. The radical choice to opt for a one-third ratio is of course very problematic. It can only be justified by the fact that the towage distance is shorter in Rotterdam than it is in Antwerp and by the fact that there has been much more competition between towage companies on the Maas than on the Schelde.

The income from land (and infrastructure) leasing has been published in the annual city accounts in Antwerp as well as in Rotterdam. This entry consists of income from port dues as well as from land and quay leases<sup>28</sup>.

Estimating the income from the activities of shipping and forwarding agents, however, proves to be much more difficult. An agent is normally remunerated on the basis of a certain percentage of the freight. He also receives an 'agency fee' as compensation for his other services. This income is difficult to estimate, since

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<sup>25</sup> Stad Antwerpen (1950-1994); GHA (1995-2001).

<sup>26</sup> Bedrijfsorganisatie loodswezen (2002), pp. 27 and 59. Many thanks to Mr. Wino Dorst (financial director Loodswezen) for the additional information.

<sup>27</sup> Kamer van Koophandel en Fabrieken van Rotterdam (1950-1972). Quoted by Blonk (1974), p. 87.

<sup>28</sup> Stad Antwerpen (1950-1994). GHA (1995-2001). RMPM (1950-2001).

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hardly any official rates have been published. Even if the commission could be calculated approximately (for example 10% of freight rate), a reconstruction would require more information on freight rates - which is also not available. Because of the lack of data, the shipping and forwarding agent's income as calculated by NBB (1985-2000) has been extrapolated to earlier years. For 1985 the income resulting from one ton of throughput has been calculated. In a next step, the resulting ratio has been extrapolated to the 1950-1980 period by means of a docker's wage index, and eventually applied to the total amount of seaborne throughput<sup>29</sup>.

### 3. Measuring Antwerp-Rotterdam port competition

#### 3.1. Seaborne throughput

In terms of tons, Rotterdam has always outpaced Antwerp. Chart 1 shows the post-war progress of seaborne throughput in the ports of Antwerp and Rotterdam in tons. As Chart 1 indicates, Rotterdam handled more seaborne cargo than Antwerp throughout the second half of the twentieth century. Immediately after World War II, Antwerp did however briefly outperform its Dutch counterpart. Antwerp handled very large amounts of commodities since the port installations had hardly been destroyed by war<sup>30</sup>. As the Allies used Antwerp's facilities to gradually arm and feed the liberated parts of Europe, severely destroyed European ports like Rotterdam and Hamburg had the opportunity to re-equip and re-think their installations extensively<sup>31</sup>. Once this process had been completed, Rotterdam and others soon caught up with the now old-fashioned installations in Antwerp. Rotterdam first surpassed the Belgian port in 1949 (respectively 21 and 20 million tons).

In the first half of the 1950s, throughput reached 29 million tons in Antwerp and 39 million tons in Rotterdam. Already by 1955 Rotterdam attained the 60 million tons mark. The fact that Antwerp needed another decade to attain this level (despite the Korea boom) shows just how spectacular the increase in Rotterdam was. As the Botlek area opened for business, Rotterdam's throughput yearly grew with 14% on average<sup>32</sup>. The fast economic expansion of the European economy in the silver fifties and the golden sixties caused the expansive growth of seaborne throughput in both ports. The Dutch port eventually became the largest port in the world by 1962<sup>33</sup>. In a decade's time seaborne throughput rose from 83 to 225 million tons. The Rotterdam port opened another new port site ('Europoort') after

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<sup>29</sup> Vanfraechem (2005). CEPA (1950-1993).

<sup>30</sup> Leemans (1948).

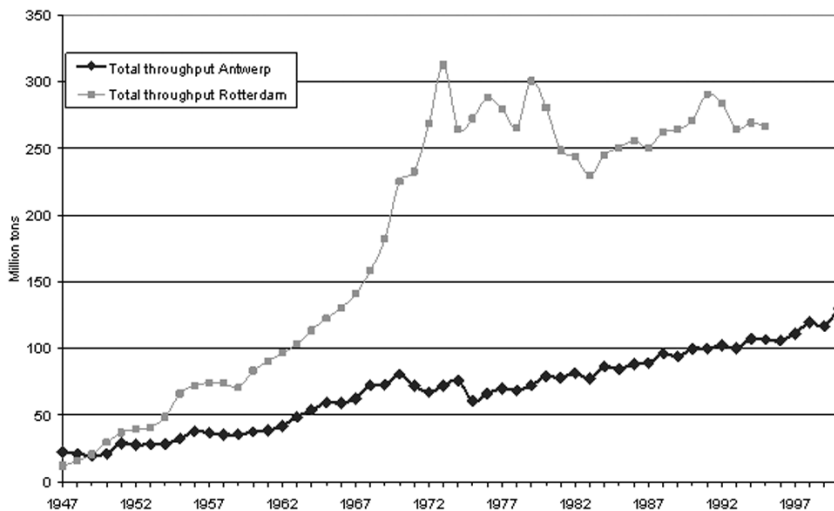
<sup>31</sup> Van de Laar (2000), pp. 451-470. Van Walsum (1972). Kludas, Maass & Sabisch (1988), pp. 183-202. Hazewinkel (1977). Suykens (1986), pp. 457-462 and 481.

<sup>32</sup> van der Plas & Westerduin (1996), p. 21.

<sup>33</sup> Van de Laar (2000), p. 512.

1965 in order to accommodate this expansion. This immense growth did not occur in Antwerp, notwithstanding a large port expansion plan ('Ten Year Plan' 1956-1966) similar to the Botlek and Europoort expansions<sup>34</sup>. Over the same time span Antwerp traffic 'only' increased from 38 to 81 million tons. In terms of market shares (Table 1) Rotterdam handled on average 63% of the total Antwerp-Rotterdam throughput in the 1950s -a market share it extended to 69% in the 1960s and to 79% in the course of 1970s. Rotterdam continued to expand spatially in the 1970s ('Maasvlakte'), whereas Antwerp looked at the left bank of the river Schelde for future spatial expansion.

**Chart 1. Total seaborne throughput in the ports of Antwerp and Rotterdam in million tons (1947-2000)**



Source: NIS, *Jaarstatistieken over de internationale trafiek der havens* (Brussel 1947-1983). NIS, *Statistiek over de internationale trafiek in de havens van de BLEU* (Brussel 1984-1994). Gemeentelijk Havenbedrijf Antwerpen, *Statistisch jaarboek* (Antwerpen 2001). Rotterdamse Kamer van Koophandel en Fabrieken, *Statistiek van handel, nijverheid en verkeer* (Rotterdam 1946-1981). CBS, *Statistiek van de aan-, af en doorvoer* (Den Haag 1982-1995).

Over the entire 1947-1995 time span throughput in Rotterdam increased with on average 7.3% every year. In Antwerp the annual growth rate was 3.7% per annum (Table 2). Table 2, which contains the average annual growth rates and market shares of the commodities handled in Antwerp and Rotterdam, shows however that the former possessed a much more balanced seaborne throughput in

<sup>34</sup> Suykens (1986), pp. 480-488.

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the post-war period. Nonetheless, petroleum and petroleum products completely dominated post-war port development in both ports. The overspecialisation in petroleum was much more pronounced in Rotterdam though. Rotterdam specialised decidedly in petroleum throughput, while Antwerp also relied on ores and metals in addition to petroleum. Eventually Rotterdam paid the price for this near-monoculture. The advantages of a diverse throughput structure (which lay in a relative flexibility and independence vis-à-vis the world economy) allowed Antwerp to expand modestly, but continuously.

Considering the entire post-war time span, Antwerp may be characterised as a port that chiefly handled petroleum, ores and metals (Table 2). Much as in the interwar years, Antwerp concentrated especially on exporting category 5 (i.e. iron, steel and non-ferrous metals). This cargo flow guaranteed 15% of total Antwerp seaborne throughput, and annually grew by 5% - in spite of a crumbling steel industry in the hinterland. Together petroleum, ores and metals comprised half of Antwerp's seaborne throughput. In Rotterdam on the other hand, on average 49% of throughput consisted of only one commodity: petroleum. In Antwerp, petroleum transshipment accounted for just 25% of throughput. Ores 'only' made up 13% of Rotterdam's seaborne throughput (Table 2). In other words, the emphasis on petroleum can be described as overwhelming. The relocation of refineries to Europe in the 1940s and 1950s and the increased demand for petrol had generated a large flow of crude oil to Western Europe. Here, Rotterdam appeared to be virtually the only port capable of handling these quantities. In 1951 Rotterdam already handled 12 million tons of crude (versus 3 million tons in Antwerp). The Suez crisis in 1956 accelerated Rotterdam's expansion as a deep-sea oil port. As ultra-large crude carriers begun appearing on the oceans, Rotterdam was one of the few ports able to accommodate these giant seagoing vessels. Rotterdam soon assumed a distribution function for Western Europe. Several international pipelines were built for that purpose (e.g. Rotterdam-Rhine Pipeline in 1960 and Rotterdam Antwerp Pipeline (RAPL) in 1969)<sup>35</sup>.

Key goods: 0: Agricultural produce; 1: Foodstuff and fodder; 2: Solid mineral fuels; 3: Petroleum and petroleum products; 4: Ores and metal waste; 5: Iron, steel and non-ferrous metals (incl. semi-manufactures); 6: Crude minerals and mineral products: building materials; 7: Fertilizers; 8: Chemical products; 9: Vehicles, machinery and other goods

Apart from petroleum transshipment, Rotterdam also led Antwerp in foodstuff handling for the entire post-war era. According to Table 1, Rotterdam initially also dominated coal transshipment. In the course of the 1980s Rotterdam's market share dropped from 74% to 69% on average (which means that Rotterdam lost its *absolute* dominance). This is explained by the fact that Antwerp had to import more solid mineral fuels in order to compensate for the closure of the last coalmines in the Belgian hinterland. In fact, the impact of the spectacular increase in petroleum imports in the Rotterdam of the 1950s and 1960s would have been

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<sup>35</sup> de Goey (1990), pp. 82-89. Scholten (1996), p. 41.

**Table 1. Average share of Antwerp and Rotterdam in seaborne throughput per commodity and decade (in percent, 1950-1995)**

Goods	1950-1959		1960-1969		1970-1979		1980-1989		1990-1995	
	Antwerp	Rotterdam	Antwerp	Rotterdam	Antwerp	Rotterdam	Antwerp	Rotterdam	Antwerp	Rotterdam
0	44	56	34	66	32	68	41	59	46	54
1	29	71	24	76	16	84	17	83	21	79
2	25	75	24	76	26	74	31	69	29	71
3	21	79	22	78	10	90	15	85	16	84
4	37	63	37	63	27	73	22	78	20	80
5	81	19	75	25	71	29	66	34	58	42
6	60	40	34	66	38	62	42	58	42	58
7	53	47	44	56	50	50	56	44	66	34
8	44	56	34	66	33	67	32	68	40	60
9	62	38	55	45	47	53	45	55	46	54
Total	37	63	31	69	21	79	25	75	27	73

Source: NIS, *Jaarstatistieken over de internationale trafiek der havens* (Brussel 1947-1983). NIS, *Statistiek over de internationale trafiek in de havens van de BLEU* (Brussel 1984-1994). Gemeentelijk Havenbedrijf Antwerpen, *Statistisch jaarboek* (Antwerpen 2001). Rotterdamse Kamer van Koophandel en Fabrieken, *Statistiek van handel, nijverheid en verkeer* (Rotterdam 1946-1981). CBS, *Statistiek van de aan-, af en doorvoer* (Den Haag 1982-1995).

even greater if it had not been weakened by these kinds of specialisations in out-of-date commodities with limited potential. In the 1950s and 1960s Rotterdam's overspecialisation in coal handling e.g. halved the positive contribution of petroleum to Rotterdam's growth<sup>36</sup>. Solid mineral fuels (coal) remained important in Rotterdam thanks to German coal exports. Coal did not survive the 1950s in Antwerp however: it is by the way the only commodity that actually shrank in the volume handled (- 2.8%, cfr. Table 2). Like agricultural produce, it was an important but 'out-of-date' specialisation. Solid mineral fuels and agricultural produce had been very important assets prior to World War II, but now took the edge off Rotterdam's impressive overall advance. In the case of agricultural produce, which had e.g. represented half of Antwerp's throughput during the first half of the twentieth century, European agricultural policy had halted overseas imports<sup>37</sup>.

<sup>36</sup> Loyen (2004a).

<sup>37</sup> Van Echelpoel (1982). Geeraert (1959).

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**Table 2. Average annual growth rate and market share (in percent) of the commodities in the ports of Antwerp and Rotterdam (1947-1995)**

Commodity	Antwerp		Rotterdam	
	Market share	Growth rate	Market share	Growth rate
0: Agricultural procedure	10	3	7	3
1: Foodstuff and fodder	5	4	8	6
2: Solid mineral fuels	7	-3	9	1
3: Petroleum and petroleum product	25	4	49	7
4: Ores and metal waste	14	5	13	6
5: Iron, steel and non-ferrous metals	15	5	3	5
6: Crude minerals and mineral products	4	2	2	4
7: Fertilizers	6	4	2	2
8: Chemical products	7	8	4	9
9: Vehicles, machinery and other goods	7	5	3	6
Total	100	4	100	7

Source: NIS, *Jaarstatistieken over de internationale trafiek der havens* (Brussel 1947-1983). NIS, *Statistiek over de internationale trafiek in de havens van de BLEU* (Brussel 1984-1994). Gemeentelijk Havenbedrijf Antwerpen, *Statistisch jaarboek* (Antwerpen 2001). Rotterdamse Kamer van Koophandel en Fabrieken, *Statistiek van handel, nijverheid en verkeer* (Rotterdam 1946-1981). CBS, *Statistiek van de aan-, af en doorvoer* (Den Haag 1982-1995).

Rotterdam increased its competitiveness thanks to one single commodity: petroleum (although ores and - surprisingly - metals also had a part in the ascent). Whereas in the 1960s both ports expanded with a very comparable growth rate (7% - 10%), the growth rates diversified in the 1970s (0% - 6%). In all Antwerp lost 7% of its market share between 1970 and 1979 to Rotterdam. The fact that Antwerp only topped Rotterdam convincingly in the fertilizer trade is symptomatic of the port's strategic position. Antwerp could not keep pace with Rotterdam. In the 1970s seaborne throughput in Rotterdam increased by 5.7% on average each year. Compared to the growth rates of the preceding decades, this lower ratio clearly points to economic crisis. But: for the first time since World War II, Rotterdam's expansion ceased to be the (virtually) exclusive result of overall economic growth. The Dutch port now owed its expansion to a favourable competitive position. In the case of petroleum and ores transshipment, Rotterdam obviously outpaced its competitor (mainly due to the assumption of a distribution function for petroleum in Europe, cfr. pipelines). The bad news for Rotterdam turned out to be the fact that it was precisely crude petroleum that can be made accountable for an (over)specialisation in a commodity that would have lost its potential in the 1980s.

Ores also provided a significant, but much smaller contribution. Throughout the 1950s and 1960s, Antwerp maintained a respectable market share of 37%, a figure that dropped to 27% in the 1970s and eventually to 20% in the 1990s (Table 1). Fundamental changes in the Belgian port's hinterland can explain this dramatic shift. From the 1970s the heavy Belgian industry, which had been supporting the port's development ever since the nineteenth century, found itself in a serious economic recession. The closure or far-reaching reorganisation of steel production plants diminished the demand for iron and other ores. Scaling-up in shipbuilding further reinforced this downward trend: the ever-larger ore carriers were confronted with the limited possibilities of Antwerp's maritime access (as compared with Rotterdam).

The tide would turn soon. A first small stagnation took place in Rotterdam in 1970-1971. As Rotterdam peaked in 1973 with 313 million tons, throughput in Antwerp fell back to 72 million tons. But Antwerp lost large amounts of port traffic because of the construction of the RAPL<sup>38</sup>. Antwerp, which had a very bad time in the 1970s, fought back during the 1980s and 1990s and re-conquered market share. During the latter half of the 1970s, throughput in Rotterdam would stagnate (first oil shock) and decline strongly in the early 1980s (second oil shock). Antwerp experienced the first shock as well, but digested the second crisis without a whimper thanks to the oil pipeline. At the nadir of the second oil crisis in 1983, Rotterdam handled 230 million tons - a 71 million tons loss in five years' time. 1983 turned out to be the worst year for Rotterdam since 1971.

Throughout the 1980s and 1990s Rotterdam would only recover slowly from this strong relapse. From 1975 onwards (61 million tons) Antwerp slowly started re-gaining market share. From the second half of the 1970s Antwerp is virtually continuously on the rise (albeit mercurial), whereas Rotterdam repeatedly lost important cargo flows. Antwerp throughput grew from 69 million tons in 1978 to 82 million tons in 1982 - in spite of the troubled economic times. The 1983 oil shock also ended this upsurge as throughput dropped to 78 million tons in Antwerp. By 1990 Antwerp passed the 100 million tons mark. Five years later Antwerp realised 107 million tons whereas Rotterdam managed 266 million ton. In terms of market shares (Table 1): the Belgian port's share grew from 21% in the 1970s to 25% on average in the 1980s and 27% in the 1990s.

In all, Rotterdam surrendered a market share of 4.2% between 1980 and 1989 to Antwerp. Although Antwerp's success can be attributed to advantageous specialisation and competitive effects - the economic slump prevented larger increases. Antwerp specialised in the 'right' commodities at the right time: '5: Iron, steel and non-ferrous metals', '8: Chemical products' and '9: Vehicles, machinery and other goods' contributed strongly. Antwerp particularly profited from the 'reversed oil shock' of the mid-1980s and outperformed Rotterdam in petroleum handling. Rotterdam stayed Western Europe's oilman: its traffic consisted chiefly of inward-bound crude oil. Antwerp's oil throughput counted a great number of

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<sup>38</sup> Suykens (1986), pp. 507-510. Mingret (1976), pp. 435-464.



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small inward and outward-bound consignments of specialized or derived products destined for or originating from its petrochemical industrial complex and virtually no crude. A second explanation lies in the fact that in the late 1960s and early 1970s port authority and town council went separate ways in Rotterdam. As the negative effects of port expansion became clear, this alliance, which had constituted the strength of the port, slowly dissolved<sup>39</sup>. Thirdly, the chemical industry's close link to the Rotterdam oil industry also offers part of the answer. In contrast to Rotterdam, Antwerp's chemical industry concentrated on chemicals derived from semi-manufactures and was therefore not affected by the problems in the oil business. Paradoxically, chemicals engineered Antwerp's comeback, whereas they remained in the background in Rotterdam.

Especially in the 1980s, chemicals became the new driving force behind the expansion of seaborne throughput. Although the transshipment of chemicals grew faster in Rotterdam (9%) than it did in Antwerp (8%), the importance of chemicals cannot be underlined enough in the case of Antwerp. The ascent of chemicals is directly related to the industrial relocation towards the port areas. Petro-chemical and chemical plants followed the petrol refineries in the 1960s and early 1970s for a number of reasons (availability of land and labour, economies of scale, agglomeration effects etcetera)<sup>40</sup>. Obviously the cargo-generating capacity of the chemical industry slowly paid off. As Table 1 indicates competition in chemicals had been at a standstill for more than three decades (to the advantage of Rotterdam). In the course of the 1990s this 33/67 changed into a 40/60 relationship. Apparently, the petrochemical complex in the Antwerp port area attracted and generated an ever-increasing exchange of chemicals. The shift towards intra-industry trade, where products belonging to the same industry are simultaneous in- and exported, further explains the recent ascent of chemicals. This shift created a much larger demand for international trade and facilitated the rise of the container. As most intra-industry trade takes place in commodities that are differentiated (i.e., goods that are close but not perfect substitutes), the highest levels of intra-industry trade can also be found in chemicals and machinery.

Although the debate whether intra-industry trade largely bypassed Rotterdam has not been concluded yet, it is a fact that chemical products would remain the spearhead of Antwerp's comeback - even well into the 1990s. The chemical products made up for the loss of the single category that Antwerp had dominated since the nineteenth century, namely 'iron, steel and non-ferrous metals'. As a matter of fact, Rotterdam outperformed Antwerp in the field of metals handling for the first time ever in the 1970s. Antwerp had dominated this commodity uncontested since the nineteenth century<sup>41</sup>. In the 1950s, Antwerp realised 81% of total metals throughput in Antwerp and Rotterdam. In the course of the 1960s and 1970s this share shrunk to 75% and to 71% (Table 1). In the 1980s, Antwerp lost the out-

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<sup>39</sup> den Dunnen (1996). Kreukels & Wever (1996).

<sup>40</sup> Winkelmanns (1972). Mingret (1976). de Goey (1990).

<sup>41</sup> Loyen (2004a).

spoken character of its dominance as its market share further decreased to 66% (and 58% in the 1990s). Antwerp's demise as a metals port may be explained by a number of facts. The first explanation that leaps to mind is the abysmal state of the Belgian steel industry, which had after all provided the economic base of Antwerp's expansion in the nineteenth century. The heavy industry had specialised in the fabrication of simple products such as rails, rods and bars. The production of such goods has slowly moved to low-wage countries, and has thus been substituted by overseas imports. The know-how and the large number of regular shipping lines, a necessity to attract steel shipments, remained in place and indeed gradually attracted some of the new inward-bound metals from the mid-1980s onwards. Rotterdam, however, anticipated this new cargo flow much faster. Rotterdam metals traffic appears to be two-way, whereas Antwerp's was (until recently) largely one-way outward-bound. Moreover, Rotterdam's rise appeared to be largely based on transit. The Dutch port had been faster in anticipating a new market: the throughput of *non-ferrous* metals. This is all the more surprising since Antwerp (and Belgium in general) had specific experience in the field of non-ferrous metals. Union Minière, a subsidiary of the Société Générale, exploited many mining sites in the former Belgian colony of Congo, and had invested heavily in non-ferrous industry in the Antwerp periphery. Notwithstanding Belgium's and Antwerp's long-standing experience in this field, Rotterdam based its entire rise in the metals trade on non-ferrous metals - a rise that can even be attributed to the activities of one single cargo handler. Ironically, now that metals no longer hold great potential, Rotterdam seemed finally to have caught up with Antwerp.

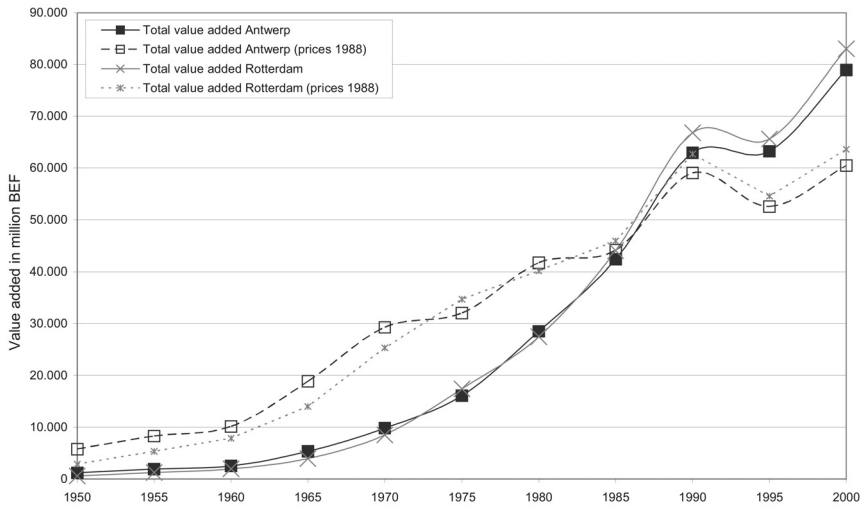
### 3.2. Value added creation

In 1950, value added created in Antwerp amounted to 1,189 million BEF versus 593 million BEF in Rotterdam (Chart 2). This marked difference is surprising because of the fact that Rotterdam already handled more seaborne throughput than Antwerp in this year. By 1955 Rotterdam drew closer with 1,225 million BEF (versus 1,894 million in Antwerp). By that time Rotterdam handled, for the first time, twice as many commodities as Antwerp. This gap still existed in 1960, but slowly began to increase in the course of the golden 1960s. In 1960 Antwerp and Rotterdam still appeared to develop in parallel (respectively 2,525 and 1,959 million BEF). Later, by 1965, Rotterdam lost more terrain in value added, whereas it continued to double and even triple Antwerp's seaborne throughput. In 1965 Rotterdam handled 123 million tons or 3,959 million BEF, versus 60 million tons or 5,335 million BEF in Antwerp. In the meantime Rotterdam has become the world's largest seaport. The impact of crude petroleum imports on the Rotterdam performance is once again clearly demonstrated here. In 1970 Antwerp could still maintain this paradoxical position (9,829 versus 8,508 million BEF in Rotterdam), but by 1975 Rotterdam equalled and passed Antwerp by in terms of value added, for the first time since the Second World War. In Rotterdam 17,432 million BEF value added had been created (versus 16,082 million in Antwerp).

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The 1970s, as indicated earlier the worst stage in Antwerp's post-war development, appeared to be a turning point.

**Chart 2. Value added created by classical port activities in current and constant (1988) prices (ports of Antwerp and Rotterdam; 1950-2000)**



Source: Loyen (2004b).

In 1980 Antwerp was able to create a greater amount of value added for one last time - and this only by a very narrow margin (27,457 million in Rotterdam versus 28,515 million in Antwerp). This narrow margin contrasts markedly with the 202 million-ton gap separating both ports in terms of seaborne throughput. In 1985 Rotterdam created 44 billion BEF, whereas Antwerp succeeded in producing 42 billion. This slight advantage in favour of Rotterdam is remarkable, especially since Rotterdam had been losing a great amount of cargo since 1980, while Antwerp had gained some. The same happened in 1990: with 271 million tons Rotterdam created 66,825 million BEF value added, whereas Antwerp lagged behind with 100 million tons and 3,882 million BEF. Yet, as discussed earlier, Antwerp regained market share in the 1980s and 1990s. 1995 saw Antwerp begin to catch up again. Now Antwerp booked 62,943 million BEF, whereas Rotterdam had to be satisfied with 65,606 million. The difference in terms of tons amounted to 160 million tons and 2,663 million BEF in favour of the Dutch port. By 2000 the gap between Rotterdam and its competitor had increased with 4.1 billion and amounted to 83 billion BEF.

#### 4. Results of the comparison

**A**lthough the exact extent of the discrepancy may be subject to discussion, the basic trend, Rotterdam catching up with Antwerp, is what counts<sup>42</sup>. Two important conclusions may be drawn.

Firstly, Antwerp lost the lead in terms of value added to Rotterdam in the course of the 1970s. Rotterdam gradually started to outperform Antwerp. The downturn Antwerp suffered in the 1970s (at first sight caused by the introduction of an oil pipeline and the first oil shock) had in other words a much more dramatic side to it than suggested by the ton analysis. In spite of the depression of its throughput in the 1980s, Rotterdam steadily assumed leadership in the creation of value added. Apparently, the expansion of Antwerp's ton market share in the 1980s did not take place in trades with high value added potential. This, however, appeared to be very much the case in Rotterdam. Rotterdam's take-over in terms of total value added creation took place at a point in time where Antwerp had already lost large quantities of crude oil - a low value added commodity - and where Rotterdam was about to lose even larger quantities. Rotterdam then expanded strongly in the container market, whereas Antwerp initially hesitated (Chart 3) and rather concentrated on chemicals and petroleum derivatives. As indicated earlier, both commodities formed the basis of Antwerp's 'tonnage comeback' in the 1980s and 1990s. Unfortunately the handling of liquid bulk (such as petroleum derivatives and some chemicals) does not create a lot of value added (hence the value added/ton stagnation in the 1980s). Rotterdam's expansion in the container business (in relation to derivatives and also chemicals in Antwerp) thus explains Rotterdam's success in terms of value added. Whereas the tremendous increases in Rotterdam's seaborne throughput of the 1950s and 1960s did not result in comparable increases in value added creation, the virtual stagnation of the 1980s and 1990s led to more overall value added creation simply because the dominant feature of seaborne throughput changed from (liquid) bulk to containers. Later on, as Rotterdam succeeded in finding new niches with appealing value added logic (like the non-ferrous metals mentioned earlier), the Dutch port would continue to make up some of its leeway vis-à-vis its competitor.

At the same time, Antwerp saw more and more of its high value added classical general cargo disappear into containers. Initially, containerization got underway slowly in Antwerp. Rotterdam had been the first European port to receive containers (1966), and, compared to Antwerp, the container traffic had increased much faster in Rotterdam. The low degree of containerization in Antwerp is traditionally explained by referring to the fact that many typical Antwerp commodities (e.g. coils) could not be put in containers<sup>43</sup>. Because of its land-inward geographical position, Antwerp also hardly handled any short sea and feeder traffic<sup>44</sup>.

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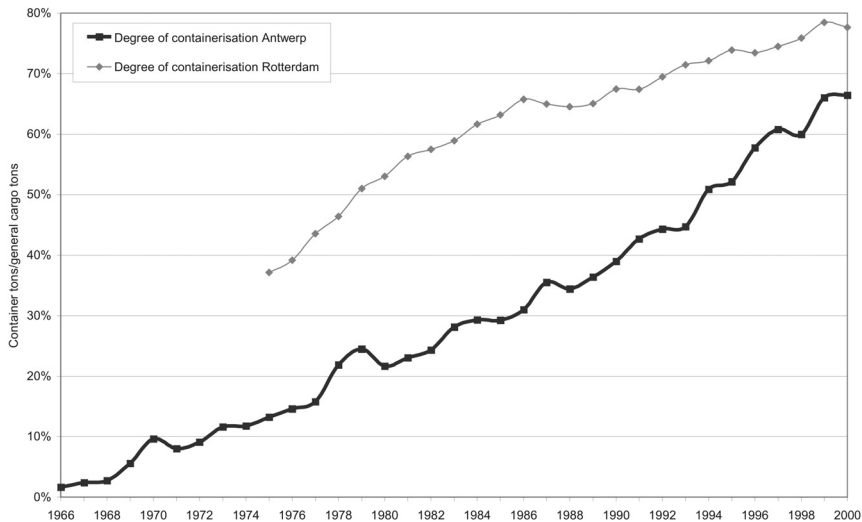
<sup>42</sup> The reliability of the estimates has been discussed in: Loyen (2004b).

<sup>43</sup> SEA (1993).

<sup>44</sup> Vleugels (1967).

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**Chart 3. Degree of containerization in the ports of Antwerp and Rotterdam (1966-2000)**



Source: Antwerp and Rotterdam Port Authority statistics and own calculation

In the course of two decades, the degree of containerization tripled in Antwerp because non-containerised general cargo traffic hardly increased, whereas container traffic increased continuously. The rising degree of containerization in Antwerp (Chart 3) has always been very well received in the port community, but simply means less value added creation. Even the repairing, and the stuffing and stripping of containers cannot compensate for the loss of value added caused by dwindling amounts of traditional general cargo. Compared to Rotterdam (79%) Hamburg (93%) en Bremen (81%), Antwerp nowadays still maintains a relative low degree of containerization (67%)<sup>45</sup>.

On the other hand, it should not be forgotten that Antwerp maintained its lead over Rotterdam in terms of value added creation per ton of seaborne throughput. By dividing total value added created in Antwerp and Rotterdam by the respective amounts of commodities, the economic effects generated per ton handled can be estimated. In spite of the very large difference in tons handled, Rotterdam's BEF/ton ratio has always amounted to a third of Antwerp's -with the exception of 1995-2000 (42%).

<sup>45</sup> Notteboom (2003).

**Table 3. Composition of the value added created by ‘classical’ port activities in Antwerp and Rotterdam (in percent benchmark years 1950-2000)**

	Antwerp						Rotterdam					
	1950	1960	1970	1980	1990	2000	1950	1960	1970	1980	1990	2000
Cargo handling	43	44	46	56	67	72	37	55	61	72	79	81
Shipping agents and forwarders	47	47	49	41	28	23	48	30	28	21	13	11
Land leasing	4	3	2	1	2	2	5	5	4	4	5	6
Ship handling	2	3	1	1	2	2	4	4	3	2	2	2
Various activities	3	3	2	0	1	1	6	5	4	1	1	1
	100	100	100	100	100	100	100	100	100	100	100	100

Source: Loyen, ‘From register tonnage to value added’.

A second conclusion deals with the growth rate of value added compared to that of seaborne throughput. When considering the evolution of value added in constant prices (which filters out inflation), it becomes clear that value added creation has barely risen over the last decade. In the port of Antwerp value added creation rose from 5,766 million BEF in 1950 to 10,126 million in 1960 and then almost tripled to 29,270 million BEF in a decade’s time (Chart 2). In the years to follow the rate of growth would slow down in Antwerp. In 1975 Antwerp would only reach 32,035 million. Although the early 1980s saw value added reach the 40 billion mark, by 1985 value added creation had slowed down again. By 1990 value added increased with a third to 59,068 million BEF. For the next benchmark, 1995, value added even dropped (to 52,580 million BEF). By 2000 Antwerp regained the 1990 level. Much the same evolution can be registered in Rotterdam. Value added increased from 2,875 million BEF in 1950. Rotterdam had doubled this sum five years later (whereas Antwerp had needed a decade to double) and continued to grow. In the course of the 1960s value added tripled from 7,855 to 25,336 million BEF. Much like Antwerp, Rotterdam then embarked on a slower growth course (which resulted in 40 billion BEF in 1980). In the following benchmark years Rotterdam gradually outgrew Antwerp. Value added creation in Rotterdam also rose strongly in 1990, also dropped in 1995 and also just regained the 1990 level by 2000 (63,625 million BEF).

Total value added creation in constant prices has barely risen. This is of course explained by the fact that the labour input decreased as ever more goods were put into containers. Containerisation, however, also cost jobs in the ranks of the shipping agents, forwarders, and other service providers. Prior to containerisation, middlemen like the shipping and forwarding agents contributed strongly to overall value added creation. Table 3, which outlines the composition of value added in Antwerp and Rotterdam, shows that the shipping agents and forwarders repre-

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sented between half and a quarter of value added creation. More important is the downward trend Table 3 indicates. In Antwerp, often described as the agency and forwarding port par excellence, their share dropped from 47% in the 1950-1970s to 23% in 2000. The port of Rotterdam saw its agents and forwarders undergo an even stronger decline, namely to 11% in 2000. Although decolonisation is often quoted as the main reason for the demise of shipping agencies and forwarders, containerization certainly sealed their fate. Most closed down or reverted to consolidations and consortia in view of the fact that operators started to internalise services they had previously confided to middlemen like the agents and the forwarders<sup>46</sup>. Because of vertical and horizontal integration in the transport sector, operators like the ship owners had become very large and powerful. They were either able to do the job without middlemen or forced middlemen to work at cheaper services<sup>47</sup>. The personal networks and knowledge of middlemen like the agents regarding rates, practices and commodities no longer mattered in times of containerization and computerisation.

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<sup>46</sup> Broeze (1998).

<sup>47</sup> See among many others e.g.: Heaver et al. (2000). Heaver et al (2001). Winkelmans et al. (2001). Slack et al. (2002). Notteboom (2002).

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