Regional integration and Maritime Range

Arnaud Lemarchand, Olivier Joly

Chapter 7
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Introduction

For over fifteen years, several studies have focused on the similarities between 'Marshallian districts' and the economics of port cities (Le Marchand 2000; 2006). These approaches take into account several aspects such as the specificity of institutions, the mobilization of key actors, and the governance of cities, in order to understand their local dynamics. Beyond the Marshallian approach, another important dimension of such research is the analysis of regional integration using the concept of maritime range. This chapter proposes to widen the definition of the maritime range based on a comparison of selected European, American and Asian port systems.

The concept of range describes the networking of port cities. Common markets resulting in mixed hinterlands constitute a frame for action and organization. Therefore, ranges are key elements in a new understanding of emerging interdependences through globalization processes and the new modalities of cooperation and competition. This calls for a new analysis on the insertion of port city economies within maritime ranges, based on existing port studies.

During the 1970s, the French maritime transport geographer, André Vigarié, developed the notion of range, or maritime front. An explicit relationship was made with the American term 'region' that supposes a process of integration on various geographical levels. The concept of maritime range is used in this chapter as a fully integrated maritime front, as proposed by Vigarié (1979) by contrast with a maritime front that is simply a collection of scarcely linked port cities with weak interdependencies. In this way, spatial proximity is not sufficient to establish a range.

Vigarié (1979) proposes that a front becomes a range when 'a bundle of common causalities give the direction of their local development'. The first causality is the overlapping of ports' hinterlands, i.e. the mix of their markets. This results from economic regional integration and is simultaneously spontaneous and political. One canonical example is the Northern Range between Hamburg and Le Havre. The removal of trade barriers, intra-European trade growth, the harmonization of European norms and the liberalization of services all created new patterns of port competition. Seaborne exchanges benefited from a favourable conjuncture, and have, in turn, made European trade growth easier. The monetary union induced greater integration among European ports, due to lower discrepancies in terms

of growth regimes. Variations remain due to local traffic variations of specific commodities.

The finalization of such a process also needed an integration of commercial activities. From an economic point of view, growth in intra-sector trade among European countries would be sufficient creating shared hinterlands and making ports interdependent within the same region. From a geographers' point of view, regional integration is the key condition, notwithstanding a complementary bundle of causalities such as history and port governance. Long-term historical impacts or 'memory effects' giving birth to a maritime range were identified by Braudel (1982) as a combination of non-trade factors such as politics, cultural affinities and a matter of shared memory. Such principles make it doubtful whether this phenomenon can apply to other seaport ranges. Political, religious and cultural divisions make this integration unlikely on the Mediterranean shores. Only the ports of the US and Japanese megalopolises were included in the work of Vigarié (1979) on port ranges. However, it seems crucial to rethink these issues in an era of globalization and regionalization.

The following questions in relation to economic geography help us to establish the theory for this study:

- How do we analyze the process and the patterns studied thirty years ago by Vigarié?
- Which mechanisms explain these stylized facts?
- How did containerization and globalization influence the emergence of maritime ranges?

Range and Archipelago Economy

The issues explored in this chapter seem to have been ignored by many shipping economists. Bauchet (1977) for instance proposed in a very symptomatic way to focus on varying trade patterns between national and transnational spaces created by multinational shipping firms. Among other transnational realities, the maritime range did not constitute an object of interest in Bauchet's work because such object was not constructed by such economic players across continued and seamless spaces. It is only since the theory of networks of firms and territories has emerged that a re-conceptualization and empirical verification of the maritime range became possible.

Based on container traffic statistics, this chapter proposes using the more recent work of the economist Veltz (1996) who defined the so-called 'archipelago economy'. Although this work does not explicitly mention containerization and ports, it suggests that 'horizontal, frequently transnational relations increasingly outmatch traditional vertical relations with the [port] hinterland'. Such an impression can obviously apply to ports involved in a maritime range. This chapter also wishes to bypass the actual paradox that port cities play a central

role in globalization, but they tend to be ignored by the economical theory of globalization.

More formally, four important dimensions are underlined by Veltz (1996) constitutive of a new economic paradigm linking globalization, cities and territories:

- Scale economies: scale economies played a fundamental role both in the theory and empirical evolution of economic geography. They can be conceptualized as unbundled from one single place, like a site or a factory, and developed through network externalities, hence bypassing their local dimension. On the other hand, they must be combined with scope economies, in order to qualitatively adapt to a more differentiated and heterogeneous demand. However, a strong limit to the study of scale economies is the increased difficulty measuring local dynamics;
- A relative de-hierarchy: the classical hierarchy among cities, theorized by Christaller (1966), should be reconsidered through the paradigm of networks. The polarization of various products or services seems more mixed and nested than in classical models. This means that a location though dominated by a bigger one, can become in some sectors the dominant node for specific goods or services. Polarization has limits and the so-called locked-in positions can also be, at least partially, reconsidered;
- Coordination patterns: coordination does not any more follow linear and hierarchical ways. A direct result of this evolution is the increased importance of social and political modes of coordination or governance. Such view aims at tackling a growing unpredictability of interactions, due to retroactions, which include the network effects and the decline of the classical scale economies. In a context of uncertainty and considering the complexity of networks, flexibility becomes a matter of variety of choices in the modes of coordination. This flexibility assumes the active role of relational resources to manage sites, equipment, and labour that are geographically more distant;
- The search for new insurance devices: the strategy of flexibility has developed in a multi-polar environment, combining with intricate hierarchies and the search for new insurance devices. Such terms refer to the demand for guarantees against risks, not necessarily implying formal contracts. This need of insurance explains locations at certain nodes, especially at the ones offering multiple options. The increased importance of insurance favours bigger size, and gives to that factor a positive effect on growth. However, this growth is not due to a direct effect on costs, but by the advantages of an options portfolio (Catin and Ghio 2000) of opportunities associated with the number of links and the variety induced by the central locations in an archipelago economy.

Based on such insights, the hypothesis of this chapter is that in a globalized economy, the maritime range is a network of ports benefiting from scale economies from different locations, and resulting in an intertwined port hierarchy. To emerge and stay, co-operation relying upon cultures and common rules are necessary. Such a construction rests upon the stabilization of the advantages enjoyed by concerned facilities, which develop in return a multiplicity of links and a variety of alternative options. However, a bundle of causalities produces great unpredictability in the system's possible evolutions. In addition, such observations are coherent with the property of maritime networks that are often scale-free, i.e. non-linear networks.

Throughout such networks, there are always bypasses, shortcuts and new links created, while the activity of each node admits fluctuations sometimes very important. In such a situation, the range is a 'small world' (Watts 1999; Stocker et al. 2002). Simultaneously, one can observe permanent change in the hierarchy of ports, especially at medium-sized ports (Terrassier 1997; Lemarchand 2000). Yet, very few ports lie at the top of the distribution, and traffic concentration has remained very stable at Northern European Range ports between 1994 and 2002, confirming previous observations (Frémont and Soppé 2005).

This uncertainty, explained by complexity, leads us to use the theory of the self-organizing economy (Krugman 1996). The maritime range can be understood as an emerging regulation from the noises of international trade, international shipping, singular contexts of each port city and wider political contexts. The traditional conception of port cities enjoying comparative advantages was based on inter-sector trade, respective national economies, with very few links to their neighbours, compared to the transcontinental and colonial lines as suggested by Fujita and Mori (1996). The authors developed a model of self-agglomeration at port cities that stands far from the neo-classical view. The current period witnesses another kind of trade in an age of intra-sector trade within an economically, if not politically, integrated region. If many seaports are now seen as de-linked from their surrounding hinterland, it does not mean that they are totally footloose. The small world of the regional network is a good level to analyze their activity and interdependency.

The Range: From Random Walk and Self-organization to the Memory Effect in a Political Frame

From Gibrat Law to Deterministic Deviation: Evidence from the North European Range

There are very few economical models on port activity. Most postulate a linear relationship between investments in infrastructure and traffic growth, which implies that the dynamics of a port are determined by the accumulation of capital dedicated to transportation. Competitive advantage goes to firms choosing the ports through extending their market areas, what supposes the possibility of endogenous

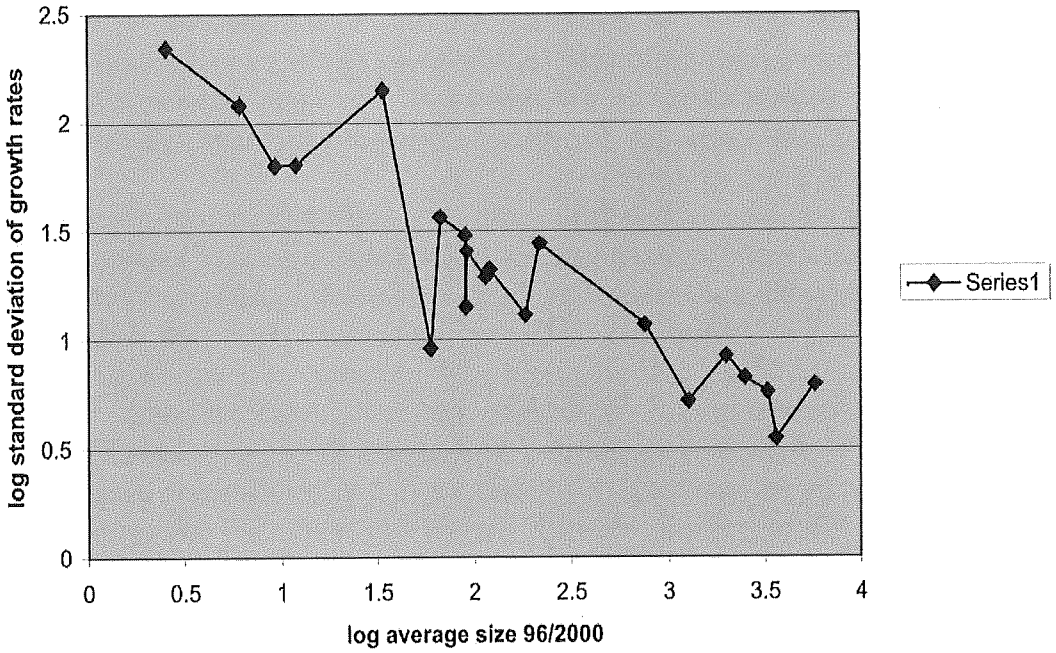


Figure 7.1 The North European maritime range, 1997–2001

growth. By using these results, it was possible to create plans at both regional and macroeconomic levels.

Two main reasons put in question the predictability of the effect of infrastructure investment: negative externalities, which restrain the interests of investments, and complex retro-effects on industrial location. Transport infrastructure does lead to agglomeration, but it also leads to splintered space and territories. Therefore, transport reduces some market imperfections and creates others (Quinet 1992). In addition, endogenous growth does not perfectly fit traffic evolution despite concentration trends, as seen in the aforementioned study of Frémont and Soppé (2005).

Among the world's ports, the distribution and evolution of container traffic seems to follow a random walk instead of logic of scale: this is an application of the Gibrat law (Richiardi 2004). Traffic growth rate is not explained by traffic size or by previous traffic growth rates, but by other factors such as the influence of local and global contexts, the evolution of production localization, social relations, and the efficiency of port and urban governance. Main results of the empirical analysis are shown in Figure 7.1.

Northern range ports show a deviation from the Gibrat law: growth variability decreases with the size of ports, measured in TEU traffic. More precisely, the standard deviation of the growth rate of port traffic decreases when the average size of the traffic on five or ten years increases. The range seems to be the best sub-system to appreciate this phenomenon. A bigger sized port does not always have extensive growth, but its activity is not dependent on few markets

or few customers. With more links, the activity is less unstable, as there is compensation from gains and losses. The scale of activity plays an indirect role by securing the market share via diversification. The agglomeration effect is a portfolio effect. In this range, the decreasing of growth variability with the size of traffic may follow a common trend.

Such results can be interpreted in terms of a self-organization effect of the maritime network. It shows interdependences between the ports of the region. But these interdependences must be understood in the context of European integration and as a result of the development of intra-sector trade in the region. This traffic distribution and variability is compatible with hierarchy change, because, in a certain way, the variability is an incomplete lock-in of the market share.

The range, as a level of regulation, depends on the anticipations of ocean carriers in the regional context, which leads us to another factor to ponder: the memory effect. We suggest that memory plays a key role in the process of ports' regional integration. Liner shipping companies often express that bad experiments at port terminals, such as the blockage of a vessel due to labour strikes, have lasting effects. Each negative historical port accident results in a decrease of traffic. As a consequence, the place where problems have occurred will have fewer links and see their portfolio getting thinner. Therefore, fewer options will be available at this point in the network. This was one example of a memory effect, but there are others, such as safer investments to finance with a quiet growth regime.

If memory plays a role, we turn away from the pure stochastic model. In that perspective, the growth regime is not comparable to a perfect hazardous drawing, where each draft will be independent from the previous. This is explained by the finite numbers of actors at certain parts (segments) of the logistical chains. Within these networks, there are global actors who cannot be taken as negligible. That is why past interactions matter. In parallel, local innovation capacities and governance must not be neglected. In fact, shipping and port activities are very far from emanating perfect competition and efficient markets; so the part for hazard is reduced. Even if the strategies do not abolish the unpredictability of some traffic fluctuations, path-dependent history matters.

Table 7.1 Factors of port range emergence

Stochastic	Deterministic
Hinterlands evolve	Shipping and handling actors are global and not in an infinite number
Numerous factors influence traffic in a random walk	Actors have memory
Port network is a 'scale-free' network	There is a need for insurance via the portfolio of links
Ports may be unlinked to their neighbourhoods	Path-dependency

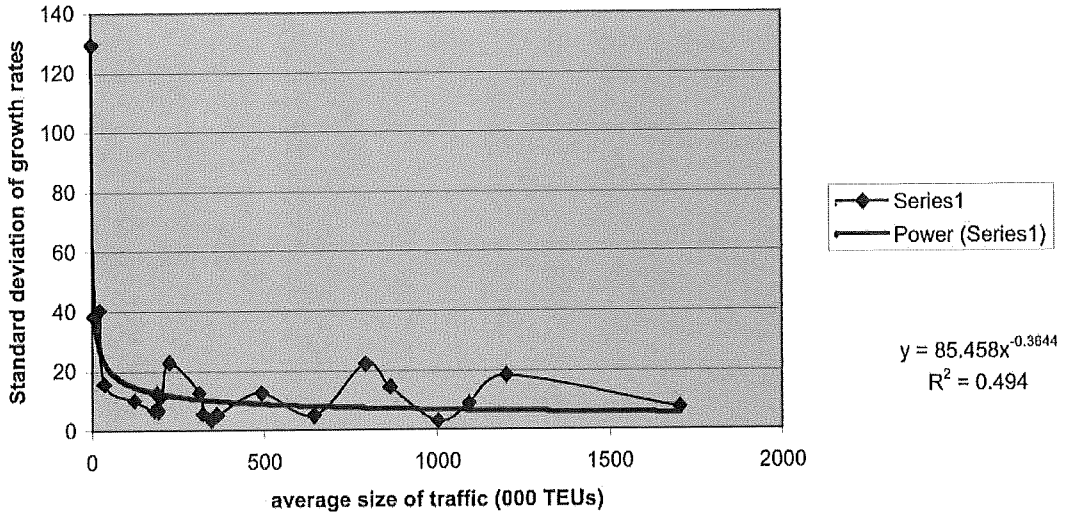


Figure 7.2 The South European maritime front, 1997–2002

The memory effect leads to a 'reputation effect' which can be highly self-fulfilling. From observed accidents, actors go to self-fulfilling anticipations, translated into decisions and the further institutionalization of a central or marginal position. An informal map of anticipated performances leads the choices of previously uncertain investors and other stakeholders. Along a longer time frame, interactions occur among memories, what confirms the role of history as suggested by Vigarié (1979). This is compatible with the 'archipelago economic' assumptions described by Veltz (1996). Such remarks are synthesized in Table 7.1, putting together elements of stochastic approaches and elements of a deterministic approach.

In such perspective, the range emerges more from shipping companies than from ports themselves. The interdependence between port cities is organized by these actors. The latter face an unpredicted fluctuation on a service within which they may cut one ply without bargaining with the concerned port. In this game, the situation of each seaport is globally linked to the others, so it is important to understand how shipping firms favour or do not favour regional port integration. At the same time, each harbour community plays its own cards to keep or conquest new traffic, as seen in other regions of the world.

Traffic Patterns at Other Maritime Fronts

Since this deviation does not occur at every group of ports around the world, it can be considered to be a good indicator of the regional integration level of maritime activity, and of economic integration in general.

Nevertheless, this deviation does not fit the South Europe case (Figure 7.2). In this case, this group of ports remains a front: it is not a real integrated range. More specifically, the following issues relate directly to the Southern European Front:

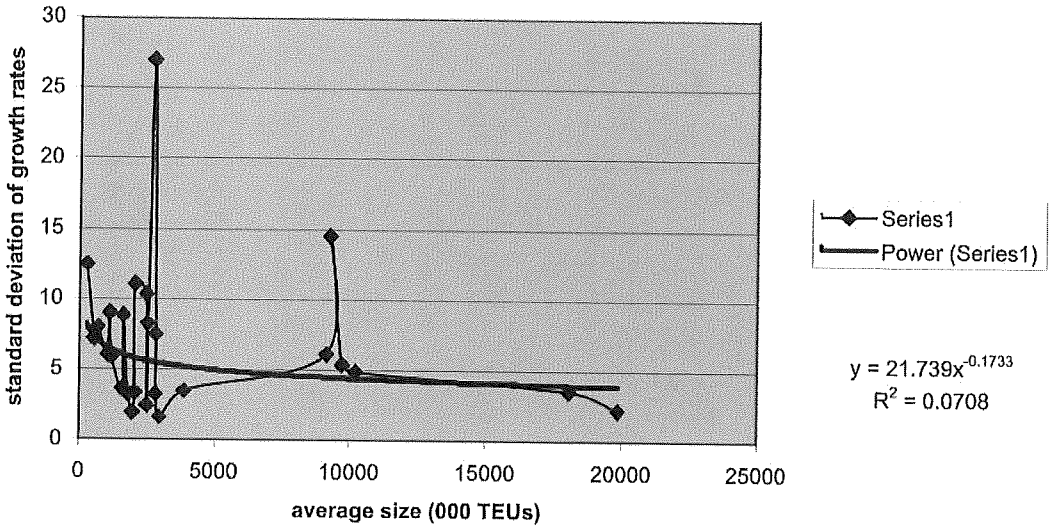


Figure 7.3 The Asian maritime front, 1999–2002

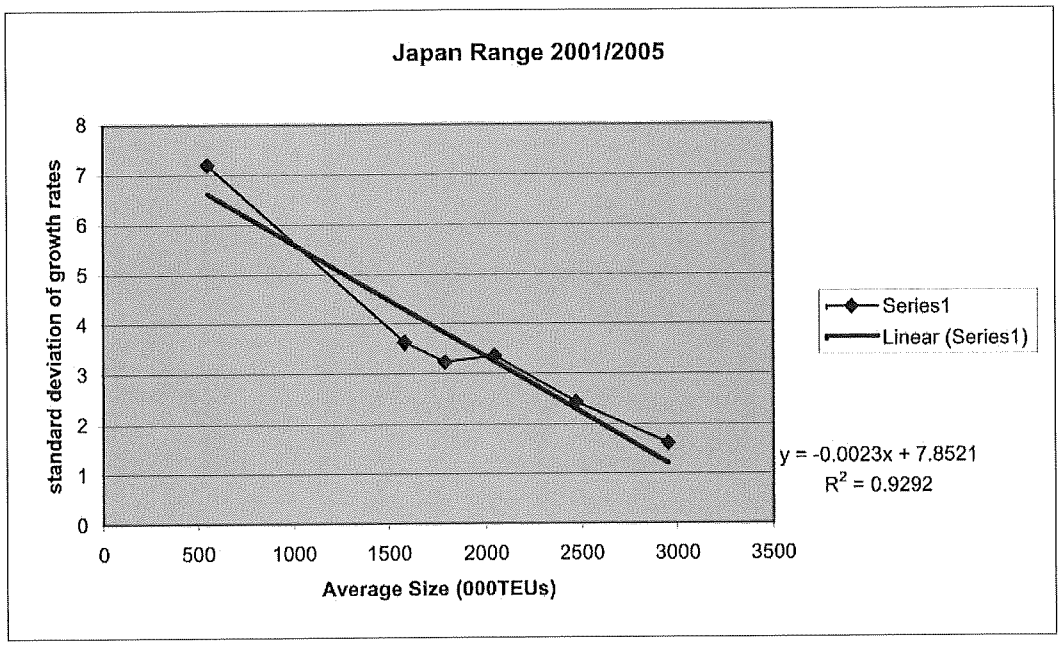
- There is no observable range effect within this part of Europe;
- Port traffic follows a random walk;
- Mediterranean integration is not a reality;
- There are great disparities of wealth among the territories.

In this analysis, the port of Gioia Tauro has been intentionally removed because the explosive growth of this hub exceeds all comparisons. The standard deviation of its growth rate is over 64 and is the biggest average traffic of the line. Such a huge fluctuation hints that we may need fractal tools to understand port statistics. Therefore, it is not surprising if fractal fluctuations (Mandelbrot 2005) occur within a network of complex interactions as in the case of port business.

Based on the idea that the range is an economic and political construction, a comparison with American and Asian situations shows that spatial proximity is not sufficient for the emergence of a range as an integrated maritime front. To produce a range, arbitrage and substitutability among concerned ports is necessary, resulting in various links between places and between hinterlands. On the other hand, when a region is economically 'hot', like in Asia, each port may find some opportunities for growth, making each port independent from the other. The following trends summarize the Asian situation based on Figure 7.3:

- There is no deviation of the Gibrat law: standard deviations of growth rates are independent from size on the 1998–2002 period;
- Integration is not yet achieved;
- Or there is a need for another indicator better fit with this case.

Based on the same data, a deviation becomes observable on a national level for Japanese and Korean ports (Figure 7.4). Intra-sector trade has grown faster in



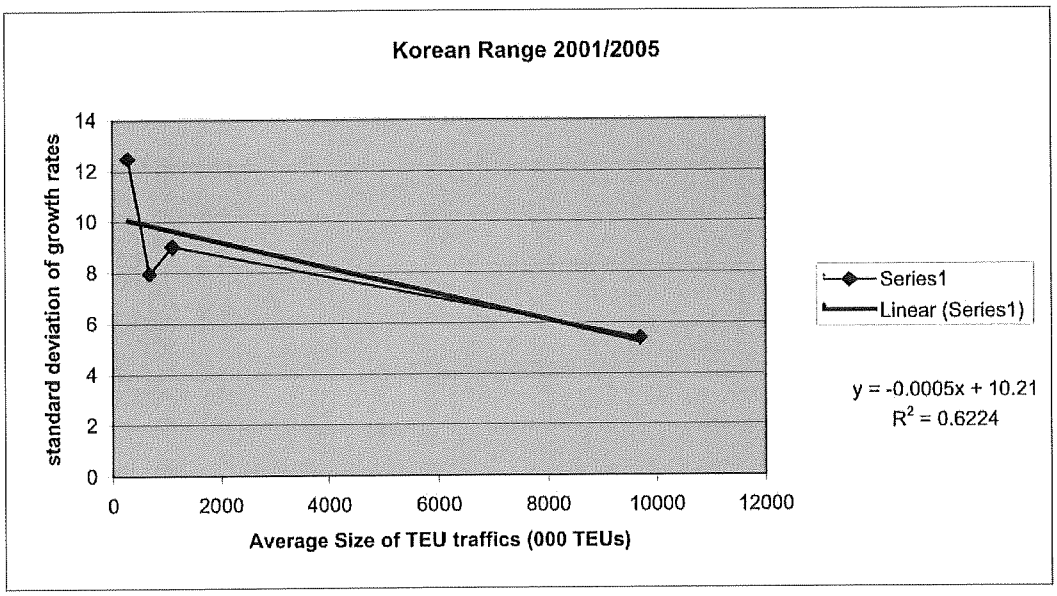


Figure 7.4 Korean and Japanese maritime ranges, 2001–2005

Asia as a whole, but there are still no free-trade agreements among most of these countries and especially between Japan and Korea. This may explain, according to the approach of Vigarié (1979), the absence of common trends among Asian ports. However, since Korea's main free-trade agreement exists with Chile, spatial proximity is not synonym of integration. Yet, one can observe a regular deviation of the Gibrat law within Korea and within Japan, as suggested by Vigarié (1979).

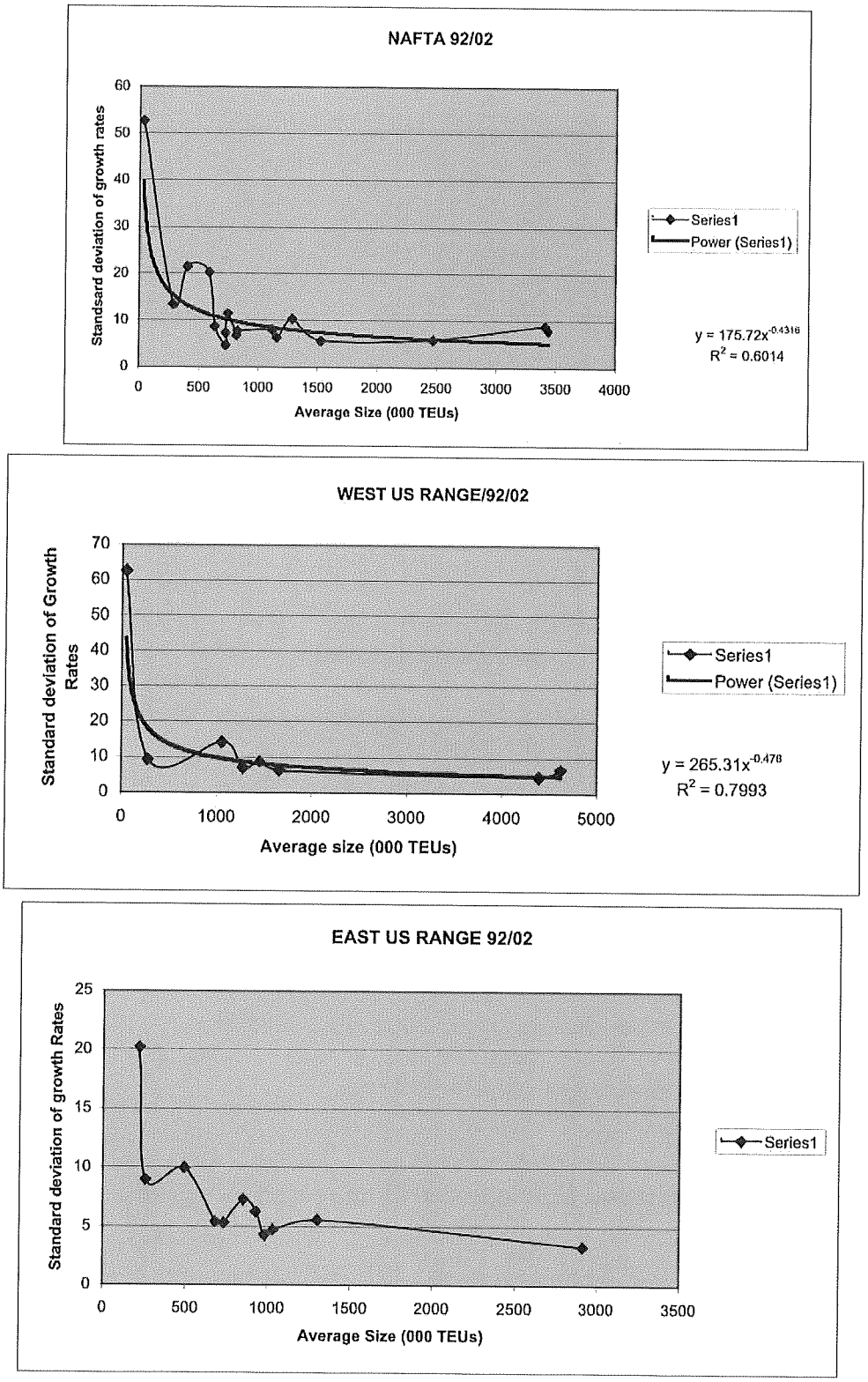


Figure 7.5 North American maritime ranges, 1992–2002

Such facts highlight that fast industrial growth in Asia gives opportunities to each port independently from the others on a regional scale. In fact, many Chinese ports are both logistical and production places. These ports are linked to a very nearby hinterland, or industrial enclosure, which can explain why the range effect is not visible in the figure.

Turning to North American ports, a deviation is observable, but it is less strong than in Northern Europe (Figure 7.5). However, the number of ports within North American ranges seems to have increased during the last three decades, which is believed to be an effect of the North American Free-Trade Agreement (NAFTA). Integration is more perceptible by looking separately at the two main US ranges. One possible factor explaining lower deviation than in Europe is that the American economic geography is less intricate and mixed than in Europe. Therefore, US hinterlands are less co-dependent, albeit they belong to the same nation.

The Range as a Managerial Construction

Many models have suggested a self-organization of cities, such as urban population under the Zipf law, among others (Portugali 1997). These models can be associated with the type of deviation seen above, via stochastic evolution or memory effects. Is such association sufficient explaining the emergence of a maritime range?

By considering the concept of range and describing the economic geography of port activities, one must acknowledge that the range is the first quotation system of shipping companies. Is it a nomenclature, a socio-economic and managerial construction? The networks of seaports depend upon this classification before being a result of regional integration. Just like every nomenclature, it can be contested and modified. Such statements allows creating bridges with other theoretical fields, including the role of rules and conventions in economic coordination, not only prices. What becomes clear from the results is that nomenclature effects are not sufficient creating a maritime front, i.e. turning a system of quotations into a real maritime range. The latter needs to be self-fulfilling but also to support free-trade agreements and the political rules of regional integration, as seen in Northern Europe or in the US.

Regional integration may not be the only sufficient condition required for observing self-organization, specifically if it contradicts the globalization of the maritime network. Transcontinental competition and linkages may oppose the emergence of a regional range to a certain extent. Furthermore, according to the importance of rules, security acts may contribute to the organization at this level. The set of performance criteria on supply chain management has recently been enlarged to security issues, following the development of trade globalization, activity outsourcing, and lean manufacturing strategies. Security risk management appears to be a well surmised and sought-after global performance factor of logistics chains (Carluer et al. 2008).

In the same vein, a maritime range may emerge for specific sectors such as the cruise market, as seen in Southern Europe where a tourism range is about to

emerge. The cruise market considers a network of ports connected through regular services, resulting in common links and interests among concerned ports.

Another factor for range construction as a self-organization process is related with data procedures. Again, one good example is the North European range where

> two ICT distinct approaches have been observed within the four ports over the last ten to fifteen years. Initially in Hamburg and Le Havre, a port community approach integrates all local players together, i.e. port handling companies, maritime agencies, customs and forwarders. Secondly in Antwerp and Rotterdam, an in-between approach mixing, on the one hand, shipping lines' private/integrated approach and, on the other hand, local players' networking (Joly and Thorez 2006).

Thus

> the unstoppable expansion of ICT tools at majors Northern range ports seems to move gradually from port community network (linking all local players) to single integrated and private players' e-management solutions. Following this trend, one can observe the early steps of the break-up of some ports (as single communities) into the juxtaposition of numerous interconnected terminals, small private ports, and overseas operators, less and less interdependent with each other within every seaport, in their decision making strategies and due to the influence of external economic newcomers (Joly and Thorez 2006).

The standard rules are organized at this transnational level, where resources and trade practices are shared. The data flow, which accompanies the goods flow, becomes a vector of this organization. Port security follows the same logics and, as a result of the US policy for customs and security, might lead to an increasing integration of some foreign maritime fronts (Carluer et al. 2008).

Conclusion: Implications for Public Policy

The emergence of a range creates public policy issues. It also creates new interdependencies into the sphere of ports and cities, which tend to escape from national regulations in a regional market environment. This is reinforced by the action of various and new global players that are now managing container terminal networks and the global supply chain. Few intermodal players achieve this integration. Perhaps port policy is about to become an international goal and an international public good?