ERASMUS UNIVERSITY ROTTERDAM

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The impact of Chinese BRI investments on the north-south balance of the European container port system.

Abstract

The central question put forth in this thesis discusses whether Chinese involvement in European container terminals is rebalancing the container throughput volumes between North-Western European ports and ports located at the Mediterranean Sea. The multi-port gateway system, as defined by Notteboom (2010), is used to analyze contain throughput growth at European ports. This is put side-to-side with investments made by COSCO and CMPort, two Chinese state-owned enterprises, in the European container terminal system. The results show that their terminals are equally spread throughout the Hamburg-Le-Havre range and the Mediterranean basin. However, based on capacity and ownership share, the distribution is tilted towards the Mediterranean basin. The terminals that are owned and operated by COSCO handled over 10 million TEU in 2019, two-thirds of this throughput is handled at the COSCO terminals in Piraeus and Valencia, which are in the Mediterranean.

Key words

BRI, Chinese FDI, COSCO, European container port system, multi-port gateway analyses

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List of Abbreviations

BRI	Belt and Road Initiative
BSR	Baltic Sea Region
CMPort	China Merchants Port Holdings
COSCO	China Ocean Shipping Company
CT	Container Terminal
EU	European Union
EUR	Euros
EUROSTAT	European Statistical Office
FDI	Foreign Direct Investment
HLH	Hamburg-Le-Havre
HP	Hewlett Packer
LOLO	Lifted On Lifted Off
MSR	Maritime Silk Road
NATO	North Atlantic Treaty Organisation
OBOR	One Belt One Road
OECD	Organisation for Economic Co-operation and Development
PPA SA	Piraeus Port Authority SA
QPI	Qingdao Port International Development
SOE	State Owned Enterprise
TEU	Twenty Foot Equivalent unit
USD	United State Dollars
USSR	Union of Soviet Socialist Republics

1. Introduction

This thesis examines the effect of Chinese foreign direct investments on the European container port system, specifically whether it is affecting the north-south imbalance of the European container port system. This is done by comparing container throughput growth between the ports in the Hamburg-Le-Havre (HLH) range and the ports located at the Mediterranean Sea. This is set side by side with the increased level of investments and involvement of Chinese state-owned enterprises in the European container port system, under the Belt and Road Initiative.

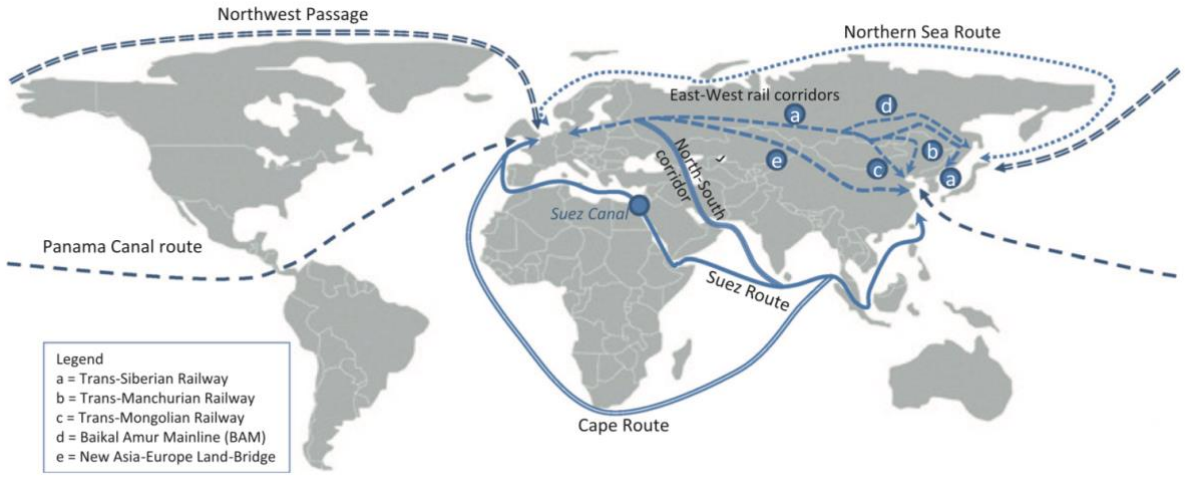
The Belt and Road Initiative (henceforth BRI) has succeeded in gripping the world's attention ever since it was announced in 2013, heads of states keep a close eye on the rollout and further developments of the project and China's strategic motives are intensely debated (NATO, 2020). On the other hand, the BRI opens up plenty of opportunities to the countries located on its "banana" shaped trade route, and that is why many countries have welcomed Chinese investments in port- and rail infrastructure. An area of particularly interest is the Mediterranean Sea region, the majority of Chinese BRI related port investment in Europe flowed towards port gateways that are connected to the Mediterranean Sea (Agatić, Čišić, Hadžić, & Jugović, 2019). This is interesting since the majority of container cargo is handled in the Hamburg-Le Havre range, the north-west of Europe. This paper analyses the impact of BRI related investments in European ports on the north-south container shipment balance. It assesses whether the Chinese investment spree in European ports is a force to be recognized, and whether it will change the balance within the European container port system.

First, a brief literature review on the BRI will give insight into the concept and summarize the most important infrastructure projects, with a special focus on port- and rail projects in Mediterranean- and Balkan Europe in the south, and West- and Central Europe in the north. Secondly, data on container throughput in European multi-port gateway areas will be aggregated and analysed, this gives insight into port sizes and port growth. Thirdly, Chinese investments in European ports will be aggregated and analysed. Fourthly, container throughput growth at COSCO owned terminals is set side by side with growth at other European ports. Together, these analyses, will give an insight into the change in competitiveness position of Northern European ports versus Mediterranean ports because of increased BRI related investments. A central question throughout the paper is whether the increased popularity of Mediterranean seaports will cause a stagnation of throughput growth in the Hamburg-Le Havre range, or whether these Mediterranean ports will serve areas that were previously underserved.

2. The Belt and Road Initiative

This section gives an overview of the Belt and Road Initiative and summarizes relevant key-findings of previous research, with a focus on the different trading corridors, Chinese loan terms, and the impact of the war in Ukraine on the BRI initiative. In 2013 president Xi Jinping and the Chinese party announced their ambitious goals to revitalize the ancient silk road trading route, an effort to improve connectivity of the Eurasian continent and to permanently put China on the map as a global trade power. The original name for this project was the "One Belt, One Road" initiative, which was changed to "Belt and Road Initiative" in 2015, the latter is better suited since the "belt" part consists of multiple land-based corridors. It is a project so vast in size that it stretches across three continents, includes or is about to include direct foreign investment in over 160 countries (The Economist, 2020a), and the OECD (2018) estimated that over USD 1 trillion of Chinese infrastructure investments will be made in the course of a decade, starting from 2017. Due to the magnitude of the project, it is difficult to make accurate estimates of the scope of the project and to put a number on actual Chinese foreign investments (The Economist, 2020a). But, throughout Asia, Africa, and Europe infrastructure projects under the BRI umbrella are springing up like mushrooms. Examples of large Chinese foreign undertakings are the dry port of Khorgos, the port of Piraeus, and the engagement in Djibouti.

2.1 The Belt

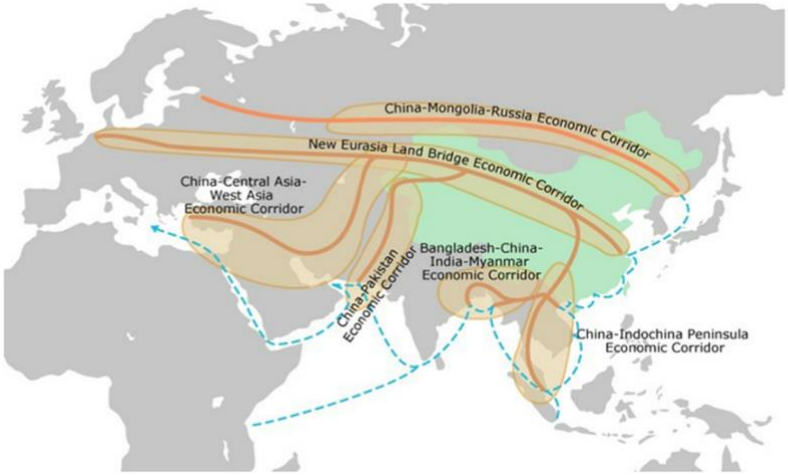


Infographic 1 - Sea shipping routes and BRI rail corridors, source: (Notteboom, 2021)

The land-based part of the BRI, commonly referred to as the belt, consists out of a collection of different types of infrastructure projects with the aim to connect China with the Eurasian continent over land, of which rail infrastructure is most visible. However, under the BRI umbrella, China is also investing in dry-ports such as Khorgos, oil pipelines connecting China to Myanmar and Russia, fibre-optic cables, and road infrastructure (The Economist, 2020a). This section focusses on the implications of investments aimed to improve rail connectivity, since it has an impact on how cargo is transported

from China to European countries, and therefore might be of influence on the European port system. *Infographic 1* shows the different railway routes connecting China to Russia, Europe, and Central Asia. An interesting question arises when you compare the East-West rail route with the Suez Route: is rail transport a viable alternative for sea transhipment and a threat for the position of European seaports?

Kuipers & De Jong (2017) used a logistical analysis by Van Groningen (2017) on the competitiveness of rail transport, air transport, and sea transport, to conclude that shipping via rail is a competitive option, especially for high value-density products. In addition, a quantitative analysis by Wen, Ma, Choi, and Sheu (2019) uses a "Route Utility Function" to estimate the competitiveness between the BRI rail corridors and traditional ocean routes, factoring in transit times, costs, environmental impact, security, and route reliability. This research ads to the presumption that rail transport is competitive, especially when shipping under a time constraint. The first step in their analyses is dividing China into 14 sub-regions, *Appendix 1* depicts the according sub-regions. Thereafter, the route utility function is used to estimate the preferred transport route from China to Europe for each of the 14 sub-regions under three different time constraints (15 days, 25 days, and 35 days). The land-based transport corridors included in the analyse are depicted in *Infographic 2*, and the traditional ocean route that starts in Shanghai and passes through the Strait of Malacca is depicted in *Infographic 1.* The results show that under the 15-day time constraint the rail corridors are the preferred option for all 14 sub-regions, under the 25-day time constraint the traditional ocean route is the preferred option for just one sub-region (S4 – Guangzhou), and under the 35-day time constraint the ocean route is the preferred option for 8 of the 14 sub-regions (Wen et al., 2019).



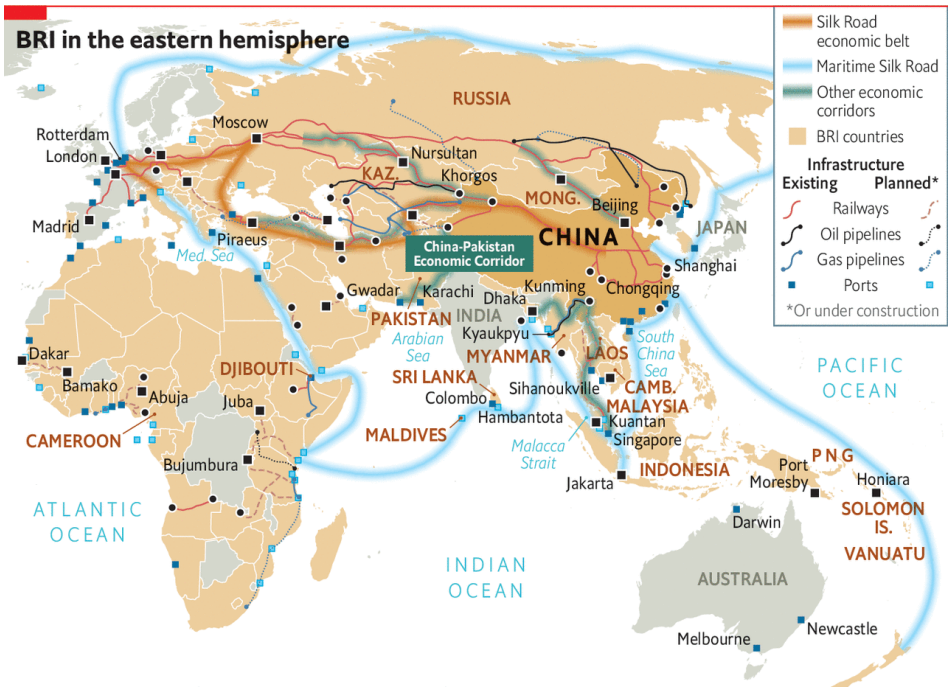
Infographic 2 - six proposed BRI economic corridors, source: (Wen et al., 2019)

However, despite the competitiveness of the rail corridors when shipping under tight time requirements, Kuipers et. al (2017) estimated that a maximum of 1.6 percent of containerised trade to and from China in the Port of Rotterdam will be done by rail transport instead of sea transport in the future, this amounts to 200.000 containers (TEU). At first glance this doesn't appear to have a significant impact, but combined with other trends such as re-shoring, near-shoring, and strong

economic growth in Eastern European countries, it is a noteworthy trend. Besides, Wen et al. (2019) point out that the BRI rail corridors are currently not being fully exploited, most of the trains bring cargo to European destinations but return empty to China. They point out that Chinese subsidies for rail transportation might be one of the reasons causing this imbalance. Additionally, Lee and Shen (2020) accentuate the opportunities offered by new transport modal choices. They take Hewlett-Packer (HP) as an example, HP's production in China has shifted inland to Chongqing, boasting 87 percent of their manufacturing. However, the inland location makes shipping via China's east-coast a lengthy process that can take up to five weeks, the BRI rail corridors offer a considerable alternative that is becoming more feasible due to rail infrastructure improvements. Overall, the capacity transported via BRI rail corridors is only a small fraction of the cargo transported via ocean liners, yet the new rail transport mode opens up interesting opportunities for time sensitive cargo and high density-value cargo, such as laptops and semi-manufactured parts.

2.2 Maritime Silk Road

Oddly enough, the 'Road' section of BRI refers to the maritime shipping corridors connecting China to Asia, East-Africa, and Europe. *Infographic 3* depicts these corridors and the major strategic ports located on this trading route. The Northern Sea Route is depicted as the route passing the Bering Strait and Russia, in the wake of geo-political stabilisation after the collapse of the USSR, and as a result of global warming, it has opened up as a possible alternative shipping route. It is shorter than its southern counterpart, but due to the difficulty of navigating it and the lack of ports on the route, it has thus far failed to take-off as a competing alternative for the southern shipping route (Verny & Grigentin, 2009).



Infographic 3 - BRI corridors and key cities/ports, source: (The Economist, 2020a)

In contrast, the southern corridor that passes through the Strait of Malacca and the Suez Canal, is an integral part of the BRI. China has invested in multiple port-infrastructure projects in countries alongside this route. Projects worth mentioning are Chinese investments in the port at Hambantota, the former president of Sri Lanka agreed to sign a 99-year lease contract giving Chinese state-owned enterprises (SOE) a controlling stake in the port (Wignaraja et al., 2020). Further west, China is expanding its influence in Djibouti, where it began constructing its first military naval support base on overseas territory (Downs et al., 2017). This is in confirmation with the three strategic BRI goals that are pointed out by Fallon (2015), specifically: energy, security, and markets. The overseas naval base is strategically located near the Bab al-Mandab strait and the Strait of Hormuz, a geographical area characterised by conflicts, it is not hard to connect the dots and draw the conclusion that China is ensuring safe passage for their cargo- and oil vessels, especially in the light of the Iranian hostage taking of a British oil tanker in the Strait of Hormuz in 2019. Chinese strategic BRI-related investments in the Mediterranean Sea area and throughout Europe will be discussed further on in the paper.

2.3 Debt trap

The Belt and Road Initiative has certainly succeeded in gripping the world's attention, heads of states keep a close eye on the rollout and further developments of the project. China's strategic motives are intensely debated, in the wake of the Covid-19 pandemic the NATO Secretary General stated that "Some allies are more vulnerable for situations where critical infrastructure can be sold out" (NATO, 2020), and China's military involvement in Djibouti fuels this debate even further. On the other hand, the BRI opens up plenty of opportunities to the countries located on its "banana" shaped trade route, and that is why many countries have welcomed Chinese investments in port- and rail infrastructure. This section provides an overview on existing literature on the loan structure of Chinese BRI-related infrastructure investments and discusses how the initiative is impacted by the Covid-19 pandemic.

A dept 'dept-trap' diplomacy is best explained as an unsustainable loan with an alleged negative intent, which is commonly granted to underdeveloped and small countries. These loans often become insolvable because of the high dept risk, as part of the bilateral agreement a state-owned asset, serving as collateral, is transferred to the lending country. Critics of the Chinese debt diplomacy often take the loan to the port of Hambantota as a 'dept-trap' example, due to some setbacks the project took longer than expected, putting a strain on the financials of Sri Lanka. As a result, the Sri Lankan government had to sign a 99-year lease contract, handing over port management to a Chinese SOE (Wignaraja et al., 2020). However, an analysis into the debt structure of thirteen Pacific countries did not show any signs of a deliberate Chinese 'debt-trap' policy, amongst the countries investigated were: Vanuatu, Tonga, Samoa, and Papua New Guinea. Additionally, Xi Jinping has put emphasis on

the importance of sustainable debt provision under the BRI during a forum in Beijing in 2019 (Rajah et al., 2019).

The Center for Global Development also examined the BRI's debt implications, they looked at the debt vulnerability of 68 countries located in Eastern Europe, Eastern Africa, the Middle East, Asia, and the Pacific. Their analyses identified 23 countries that were in debt distress in 2016, which meant that the countries had a credit rating below BB-/Ba3. Thereafter they integrated a 'BRI lending pipeline' into the public debt of these remaining countries, this pipeline is an estimation of future BRI-related debt that is currently unaccounted for in the countries' public debt figures. After this step there are eight countries that are vulnerable for future BRI lending, amongst those countries are Djibouti and Montenegro. Chinese investments mount up to a distressing 75 percent of Djibouti's GDP, and in Montenegro the China Exim Bank pledged a 1.1 billion USD loan to finish the construction of a road that connects Montenegro with other Balkan countries (Hurley et al., 2019). At the time, Hurley et al. 2019) concluded that "It is unlikely that BRI will be plagued with widescale debt sustainability problems", they did point out a discrepancy between China's lending practices and that of multilateral institutions as IMF and the World Bank.

However, there is a major caveat, the aforementioned research was done in an era prior to the Covid-19 pandemic. The global spreading of the virus has grounded trade and economic growth to a halt in 2020, this will have major implications for the scheduled debt repayments owed to a consortium of Chinese banks. In Egypt and Bangladesh, the construction of two coal plants has been cancelled, these projects would otherwise have been funded by Chinese lenders. In April, Pakistan asked China for less strict repayment terms on a 30 billion USD loan to construct a power project. And in the same month Tanzania has cancelled a large Chinese funded port project, based on the loan condition that China would gain full control over the port in case Tanzania is unable to repay. Furthermore, the G20, which includes China, suspended debt-related repayments of 78 countries that were scheduled to take place in 2020, altogether these postponed debt repayments are estimated to total 12 to 14 billion USD (The Economist, 2020b). The impact of the pandemic can especially be felt in countries that were already in a dire situation with regards to their public debt balance sheet, Hurley et al. (2019) identified the following "focus" countries: The Maldives, Laos, Montenegro, Mongolia, Djibouti, Tajikistan, Kyrgyz Republic, and Pakistan. China has a collateral for about 60 percent of their loans to development countries (The Economist, 2020b), due to the economic downturn resulting from the global pandemic, China could gain control over crucial infrastructure in the countries that are unable to meet the loan terms.

2.4 Impact of Russia's invasion of Ukraine on BRI

After months of building up tension at the Ukrainian border, Russia invaded Ukraine by the end of February 2022, a geopolitical event that is rapidly reshaping global economics and trade routes. The European Union and NATO responded unanimously and swiftly in condemning Russia's aggression and its violation of sovereign borders, where Putin was likely rooting for a division between EU member states and NATO members. Two-and-a-half months later Russia finds itself secluded from the rest of Europe, the NATO responded with multiple rounds of economic sanctions targeting Russia, humanitarian aid packages, and military aid packages ranging from intelligence to weapon systems.

Most EU member states, Russia, and Ukraine are important trade partners to China and an integral part of the BRI, this raises the question how the Russian invasion of Ukraine, and subsequently economic sanctions, will impact trade relations and Eurasian infrastructure initiatives like the BRI. This is not the first time trade relations between the EU, Russia, and China are distorted because of a geopolitical conflict. In 2014, after the Russian annexation of Crimea, several sanctions were put to effect. The EU could no longer export a variety of agricultural and food products towards Russia, which also had an impact on rail transit goods that were exported trough Russia towards Asian trading partners. However, research by Korhonen, Simola, & Solanko (2018) has shown that the impact of these sanctions on the Russian economy, on an aggregate level, have been limited, especially if you compare it with the impact of other economic events like the decrease in oil prices between 2014 and 2016. However, the economic sanctions after the full-scale invasion of Ukraine in 2022 are of another magnitude, how are these impacting goods that are transported via Russian rail and what are the broader implications for BRI trade routes

Let's start by assessing the impact on the rail routes connecting China with Europe, the belt component, which is impacted severely. According to data from the Eurasian Rail Alliance Index (ERAI, 2021) the transportation volume and container loads have been growing steadily since 2016. In 2021 a total of 693 thousand TEU was transported via the Eurasian railway routes, compared to 101 thousand TEU in 2016. Next to this, the average container load (TEU) per train rose by 37.6 percent during the same period. After the Russian invasion of Ukraine this growth was halted, train transport volumes decreased by 80 percent after the invasion according to Kristian Schmidt, Director of Land Transport at European Commission. Currently, Russian railways are included in the EU sanctions against Russia. Freight trains are allowed to cross trough Russia, but it is prohibited to stop in Russia. Because of security reasons many rail freight operators are avoiding transit trough Russia. Instead, they opt for different routes, like the 'middle corridor', passing through Azerbaijan, Georgia, and Istanbul (European Parliament, 2022). From a maritime perspective the consequences of the war are

less grave, especially for the Suez Route. But bunker fuel prices have risen sharply, and the biggest impact is felt by ships operating in the Black Sea area and on trading routes to/from Russia.

3. Methodology

In order to analyse the impact of Chinese BRI investments on the north-south balance of the European container port system it is imperative to device a set of sub question, that jointly cover an analysis of the European container port landscape and how BRI related investments impact this landscape. This section contains the methodology to answer four independent sub-questions about container throughput growth within European ports, BRI investments in European ports, a brief infrastructure analyses of important European ports such as Valencia, Piraeus, Bilbao, Madrid, Marseille, Gdansk, Rotterdam, and Antwerp, and an examination of the respective hinterland infrastructure of these ports. Altogether these questions give insight in the competitive advantages of the locations of ports throughout Europe and tries to answer why China is predominantly investing in Mediterranean ports (Agatić et al., 2019).

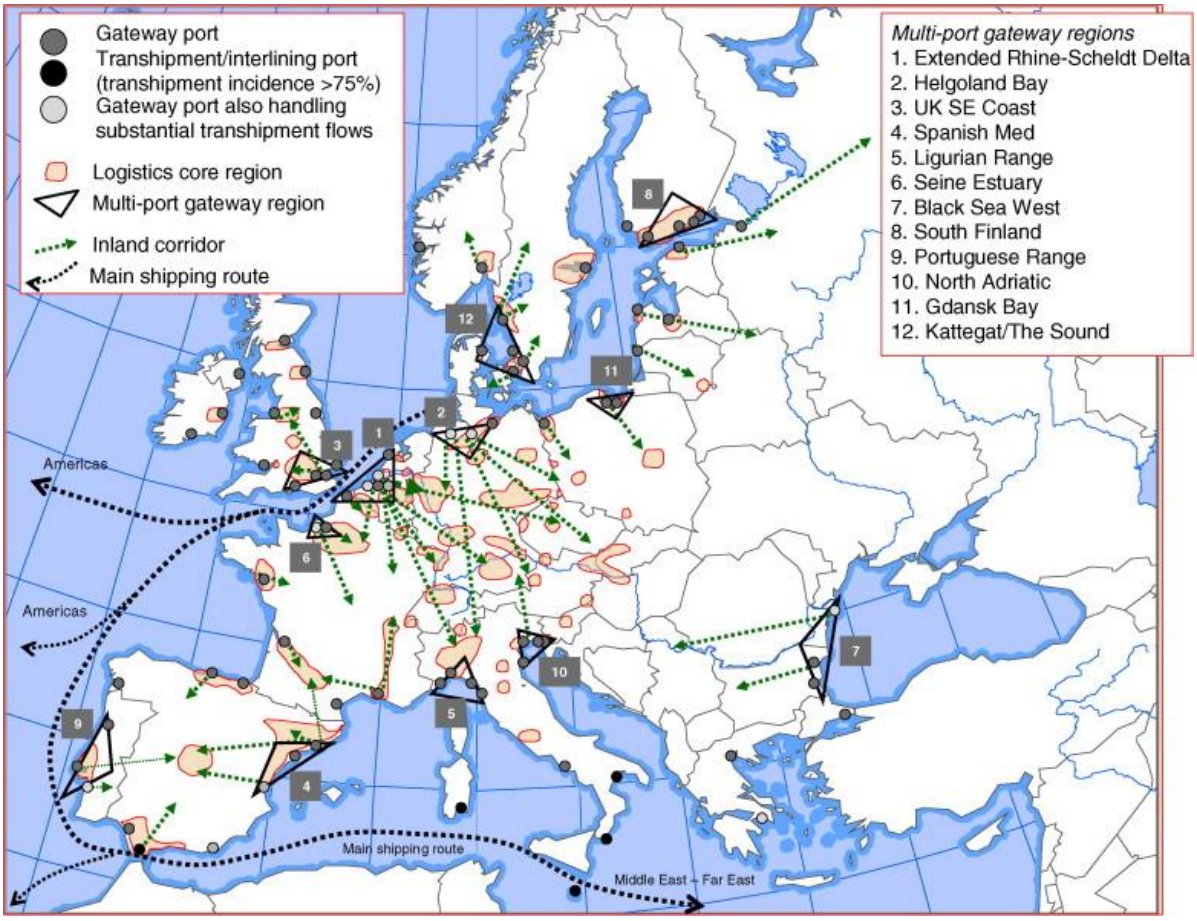
3.1 Division of container throughput across European ports growth trends

In order to answer this sub question, it is important to realize that the European container port system is characterised by a variety of different ports, which makes it hard to compare and rank them. Each of these ports serves a different region and hinterland, has their own infrastructure, and is characterised by their countries' regulatory systems. When looking at container throughput data of specific ports there is a clear distinction between three port types; the first type is a gateway port, that primarily relies on hinterland traffic, the second type is a transhipment hub, which chiefly handles sea-sea transhipment, and the third type is a combination of both. Later on, this terminology will be used when comparing a variety of European ports.

The yearly container throughput, measured in Twenty Foot Equivalent Units (TEU), is an important indicator to measure growth in ports that handle containerised cargo. There is a primary distinction between Lo-Lo and Ro-Ro container transhipment, the first category indicates that the container is lifted on and off the ship, the second refers to the containers that are rolled on and off a ship on the back of a truck. This data is collected by a number of different organisations, it is often collected by individual port authorities, but also by governance institutions on national and European level. EUROSTAT, the statistical office of the EU, has multiple databases on TEU throughput that are aggregated on national level or on individual port level. EUROSTAT has a series of datasets on the volume of containers that are transported to and from main European ports, this is quarterly data and reported every two year. The container volume is measured in TEU, includes both empty and filled containers, and only takes into account the containers that are lifted on and off (Lo/Lo). The containers that are being shipped on the back of a truck are counted towards another type of cargo in EUROSTAT's datasets (EUROSTAT, 2020).

The first step in answering this sub question is joining EUROSTAT's biannual reports into one dataset that covers the period from 2000 up until 2019. The 2019-2020 biannual report includes data on 246 individual ports, whereas the 2000-2002 report includes TEU volume data on 231 ports. This aggregated dataset is fundamental when analysing how TEU throughput is divided across the European port system. Notteboom (2010) points out the longstanding literature on geographical port models, over the last decades researchers have made a variety of models that analyse port growth in different regions around the world. In this paper two methods will be used to analyse container port growth in Europe.

The first method studies the TEU growth rate of the top 15 largest ports in Europe over the period 2008-2019, with a special focus on the north-south (im-)balance of the European container port system. Notteboom (2010) points out that analysing individual ports might give a misleading overview of port growth, this is especially true when analysing and comparing the growth of different gateway regions. In 1997 he designed a method to analyse the container throughput growth in different multi-port gateway regions in Europe, with the underlying thought that ports that are located in the same geographical region are intertwined with each other, due to the fact that they serve a similar hinterland (Notteboom, 1997). In 2010 he updated this method and included additional ports within the model, which now covers a total of 78 container ports and includes TEU data up until 2008 (Notteboom, 2010).



Infographic 4 - Multi-port gateway regions and logistic core regions in hinterland. Source: (Notteboom, 2010)

The second method used in this paper is derived from the model described by Notteboom (2010) and focusses on TEU throughput data over the period 2008-2019, this multi-port gateway system analyses provides easy insight into the development of different port areas throughout Europe. *Infographic 4* gives an overview of the twelve multi-port gateway systems, each multi-port gateway consists of multiple ports with a common hinterland they serve. Some clusters, such as the "Extended Rhine-Scheldt Delta" and "Helgoland Bay", are considerably bigger than others. These larger clusters avail from inland waterways, which connects the ports to a considerable larger hinterland than ports that are not located near inland waterways.

3.2 BRI related investments in European ports

This section assesses the Chinese influx on the European port system by aggregating data on port-related investments made by Chinese SOE's. Firstly, it is important to start with a brief overview of the various options on how to acquire a stake in a foreign port or terminal. This will be done by reviewing literature on port management systems and reviewing mechanism for involvement in overseas ports.

Secondly, data on Chinese SOE's with either a minority or majority stakeholder positions in European ports will be aggregated. The European Parliament has collected data on port investments in Europe that are connected to China trough companies such as COSCO. This section will summarize these investments and identifies what type of infrastructure enhancing projects are being undertaken after Chinese companies take an interest in a port or terminal. It also analyses how each of these stakes were acquired, and whether certain economic conditions instigated the sell-off to a Chinese SOE.

3.3 How is container throughput growing at COSCO terminals in Europe?

This part gives insight in the reasons for COSCO's increased involvement in European container terminals. Secondly, it focusses on the growth of COSCO's European container terminal assets by aggregating container throughput volumes of European terminals in which COSCO Shipping Ports is involved. COSCO Shipping Ports Limited provides annual data on container throughput volumes at their terminals, this annual data is aggregated into a time series between 2005 and 2020. The growth at COSCO terminals it is compared to the growth of European ports in general. Besides, COSCO's increased terminal involvement in European ports is put into perspective by analysing the trend of increased carrier involvement and ownership in container terminals.

4. Results

4.1 Division of container throughput across European ports and growth trends

In the past two decades the European container port system was subjected to multiple trends that reshaped it, there has been a gravity shift away from the importance of hinterland connectivity and the strategic location of ports to serve inland trade corridors, towards a port's technological infrastructure and nautical accessibility (Ducruet et al., 2009). This is fuelled by the consolidation of shipping liners, the influx of global terminal operators, and the push to capitalize on economies of scale that result from operating larger container vessels. Not only the maximum capacity of container vessels grew, container throughput also gradually increased in European ports between 2008 and 2019. Table 1 depicts the yearly container throughput numbers of the fifteen largest European ports. The market share of the largest port, top 3 largest ports, top 10 largest ports, and top 15 largest ports remained roughly the same over the past decade. Implying that the throughput in the 15 largest European ports increased with a similar trend as the increase in total throughput in Europe. Scoping down to individual port level there are some differences, but the general picture is clear. The largest European ports maintained their market share between 2008 and 2019, out of the 15 largest ports listed in 2008 there are still 13 ports left in the top 15 in 2019, only Zeebrugge and Constantza dropped out of the top 15.

The port of Constantza is an interesting case, in 2008 it handled 1.37 million TEU, which sharply dropped to 0.58 million TEU in 2009. The credit crisis of 2008 had a serious impact on throughput figures and the port never managed to rebound to their pre-credit crises throughput levels, in 2019 the port handled just 0.66 million TEU. From the 2000's until 2008 the port rapidly grew, from almost no throughput, to 1.37 million TEU in 2008. Constantza became a gateway to Eastern Europe and an important transhipment hub for the Black Sea area, it reached a transhipment level of 75 percent. But because of the credit crisis shipping liners changed their liner services to cut costs, several routes serving the Black Sea area and Eastern Europe were cancelled, resulting in a lasting decrease in transhipment throughput in the region (Notteboom & de Langen, 2015).

Where some lose others stand to gain, this is certainly true for the port of Piraeus. Between 2008 and 2019 the port quickly climbed the ranks, in 2008 it handled 0.44 million TEU, whereas in 2019 it was the 4th largest port of Europe with a total throughput of 5.65 million TEU. Similar as the port of Constantza the port of Piraeus was impacted gravely by the credit crisis in 2008, throughput dropped with 68 percent in one year time. But in contract, in the years following the credit crisis, it gained market share at an astounding pace. Several factors contributing to this growth can be pointed out. Notteboom and de Langen (2015) point out that shipping liners prefer a hub-feeder model, where they

serve the Black Sea region from Mediterranean ports instead of direct port calls into the Black Sea. Piraeus' advantageous location in the Mediterranean and its proximity to the Bosporus strait make it the ideal transhipment hub towards the Black Sea region. Van der Putten (2014) points out COSCO's involvement in the Port of Piraeus as another important reason for the rapid growth. COSCO is making a serious effort in transforming the port of Piraeus into a transhipment hub in the Mediterranean. The influx of Chinese foreign direct investments (FDI), in combination with its advantageous location in the Mediterranean, spurs the rapid expansion of the port. The port is becoming a major distribution centre for the Black Sea region, Central- and Eastern Europe, as well as North Africa and Central Asia. The port is of major strategic importance to China. Backed by COSCO, the 4th largest shipping liner in the world, it has seen one of the strongest increases in container throughput figures in Europe.

The top three largest container ports of Europe remained unchanged between 2008 and 2020, the port of Rotterdam, Hamburg, and Antwerp have all grown steadily throughout the years and maintained their leading position. Furthermore, table 1 shows that six ports out of the 15 largest container ports in Europe were located in the Mediterranean basin in 2008, compared to seven ports in 2020. Dis does not seem like a significant jump, but when you compare the growth of the ports in the Mediterranean basin with the growth of ports in the Gdansk-Le-Havre range there is a notable difference. The right side of table 3 depicts the percentual growth of a selection of ports that are located in either the Mediterranean or the Hamburg-Le-Havre range, the overall trend between 2008 and 2019 is that container throughput volumes in ports located in the Mediterranean grew at a larger pace than ports in Hamburg-Le-Havre range. With the port of Piraeus as an outlier, under the management of COSCO this container throughput grew by a staggering 1192% between 2008 and 2019. Figure 1 depicts the skewed growth rates between the largest Mediterranean ports and the largest ports in the Hamburg-Le-Havre range.

After analysing growth in container throughput volumes on individual port level it is also interesting to compare this with aggregated growth in multi-port gateway regional level, these results are depicted in table 2. When comparing the ranking between 2008 and 2020 all multi-port gateway regions located in the Mediterranean climbed at least one sport in the ranking, including the Portuguese range. While the UK South East Coast, Seine Estuary, Kattegat/The Sound, Black Sea West, South Finland multi-port gateways dropped in the overall ranking based on total container throughput volumes. The Gdansk Bay region grew at the fastest pace, in 12 years' time the multi-port gateway region gained 5 positions in the overall ranking, making it the 7th largest multi-port gateway region of Europe. The Port of Hamburg serves as an important hub for transshipments towards the Baltic Sea Region (BSR), offering regular lines to at least 34 ports located in the BSR in 2015. Yet, due to the calls of larger container vessels, the port of Gdansk is increasingly competitive in fulfilling this hub-role in the BSR (Serry, 2019).

The left pane of table 3 shows the percentual growth of container throughput volume over various periods. These results are a confirmation of the results from the analysis on individual port level. Multi-port gateway regions, located in the Western-Mediterranean and Portuguese range, have grown at a larger pace than multi-port gateway regions in Northern-Europe. With the Gdansk Bay region as the exception. Measured in container volume the combined market share of the Spanish Mediterranean, the Ligurian range, the Portuguese range, and the North Adriatic range increased from 18 percent in 2008 to 28 percent in 2020. Whilst the combined market share of the extended Rhine-Scheldt Delta, the Helgoland Bay, the UK Southeast Coast, and the Seine Estuary decreased from 73 percent in 2008 to 62 percent in 2020. Thus, over the past 12 years there has been an imbalanced growth in container throughput volumes between ports located in the Hamburg-Le-Havre range and the Western-Mediterranean ports.

Table 1

Container troughput figures top 15 European ports (2008-2020, in 1000 TEU). *Source:* EUROSTAT

R		2008		2013		2018		2019		2020	R
1	Rotterdam	10631	Rotterdam	11021	Rotterdam	13598	Rotterdam	13493	Rotterdam	13294	**1**
2	Hamburg	9767	Hamburg	9302	Antwerpen	10830	Antwerpen	11676	Antwerpen	11970	**2**
3	Antwerpen	8379	Antwerpen	8256	Hamburg	8741	Hamburg	9282	Hamburg	8578	**3**
4	Bremerhaven	5451	Bremerhaven	5822	Bremerhaven	5442	Peiraias	5646	Valencia	5413	**4**
5	Valencia	3606	Valencia	4328	Valencia	5169	Valencia	5421	Peiraias	5202	**5**
6	Algeciras	3291	Algeciras	3988	Peiraias	4886	Algeciras	5125	Algeciras	5108	**6**
7	Gioia Tauro	3165	Gioia Tauro	3652	Algeciras	4773	Bremerhaven	4850	Bremerhaven	4767	**7**
8	Felixstowe	3131	Felixstowe	3434	Gioia Tauro	4005	Felixstowe	3838	Felixstowe	3435	**8**
9	Barcelona	2567	Peiraias	3199	Felixstowe	3781	Barcelona	3313	Gioia Tauro	3320	**9**
10	Le Havre	2512	Marsaxlokk*	2750	Barcelona	3422	Gioia Tauro	2982	Barcelona	2950	**10**
11	Marsaxlokk*	2330	Le Havre	2186	Marsaxlokk*	3310	Le Havre	2763	Genova	2491	**11**
12	Southampton	1617	Barcelona	1717	Le Havre	2866	Marsaxlokk*	2723	Marsaxlokk*	2442	**12**
13	Genova	1462	Genova	1546	Genova	2554	Genova	2176	Le Havre	2170	**13**
14	Zeebrugge	1401	Southampton	1489	Southampton	1970	Southampton	1880	Marseille	1717	**14**
15	Constanta	1370	La Spezia	1207	Sines	1750	Gdansk	1800	Gdansk	1623	**15**
	Top 15	60680	Top 15	63898	Top 15	77097	Top 15	76968	Top 15	74479	
	Total Europe	69502	Total Europe	75409	Total Europe	90915	Total Europe	92186	Total Europe	83439	
	Share R'dam	15%	Share R'dam	15%	Share R'dam	15%	Share R'dam	15%	Share R'dam	16%	
	Share top 3	41%	Share top 3	38%	Share top 3	41%	Share top 3	37%	Share top 3	41%	
	Share top 10	76%	Share top 10	74%	Share top 10	76%	Share top 10	71%	Share top 10	77%	
	Share top 15	87%	Share top 15	85%	Share top 15	87%	Share top 15	83%	Share top 15	89%	

Notes:

*Based on individual statistics from respective port authorities

Table 2

Container troughput figures multi-port gateway regions in Europe (2008-2020, in 1000 TEU). *Source:* EUROSTAT

R	2008		2013		2018		2019		2020	R
	Main multi-port gateway regions in Europe									
1	Extended RS Delta	21070	Extended RS Delta	20518	Extended RS Delta	25357	Extended RS Delta	26359	Extended RS Delta	26600	**1**
2	Helgoland Bay	15315	Helgoland Bay	15338	Helgoland Bay	14900	Helgoland Bay	9976	Helgoland Bay	9050	**2**
3	UK South East Coast	6762	UK South East Coast	6362	Spanish Med	8649	Spanish Med	8782	Spanish Med	8407	**3**
4	Spanish Med	6221	Spanish Med	6193	UK South East Coast	7875	UK South East Coast	7908	Ligurian range	5052	**4**
5	Ligurian range	3004	Ligurian range	3390	Ligurian range	5477	Ligurian range	4875	UK South East Coast	3329	**5**
6	Seine Estuary	2654	Seine Estuary	2261	Seine Estuary	2934	Seine Estuary	2824	Portuguese range	2550	**6**
7	Kattegat/The Sound	1665	Portuguese range	2102	Portuguese range	2794	Gdansk Bay	2677	Gdansk Bay	2513	**7**
8	Black Sea West	1570	Gdansk Bay	1917	North Adriatic	2738	North Adriatic	2646	North Adriatic	2346	**8**
9	South Finland	1402	Kattegat/The Sound	1620	Gdansk Bay	2567	Portuguese range	2507	Seine Estuary	2238	**9**
10	Portuguese range	1226	North Adriatic	1584	Kattegat/The Sound	1694	Kattegat/The Sound	1764	Kattegat/The Sound	1810	**10**
11	North Adriatic	998	South Finland	1143	South Finland	1315	South Finland	1356	South Finland	1252	**11**
12	Gdansk Bay	794	Black Sea West	840	Black Sea West	910	Black Sea West	927	Black Sea West	898	**12**
	Some important stand-alone gateways									
1	Marseille	901	Piraeus	3199	Piraeus	4886	Piraeus	5646	Piraeus	5202	**1**
2	Liverpool	674	Marseille	1197	Marseille	1398	Marseille	1454	Marseille	1717	**2**
3	Bilbao	557	Liverpool	627	Liverpool	818	Liverpool	1070	Thessaloniki	699	**3**
4	Piraeus	437	Klaipeda	606	Klaipeda	749	Klaipeda	705	Klaipeda	639	**4**
5	Malaga	429	Bilbao	403	Thessaloniki	678	Bilbao	628	Naples	600	**5**
6	Klaipeda	373	Thessaloniki	379	Bilbao	638	Thessaloniki	619	Bilbao	486	**6**
7	Thessaloniki	242	Naples	305	Naples	594	Naples	345	Liverpool	417	**7**
8	Naples	191	Malaga	296	Malaga	154	Malaga	209	Malaga	124	**8**

Notes:

Extended Rhine–Scheldt Delta:	Rotterdam, Antwerp, Zeebrugge, Amsterdam, Ghent, Zeeland Seaports, Dunkirk.
Helgoland Bay:	Hamburg, Bremen/Bremerhaven, Cuxhaven, Emden, Wilhelmshaven.
UK South East Coast:	Felixstowe, Southampton, London, Medway, Hull.
Spanish Med:	Barcelona, Valencia, Tarragona.
Ligurian range:	Genoa, Savona/Vado Ligure, Leghorn, La Spezia.
Seine Estuary:	Le Havre, Rouen.
Black Sea West:	Constanza, Burgas, Varna.
South Finland:	Helsinki, Hamina/Kotka, Rauma, Turku.
Portuguese range:	Lisbon, Leixoes, Sines.
North Adriatic:	Venice, Trieste, Ravenna, Koper.
Gdansk Bay:	Gdynia, Gdansk.
Kattegat/The Sound:	Goteborg, Malmo/Copenhagen, Helsingborg, Aarhus.

Table 3

Absolute and percentual growth figures of multi-port gateway regions and a selection of ports (2008-2019, volume in 1000 TEU). *Source: EUROSTAT*

Period	**2008-2019**		**2013-2019**		**2018-2019**			**2008-2019**		**2013-2019**		**2018-2019**	
Growth	Volume	Percentual	Volume	Percentual	Volume	Percentual		Volume	Percentual	Volume	Percentual	Volume	Percentual
Main multi-port gateway regions in Europe							*North-South selection top 15 EU ports*						
Extended RS Delta	5289	25%	5841	28%	1002	4,0%	Rotterdam	2862	27%	2471	22%	-105	-0,8%
Helgoland Bay	-489	-3%	-513	-3%	-75	-0,5%	Antwerp	3297	39%	3420	41%	846	7,8%
UK South East Coast	1468	22%	1867	29%	354	4,5%	Hamburg	-485	-5%	-20	0%	541	6,2%
Spanish Med	2561	41%	2589	42%	133	1,5%	Bremerhaven	-602	-11%	-973	-17%	-592	-10,9%
Ligurian range	1777	59%	1391	41%	-697	-12,7%	Peiraeus	5209	1192%	2447	76%	760	15,6%
Seine Estuary	170	6%	563	25%	-110	-3,7%	Valencia	1814	50%	1092	25%	252	4,9%
Kattegat/The Sound	99	6%	144	9%	70	4,1%	Algeciras	1834	56%	1137	29%	352	7,4%
Black Sea West	-644	-41%	87	10%	17	1,9%	Barcelona	746	29%	1597	93%	-109	-3,2%
South Finland	-46	-3%	214	19%	41	3,1%							
Portuguese range	1280	104%	405	19%	-287	-10,3%							
North Adriatic	1621	162%	1034	65%	-119	-4,4%							
Gdansk Bay	1883	237%	760	40%	110	4,3%							

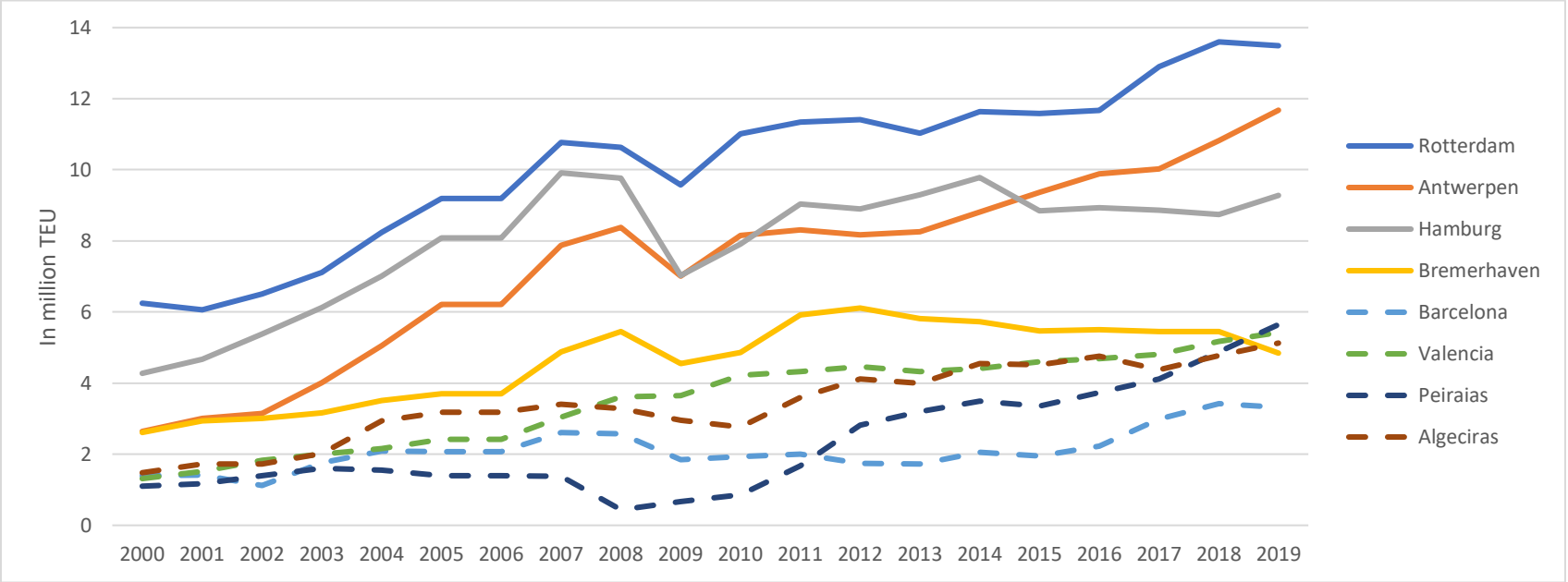


Figure 1 - TEU throughput growth in respective ports, a north-south selection. Source: EUROSTAT

4.2 BRI related investments in European ports

After a period of more than three decades, between WWII and the seventies, the general idea steered away from socialist ideology, which led to a period of nationalisation of companies in the public interest, towards a period characterised by market thinking and the return of laissez-faire philosophy. This led to a privatization spree of formerly nationalized companies under the influx of a stream of private funds. This also held for seaports, these hubs for trade were considered of great strategic and national importance, but due to structural changes in hinterland-connections, inter-port relations, and the increased logistical complexity have led to more market-oriented ports in the 80's. Ports that were formally run as a governmental organisation slowly changed into regular businesses operating in a competitive market, attracting private investors, which led to efficiency gains and cost reductions (Notteboom & Winkelmans, 2001). Increased privatization and public offering of tenders have made seaports into interesting investment opportunities for domestic and foreign private parties. But with increased privatization, governments are also - at least partly - handed over their control to private entities, that might have a different agenda.

Most European ports operate under either a landlord model or a private model. Because of this there are multiple mechanism trough which private purchases of European ports or terminals could occur. Merk (2020) describes the following mechanisms:

- **Unsolicited projects** – a country or private entity offers to construct, and/or finance, and/or operate a port. The public authority is the deciding party.
- **Direct assignment** – A national government of port authority assigns the construction of a new terminal directly to a private party or SOE, in this instance there is no competitive tender. The construction of the Hambantota International Port in Sri Lanka by Chinese contractors is an example of this mechanism.
- **Competitive terminal tenders** – A port authority sets out a competitive tender for the construction or lease of a terminal.
- **Acquisition of terminal** – Buying a terminal, including operating rights, in a port. The terminal operator and port authority are the deciding parties in an acquisition as such.
- **Acquisition of terminal operator** – By directly acquiring a terminal, including all its assets, a private party or SOE can gain control over a terminal. The terminal operator is the deciding party.
- **Acquisition of shipping company** – some shipping companies also own terminal operating assets. By acquiring a shipping company as a whole, including terminal assets, a private company or SOE can obtain shared or full control of a port terminal.

As part of China's go west strategy, which includes the BRI, there have been two large Chinese SOE's that have gained stakes in European port infrastructure. Mostly via concessions, acquisition of individual terminals, or the acquisition of a terminal operator as a whole. Table 4 shows the ports in which COSCO and China Merchant Group, both Chinese SOE's, own a stake.

Chinese SOE's acquired various stakes in ports located in the Hamburg-Le-Havre range. In 2016 COSCO acquired a 35% stake in ECT Euromax terminal from Hutchison Port Holdings, located in the Port of Rotterdam. This joint alliance is beneficial for both parties, ECT can further expand the services it offers to COSCO and 'The Ocean Alliance' partners, while COSCO gained a strong foothold in the Port of Rotterdam (ECT, 2016). In 2014 COSCO bought a 25% share in the Antwerp Gateway container terminal, nowadays it is a joint venture between DP World Antwerp Holding (60%), Cosco (20%), Terminal Link (10%) and Duisport Group (10%). The Antwerp Gateway terminal has a total capacity of 2.8 million TEU, but DP world is investing 200 million to expand the capacity towards 3.7 million TEU by 2026. Next to this, in 2017 COSOC Shipping Ports expanded their footprint in the Hamburg-Le-Havre range by acquiring the remaining 76% share in the APM Terminals Zeebrugge and renamed it CSP Zeebrugge Terminal NV. As a reason for this terminal sell off, Notteboom, Parola, Satta, & Pallis (2017) point out that the 2M alliance was not able to maintain one weekly call to the Port of Zeebrugge on the NW-Europe Far East trade route, arguing that this was likely unsustainable in the long run.

Looking to the Mediterranean basin, it becomes evident that COSCO has also rapidly expanded its involvement in various ports and container terminals. Based on the ownership share in European port terminals and their capacity in TEU, the port of Valencia and Piraeus are the most important ones for COSCO. The Chinese SOE owns majority stakes in terminals in both ports, combined these stakes represent more than half of COSCO's capacity in European container ports (Merk, 2020). In 2017 COSCO bought a 51% stake in Noatum Port Holdings, a group that operates terminals in the Port of Bilbao, the Port of Valencia, and rail terminals in Madrid and Zaragoza (Reuters, 2017). The CSP IBERAL Container Terminal in Valencia is the largest terminal of the group that can handle multiple UCLVs simultaneously, it can serve as an important hub for its majority shareholder COSCO and the OCEAN Alliance. Next to this, the inland rail terminals in Madrid and Zaragoza fit in with COSCO's broader strategy to invest in inland terminals. COSCO also took a stake in the port of Duisburg and a Greek subsidiary, Ocean Rail Logistics, and acquired a 15% stake in the Rail Cargo Terminal-BILK in late 2019 (Notteboom, 2019).

As seen in Table 4, COSCO's largest investment was made in the Port of Piraeus, in 2008 the Piraeus port concession was granted to COSCO. This concession was preceded by a tumultuous period starting in 2004, when the Piraeus Port Authority SA (PPA SA) instigated a tender procedure to change the port management structure from a public service port into a landlord port model (Psaraftis & Pallis, 2012). This initial tender was aborted, but in 2008, after years of negotiations, a concession was

awarded to COSCO Pacific to undertake the operations of pier II under a 35-year lease. Various other parties also expressed their interest in the port of Piraeus. DP World, Hutchison, and APM terminal were all involved in the concession procedure, but COSCO Pacific was the bidder offering the highest price. The bid comprised out of three elements; an upfront payment of €50 million, a monthly rental fee consisting of a rate per meter of berth length and a rate per square meter, and a percentage of the operating revenue set at 21% for the first eight years of the concession and at 24.5% for the remainder of the concession period (Karlis & Polemis, 2018). As part of the concession deal came the obligation to construct an additional berth at pier III within a period of 10 years. Based on the abovementioned payment installments and the 'full rent' scenario the Greek government and Piraeus Port Authority published that the deal amounts to an approximate average payment of €123 million per annum, totaling to €4.3 billion over a the 35-year concession period. Psaraftis & Pallis (2012) point out that this number is factually correct, but it can be deceiving since you also need to factor in a discount rate. The Hong Kong Stock Exchange asked COSCO for an explanation and based on a 9% discount rate the net present value of the concession mounts up to a total of almost €831 million in the 'full rent' scenario. This comes down to €23.7 million per annum over the 35-year period of the concession.

Table 4
Chinese acquisitions of EU port infrastructure. *Source: European Parliamentary Research Service*

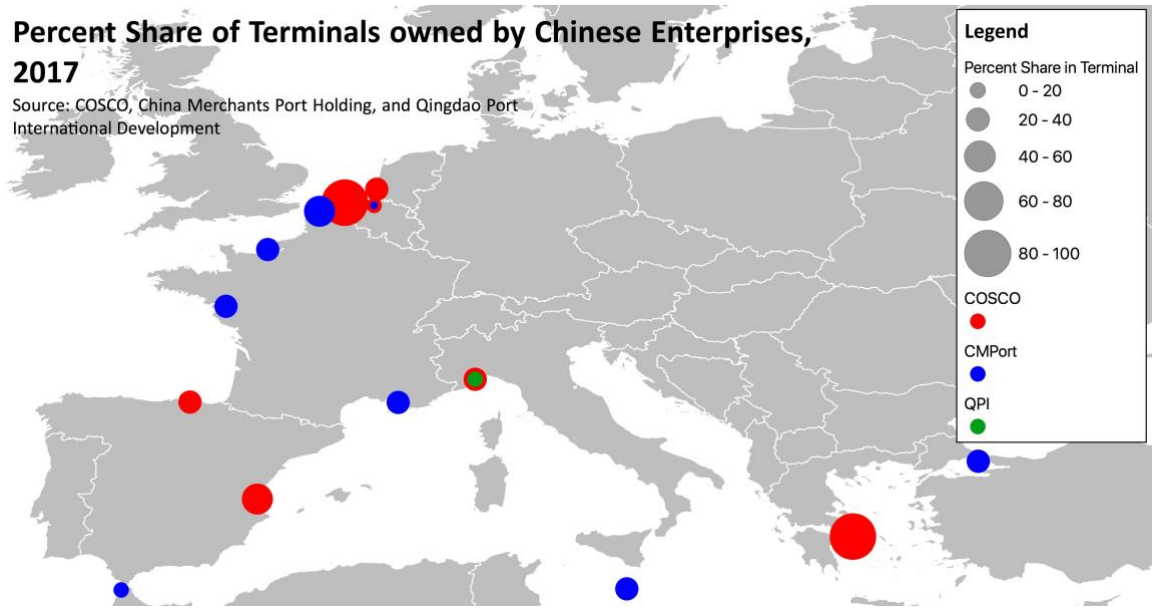
Port	Year	Asset	Acquiring Firm	Share	Value in EUR
Rotterdam	2016	CT	COSCO Shipping	35%	143.3 million
Antwerp	2004	CT	COSCO Pacific	25%	133.9 million
Zeebrugge	2014	CT	China Shipping[a]	24%	n/a
	2017	CT	COSCO Shipping	76%	35 million
Bilbao	2017	CT	COSCO Shipping	51% of Noatum Port Holding	203 million
Valencia	2017	CT			
Madrid	2017	Rail port			
Zaragoza	2017	Rail port			
Marseilles	2013	CT	China Merchants Group International	49% of Terminal Link	400 million
Vado Ligure	2016	CT	COSCO	40%	53 million
			Qingdao Port International	9,9%	15.5 million
Piraeus	2008	CT	COSCO Pacific	35-year lease to operate two piers	4.3 billion-plus upgrading investment
	2016	CT		51%	280.5 million
	2021	CT		16%	88 million

Notes:

[a)] Merged with COSCO in 2016

[b)] CT = Container Terminal

Infographic 5 shows the terminals in which a Chinese SOE is either a joint shareholder, or the sole shareholder. As seen, most of the terminals are either owned by COSCO or China Merchant Port holdings, combined they operate terminals all over the Mediterranean and the Hamburg-Le-Havre (HLH) range. Rotterdam, Valencia, and Piraeus are the most important cities in which COSCO and CMPort own majority shares in either a terminal or the entire port. Based on this map the geographical spread of assets in Europe looks uniformly divided over the HLH range and the Mediterranean basin, but based on capacity and ownership share the distribution is less equally divided. Figure 2 shows the throughput for all European ports where COSCO and CMPort are shareholders, which is calculated by multiplying the total container throughput in 2019 by the share the Chinese SOE owns in this terminal. Combined, the COSCO and CMPort terminals handled over 10 million TEU in 2019, which corresponds to almost 10 percent of Europe's container throughput. Two-third of this throughput is handled at the COSCO terminals in Piraeus and Valencia, which are located in the Mediterranean.



Infographic 5 – map of terminals owned by Chinese SOEs. Source: author's own compilation.

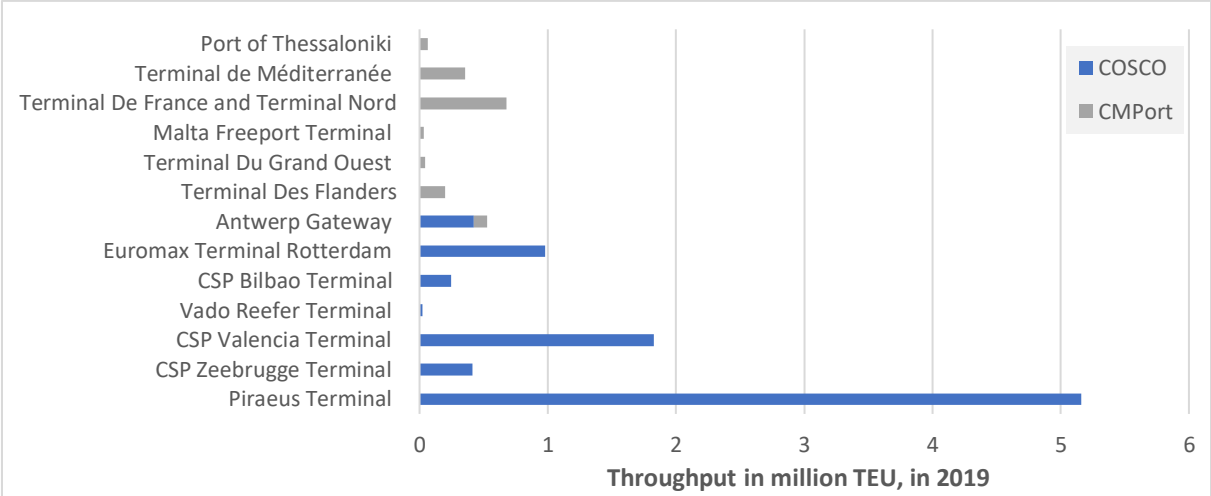


Figure 2 - Container throughput in European ports where COSCO or CMPort are shareholders. Calculated by multiplying total terminal throughput by ownership share. Source: author's own compilation based on COSCO and EUROSTAT data.

4.3 How is container throughput growing at COSCO terminals in Europe?

The previous section focussed on COSCO's presence in European container terminals, this section focusses on the growth of COSCO terminals and compares it with the average growth of European container ports. Back in 2004 COSCO acquired its first share in a European container terminal in Antwerp, in 2008 the company got awarded the concession for the port of Piraeus, and between 2014 and 2021 they rapidly acquired a portfolio of European container terminals. Merk (2020) identifies three reasons why COSCO is building up a presence in European container terminals; (1) privatisation of terminals, (2) vertical integration for shipping liners, (3) consolidation between shipping liners in alliances.

The privatisation of port operations is one of the drivers that enabled corporations or private entities to take an interest in either the management of a port or take an active part in the daily operations of container ports. With this, container terminals have become an interesting investment object for private entities. Merk (2020) points out that commercial orientations nowadays have taken priority over the regulatory functions of a port, this can also explain why port authorities actively seek for partnerships with companies that operate in the container shipping supply chain. Thus, public private partnerships with COSCO, a Chinese backed shipping liner, are interesting commercial opportunities for port authorities in Europe and explain increasing privatisation of terminals.

The same holds for shipping liners, they gain additional control over trade routes by vertically integrating terminals into their supply chain operations. Back in 2001 the market share of carrier-operated container terminals was 18%, by 2016 this has increased to 38% on a worldwide level (Merk, 2020). Vertical integration of terminals offers various benefits for carriers; it enables carriers to control costs in geographic regions or ports where terminal handling charges are high, it increases control during the (un)-loading phase of container carriers, and carriers can exploit hub and spoke opportunities. Port authorities are increasingly developing strategies where carriers own a (partly) devoted container terminal to ensure sufficient ship calls and the associated economic benefits of handling the containers (Notteboom, Parola, Satta, & Pallis, 2017). For COSCO the vertical integration of terminals serves as a tool to protect against discrimination when handling at a terminal that is operated, managed, and owned by a competitor.

Thirdly, the consolidation of shipping liners in alliances is also contributing to COSCO's investment spree in European container terminals. Ownership and control over terminals enable the participant of an alliance to favor the handling of ships that belong to the alliance owning the terminal. This explains why COSCO, a dominant member in the Ocean Alliance, is increasingly integrating terminal operation and management into their supply chains.

As discussed, there are multiple explanations for the vertical terminal integration investment strategies used by carriers, including COSCO. Figure 3 offers an overview of the container throughput growth at terminals that are partly- or completely owned by COSCO. Since 2005 COSCO has managed to grow at a significant rate, in 2020 the European container terminals handled a total throughput of 13.7 million TEU. Between 2019 and 2020 the growth stagnated, this can be attributed to the impact of COVID-19 on the global port system, especially in the first months of 2020 the impact was grave. Container handling at ports and regular ship calls were hindered by additional regulation and tightening heath requirements. Still COSCO managed to maintain their 2019 throughput volumes in 2020, while the total container throughput declined in European ports, as seen in table 1. Overall, COSCO Shipping Ports is rapidly expanding its terminal operations in Europe. Figure 3 shows the anecdotal evidence that COSCO can quickly increase container throughput at the terminals in which they acquire a stake, in most instances the result is visible within a period of two years.

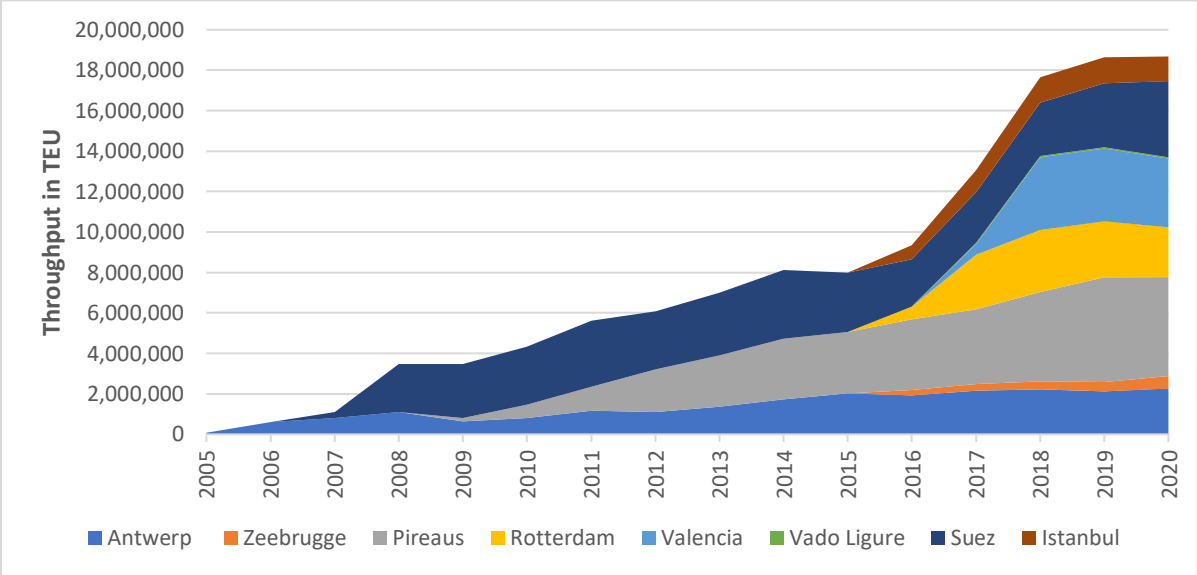


Figure 3 – Total container throughput volumes at COSCO-owned terminals in Europe in TEU. Source: COSCO Shipping.

In the mere span of 15 years COSCO has grown from an incumbent player in the container terminal business into a well-established player with a market share of 10% of the European container terminal market. Given the increased consolidation amongst ocean carriers it is likely to see additional terminal integration amongst carriers in future scenarios. Merk (2020) points out that it is an interesting opportunity for independent terminal operators to sell equity to COSCO, to ensure cargo flows. Besides, additional cooperation between COSCO and Hutchison Ports seems to be a likely scenario too. In 2016 both companies entered into a strategic agreement to enter into a formal collaboration with Asia Container Terminal Limited (ACT) to increase efficiency in the management of their combined terminals at Kwai Tsing in Hong Kong (Hutchison Ports, 2016). Another example of a strategic partnership between COSOC and Hutchison is the Euromax Terminal in the Port of Rotterdam,

in which both companies own a stake. Hutchison's European terminal portfolio, especially their presence in the HLH range, offers interesting opportunities for COSCO to increase their influence in North-Western European ports. This strategic influence over Euopean ports can be leveraged by Chinese SOE's to secure additional governmental funding and transport grants from EU funds. COSCO's strategic terminal stakes can serve as a springboard for other Chinese maritime companies to gain a foothold in the European maritime cluster (Merk 2020). All the more reason to believe that Chinese SOE's will increase their influence over European ports by acquiring stakes in container terminals.

5. Conclusion

Ever since China announced the Belt and Road Initiative in 2013 there has been a spree of investments in various types of infrastructure projects on its route, including investments in the European container port system by COSCO and CMPorts, two Chinese SOEs. The central question put forth in this thesis discusses whether Chinese involvement in European container terminals is rebalancing the container throughput volumes between North-Western European ports and ports located at the Mediterranean Sea.

In the literature research it is discussed whether container transport via rail on the 'belt' component of the BRI is a viable alternative for the shipping route between China and Europe. Overall, the capacity transported via BRI rail corridors is only a small fraction of the cargo transported via ocean liners, yet the new rail transport mode opens up interesting opportunities for time sensitive cargo and high density-value cargo, such as laptops and semi-manufactured parts. Thus, the modality shift from sea transport to road transport will likely not have a great impact on the European container port system. The second component highlighted in the literature research is whether there are indications for a dept trap strategy within the loan structure of Chinese BRI-related infrastructure investments. Overall, there is little reason to think that there is a widespread dept trap problem in BRI-related infrastructure projects that are financed by Chinese SOEs or Chinese government bonds. The risk of default is higher for countries with an already unsustainable public debt, whereas the risk for European countries is lower. Thirdly, the ongoing war in Ukraine has serious implications for the 'belt' part of the BRI, rail transport via Russia has decreased by 80 percent and rail freight operators are opting for alternative routes, like the middle corridor', passing through Azerbaijan, Georgia, and Istanbul. From a maritime perspective the consequences of the war are less grave, especially for the Suez Route. The impact is felt by ships operating in the Black Sea area and on trading routes to/from Russia.

The main results show that the European container port system is growing as a whole, the multi-port gateway analyses shows that the top 3 European multi-port gateways have remained

unchanged over the pas 15 years. Furthermore, it becomes evident that the Gdansk multi-port gateway system grows fastest and that multi-port gateways in the Mediterranean have been outpacing some of the gateway regions in North-West Europe. When comparing the container throughput growth of a selection of the largest individual ports in the HLH range with a selection of the largest ports in the Mediterranean it becomes clear that the ports in the Mediterranean are growing at a faster pace. When looking at the involvement of Chinese SOEs in the European container terminal system it shows that COSCO and CMPort are rapidly building a portfolio of terminals, equally spread throughout the HLH range and the Mediterranean. However, based on capacity and ownership share, the distribution is less equally divided. Combined, COSCO and CMPort terminals in Europe handled over 10 million TEU in 2019, which corresponds to almost 10 percent of Europe's container throughput. Two-third of this throughput is handled at the COSCO terminals in Piraeus and Valencia, which are located in the Mediterranean. The privatisation of port terminals, vertical integration of supply chains by carriers, and carrier consolidation are explanations for the increased investments in European container terminals by COSCO and other Chinese SOEs. Overall, Chinese SOEs are building a strategic interest in European ports, combined with Chinese carrier ownership the SOEs can leverage their position to favour port calls of their fleet to dedicated privately owned terminals.

This research uses a qualitative approach to investigate the impact of Chinese FDI on the European container port system. The main finding shows that Chinese SOEs are present in ports throughout Europe, but that the combined throughput of their terminals in the Mediterranean substantially outweighs the combined throughput of their terminals in the HLH range. The influence of Chinese FDI is most noticeable in the port of Piraeus and the port of Valencia.

Limitations of the research are the qualitative approach that uses case examples, such as the port of Piraeus and Valencia, their non-generalisability makes it hard to draw a comparison with other European ports. The focus of this thesis was mainly container volume growth, in future research it is interesting to look at the drivers of container throughput growth after Chinese FDI in a terminal. It would be interesting to map the different drivers for container throughput growth on individual terminal level. This can be used to draw a comparison between terminals that are owned by a Chinese SOE, owned by another terminal operator, or individually owned terminals. Conversely, due to the relatively large scope of this research, the entire European container port system, it makes sense to compare and measure the growth of these port in container volume measured in TEU.

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7. Appendices

Appendix 1 - Fourteen Chinese sub-regions and key production cities, source: (Wen et al., 2019)