Chapter 1

Introduction

> Wherever the river of traffic slows down, it tends to deposit its load: so it would be usually near the gates that the storehouses would be built, and the inns and taverns congregate, and in the adjoining streets the craftsmen and merchants would set up their shops. ... Thus the gate produced... the economic quarters of the city.... The original meaning of 'port' derives from this portal.
>
> (Lewis Mumford 1961, 305)

1.1 Introduction

Turgidly billowing clouds of mud marked the Regina Maersk's July 1998 passage under the Bayonne Bridge toward the Universal Marine terminal in Newark, where its stacks of metal boxes would be lifted by cranes directly onto truck chassis and railcars. Stretching four New York City blocks, the world's largest container ship at the time had already dropped off cargo in Halifax, Nova Scotia and had now lowered its antenna and mast in order to squeeze under the bridge. The visit was Maersk's

visceral declaration to the East Coast ports that they had better be able to handle the largest, most advanced ships if they expected to host Maersk and Sea-Land's new consolidated hub terminal. The trail of mud reflected the turbulence in the shipping and logistics industry in the late 1990s as the adoption of containerization and deregulation was transforming the relationship among shipping companies and between the companies and workers and governments of port regions. This dissertation will examine the nature of this transformation as it relates to regional economic development, particularly job creation, and port governance, and it will make recommendations for U.S. port policy.

Three interrelated trends converged in the late 1990s to create an organizational crisis in the industry. The first trend is evident in the preceding paragraph: technological change. Containerization, the shipment of goods in standardized metal boxes (for legal definitions, see Rath [1975]), had facilitated intermodalism, the seamless transfer of goods from one mode of transport to another. Inherent economies of scale had encouraged the construction of ships too large for the Panama Canal and many ports (earning them the moniker "Post-Panamax ships"), impelling ports toward major infrastructural investments. Second, the deregulation of transportation was easing logistics providers' ability to concentrate ownership and control. Shipping companies and terminal operators were taking advantage of these new freedoms to integrate horizontally and vertically through mergers, acquisitions, and alliances with other shipping companies, terminal operators, railroads, trucking companies, and other logistics providers. Third, ports, which have for most of the twentieth century been operated by government entities, were moving increasingly towards landlord status or complete privatization to accommodate technological and organizational change.

Taken together, these trends have dramatically transformed the playing field in which port authorities and workers operate. The primary impact has been to elimi-

nate ports' territorial monopolies over their hinterlands and to place them in direct competition for the same markets. The second, related, impact has been to significantly weaken their bargaining power vis-à-vis the shipping companies. And third, the historical link between port infrastructure and economic activity, particularly manufacturing activity, has attenuated, decoupling economic activity from freight transportation infrastructure nodes in the U.S.

1.2 Technological change

Fifty years ago, prior to containerization, ports teemed with men struggling up and down gangplanks weighted down by bags of coffee, bunches of bananas, and crates of goods. Small gantry cranes hoisted painstakingly balanced palettes from ships' holds down to the docks, where they were transferred to handtrucks and ferried off into a labyrinthine set of aisles or warehouses stacked high with goods. Nearby factories would take immediate delivery of arriving goods, announcing their arrival with black, transforming plumes of production. Other merchants would cut costs by delaying pickup, letting their shipments clog the free flow of other loads. This activity could go on eighteen hours a day for days at a time before a ship was emptied and free to take on goods. When the unloading and loading were finally done, the longshoremen would gather in their nearby bars and homes with the members of their community to await the next ship.

According to Levinson (2006, ch. 3), the idea for containerization came in 1953 as Malcom McLean, owner of McLean Trucking, sought to counter a business threat from domestic sea shipping. As increasing congestion in the nation's road network reduced his trucks' delivery times and his company's profits, McLean began to perceive domestic sea shipping companies, who had lower costs since domestic sea shipping's

post-1930 decline and who were eligible for postwar discounts on military ships, as direct competitors with ready access to his core markets. His bold strategy was to combine shipping and trucking. While goods had been put in boxes to ease transfer and minimize theft, and while some liner companies would haul the truck of any driver who wanted to pay, McLean's inspiration was to form one company that owned both trucks and ships dedicated to hauling them along the coast.

Following the classic *S*-curve trajectory of technological adoption, containerization growth progressed slowly at first, but its obvious economic benefits, primarily derived from reduced labor costs, led eventually to explosive growth that may be tapering off today. Today, an overwhelming proportion of international trade travels by container ship. At today's most advanced terminals, the longshoremen and checkers who swarmed the docks are now invisible inside buildings behind computerized control panels, and chassis drive themselves down the pier to accept one of the standardized $40' \times 8' \times 8\frac{1}{2}'$ crenellated boxes being hoisted from the ship every two minutes and lowered onto the chassis by cranes over 50 meters high. The containers are then immediately transferred to trucks or trains and hauled directly through the suburbs to inland, regional distribution centers, which serve as hubs for collecting and distributing goods, much like ports in the previous era. The operations that concentrated around ports historically have now expanded into broader regions in a process sometimes referred to as "port regionalization" (Notteboom and Rodrigue 2005).

In shipbuilding and shipping, there are immense economies of scale to be had, as shipping costs decrease as ships increase in size (Cullinane and Khanna 2000, 186). This has introduced a perverse incentive in shipping to compete in a glutted market by building ships of even greater capacity at ever greater prices. The result has been an exponential growth in container ship size. While the first cargo ship carried 58 containers, recent technology has permitted of ships capable of carrying 9,000. These

ships are too large to travel any but the deepest of waters and stretch more than $\frac{1}{4}$ mile (0.4km).

In summary, technological change has contributed to larger ships, lower labor requirements, greater capital investment, and a virtually seamless intermodal transfer from sea to land. The transition from ports as labor-intensive central places in the national economy to capital-intensive blips in a logistics operation reflects the eloquent epigraph from Mumford that begins this chapter. When the river of traffic slowed down as goods were transferred from sea to land, great port cities grew up around them to coordinate the production and consumption of those goods. Today the river need not slow down until it reaches distant, inland warehouses, decoupling economic activity from port activity.

1.3 Deregulation and concentration

The history of transportation in the U.S. as told by Rose, Seely, and Barrett (2006) describes a transition from modal separation to modal integration. Through trucking-related legislation in the 1920s, modal fiefdoms were created within which firms competed horizontally through licensing and cooperated through federally sanctioned or operated rate-setting bureaus. Following the introduction of containerization in 1956, political backing for deregulation slowly emerged under the sustained efforts of presidents from Eisenhower to Carter, resulting in full deregulation of the airlines in 1978, railroads and trucking in 1980, and shipping in 1984 and 1998. New legislation permitted cross-ownership among transportation modes and eliminated rate-setting institutions. Firms, particularly shipping companies, have taken advantage of these changes to consolidate ownership and control of entire global logistics networks.

Global shipping has long been a highly competitive business requiring some de-

gree of collective action for companies to remain viable. Since the late 1800s this has taken the form of government-approved, geographically based "conferences" that would collectively set terms for rates and services as well as punishment for shippers who went outside the conference (Kendall and Buckley 2001). This continued even as the disruptive new technology known as "containerization" transformed the industry. Since the early 1990s, however, a qualitative change has taken place as cargo carriers responded to the dramatic increase in international trade and competition by vastly expanding capacity and entering mergers and alliances in order to achieve economies of scale and to provide comprehensive global service (Blomme 2005; Slack 2004). Shipping companies have also sought to obtain more control over their product, to distribute their commercial risk, and to improve customer relations by vertically integrating through the acquisition of terminal operators, freight forwarders, land haulage firms, and others (Blomme 2005, 164). In 2000, Heaver et al. summarized the development as follows:

> There is a trend unfolding in the maritime and port industries towards ever greater control of the logistics chain through various forms of co-operation (strategic alliances, mergers, etc.). They include both vertical agreements along the logistics chain and horizontal agreements among suppliers of similar services, particularly shipping companies. These developments bring with them a danger of preferential treatment, conflicts of interests and market dominance. (Heaver, Meersman, Moglia, and Voorde 2000, 372)

The parallel and intertwined processes of integration have increasingly steered firms, governments, and academics to speak of "logistics chains" rather than separate types of transport, reflecting the shift in discussion from multimodal to intermodal trans-

portation.

These shifts have entailed corresponding shifts in strategy. Notably there are two complementary trends in carriers' approach to the port hierarchy. First, hub-and-spoke networks have emerged as a desired service configuration. In this arrangement, cargo is transported rapidly between concentrated "load centers" where cargo is aggregated or disaggregated and continuing cargo is transferred to smaller vessels for shipment to regional ports. Second, load center "sites are being selected to serve continents, not regions; for transhipping at the crossing points of trade lanes; and for potential productivity and cost control" (Notteboom and Rodrigue 2005, 175). Because the load center approach concentrates cargo throughput in a few ports and reduces it in others that could serve the same wide geographical market, these developments generate subsidy competition among ports for selection by carriers and terminal operators as their load centers.[1]

1.4 Port authorities

In most cases in North America, ports are administered by a regional port authority, but they may exhibit a range of administrative forms. They may be landlord ports that contract out all operations, operating ports that maintain ownership of all port facilities and directly operate them, or some combination of the two (World Bank 2007). In either sense, port authorities function as the formal governance mechanism for coordinating port functions and establishing and enforcing port regulations. While some authorities are narrowly restricted to shipping concerns alone, others are per-

[1]Meersman, de Voorde, and Vanelslander (2005, 142) predict that the emergence of global terminal operators will undermine the power of carriers over port authorities. This implies not that ports will gain power over carriers but that some of carriers' power will shift to terminal operators. Of course, some terminal operators are owned by shipping companies. In this case, carriers' power would increase.

mitted to operate airports, commuter rail systems, bridges, tunnels, free trade zones, and a variety of other pursuits.

Port authorities may also take a variety of institutional forms. They may be responsible to government officials at the local, county, district, state, multi-state, or (in Canada) federal levels. They may be independent organizations or they may be incorporated into local, state, or national bureaucracies. Based on a small sample of port authorities (60), Van der Lugt and De Langen (2007) identify three types of authority goals: one oriented to the broadly defined success of the port cluster, one oriented to profit maximization, and one a mixture of the two. These essentially embody public, private, and public-private goals and reflect sources of financing. While all port authorities collect users fees, their level of dependence on these for operations and future developments varies. More publicly focused authorities have greater access to government funds and thus more public goals, while more private authorities depend on market mechanisms for provision and goal-setting.

As the rapid changes in logistics described above have shifted power toward the large shipping companies and altered the terrain of economic activity, there has been a great deal of debate over effective port strategy and an emphasis on port reform. In these discussions, many writers conflate the wide variety of port stakeholders with the port authorities, failing to distinguish the potential variance in goals (Fleming and Baird 1999; Van der Lugt and De Langen 2007) (cf. Marcuse 2005). While the orientation toward profit maximization does tend to align the interests of port authorities with some port stakeholders, notably firms, the willingness of port authorities to subsidize private firms indicates that port authorities may have different or additional goals. Thus, it is essential to distinguish port authorities from other stakeholders as a unit of analysis. That said, the main emphasis of port reform has been a movement away from goals other than commercial success. Proposals for port authority reform

generally prescribe privatization, corporatization, or commercialization. Privatization involves selling the port facilities to a private entity. Corporatization is essentially privatization with the government retaining a large share of the resulting company. And commercialization indicates an increasing profit orientation (World Bank 2007). Port consolidation and rationalization, i.e., the administration of ports at broader administrative scales, like the national, are generally dismissed as nonstarters (Interview with Richard Larrabee, March 25, 2008).

This trend toward commercialization has tended to shunt port authorities out of direct port operations and into the status of landlord ports that primarily lease out their facilities. This has led a number of scholars to investigate the repurposing of port authorities, since their profit-orientation demands that they define their value-adding activities. There is an increasing consensus that the coordination role of port authorities reflects this landlord orientation. Authors like Chlomoudis, Karalis, and Pallis (2003) have argued that port authorities emphasize their government-like roles in setting targets for cooperation among stakeholders, directing port development by defining the operational framework for regional port production, and forecasting. These reflect some of the economic arguments for planning in a market society delineated by Klosterman (2003): resolution of prisoner's dilemma questions, provision of public goods, and dissemination of information necessary for informed market choices.

Since this coordinating role cannot be limited to the immediate port cluster, we must adopt the thinner conception of port clusters as incorporating related but geographically dispersed actors—both public and private (cf. Porter 1998; Whitford and Potter 2007; Zeitlin 2005). The trend toward port regionalization implies such a geographical transformation. Port authorities, Notteboom and Rodrigue (2005, 307) claim, must increasingly look to form associative relations with entities outside their territorial jurisdiction to enhance their competitiveness. They list several major ar-

eas of possible cooperation between port authorities and inland distribution centers, including traffic management, site issuing, hinterland connections and services, environmental protection, marketing, and research and development. For example the PANYNJ has spearheaded efforts to share market information, has begun to collaborate with ports and governments throughout the Northeast Corridor, and has even signed a memorandum of understanding with the Panama Canal Authority. This example indicates three things: first, that port authorities are also beginning to head up efforts to develop translocal networks to coordinate the provision of translocal public goods; second, that the primary focus of translocal associations is vertical integration; and third, that the region itself may still be too small a geographical unit for translocal port planning.

1.5 Stakes

Infrastructure, particularly freight transportation infrastructure, occupies the curious position of serving as a vehicle for economic activity at large and as a means of production for a particular industrial sector. Because freight movement is integral to the production process, transportation supports virtually all economic activity and thus serves the public interest. Insofar as private firms provide freight movement, transportation infrastructure operates as a means of production for those firms, like a machine in a factory. While both public and private interests stand to benefit from more efficient, cost-effective transportation networks, their stakes differ. And these stakes differ all the more where land meets the sea.

Freight shipping is an expensive, capital-intensive business. Containerships cost hundreds of millions of dollars and take years to build. The docks, berths, and cranes they require entail similar capital requirements. Generally, shipping companies have

borne the cost of ships and port authorities the cost of landside facilities, including the highly valuable land itself, though private terminal operators have also often invested in their own cranes. Additionally, the funding for dreding, which is required by most ports, is shared by the federal government via the Army Corps of Engineers (ACE) and local authorities.

For the private shipping companies, an efficient system offers access to large markets at low cost. As the dissertation will show, the size of this market area has changed significantly since the advent of containerization, expanding from ports' immediate hinterlands to entire continents. Still, direct market access, by reducing transportation times and freight transfers, cuts costs and contributes to competitiveness. Thus, the fundamental stake for shipping companies is their bottom line and the profits they generate. Any arrangement that shifts the cost of infrastructure to other players is likely to have a positive impact on the shipping companies' profits.

The public sector, however, has interests in addition to the bottom line. Though in many senses port authorities and government entities must adhere to their own bottom lines (see Chapter 5), those bottom lines are often more broadly construed. Ports can potentially generate profits through leases and user fees, but this is more often the exception than the rule. Rather, the positive impact of port activities is most often considered to be the jobs they create both directly and indirectly. The industry at one time employed thousands of men in a single port to move goods or provide services like ship repair and fueling. There are also jobs that thrive off of supporting these workers. And perhaps most importantly, by reducing transportation costs, ports and other freight transportation infrastructure reduce production costs and increase the competitiveness of those firms that locate close to infrastructure nodes. This fosters business growth and broader economic development.

Additionally, port regions sacrifice some of their local transportation networks'

efficiency to accommodate the movement of goods through the port and beyond the region. The most desirable markets for shipping companies tend to be those with the greatest number of consumers. Since large municipalities tend to face congestion challenges simply from local traffic, adding large amounts of freight destined for other regions exacerbates congestion for local residents and businesses.

1.6 The question

Given that logistics companies have increased their bargaining power by employing containerization and intermodalism to scale up their activities beyond the reach of any single port, what strategies can port authorities employ to counter these gains and best pursue public goals, which are generally framed as direct and indirect job creation? How can port authorities best address the impacts of competing for global shipping firms' business? Strategies suggested above fall into three basic categories: commercialize, build translocal associations, and rationalize. Which will best serve the public to which port authorities are responsible?

To get at this question, this dissertation explores the century-long history of intermodalism, the geographical relation between economic activity and freight transportation infrastructure, and the nature of interport competition. How did intermodalism emerge? How has it transformed the economic terrain? Have logistics activities relocated as a result of technological and organizational change in the industry? If so, to where have these activities moved? How has intermodalism affected the location of economic activity outside of transportation? How has intermodalism and industrial change affected port actors, including employers and workers? How does interport competition start and play out? How are participants impacted?

1.7 Theoretical approach: Technology, territory, and terrain

Graham and Healey (1999) argue that there is an inherent tension between network flows and territorial spaces. Network flows seek to flow past any boundary, while territorial spaces function to contain flows (Taylor 2004). This distinction gains political meaning from its extension from flows and territories respectively to Harvey's (2006) capitalistic and territorial logics of power. The capitalistic logic of power "focuses on the ways in which economic power flows across and through continuous space, towards or away from territorial entities," borne by the flows of capital (in all its forms) and labor. The territorial logic of power includes "the political, diplomatic and military strategies invoked and used by a territorially defined entity such as a state as it struggles to assert its interests and accumulate power in its own right" (Harvey 2006, 107). These two logics, while conceptually distinct, are deeply intertwined and often interdependent.

1.7.1 Terrain

Within the capitalistic logic of power, the circulation of capital in the production circuit is the network flow of primary importance. The circulation of capital can be described by adapting Harvey's (1982) elaboration of Marx's (1977) classic formula: $M \rightarrow C \rightarrow P \rightarrow C' \rightarrow M'$. Money capital ($M$) is used to purchase commodities (C), which are transformed through production processes (P) into new commodities (C') that are sold at a profit (M'). Thus, capital flows throughout the production process, but undergoes continual transformation from one concrete form to another. The longer this process takes, the more capital depreciates and the less profit accumulates.

The more expensive these transformations, e.g., through higher labor costs, the less profitable the process is. Producers thus seek to increase profits in two basic ways. First, they can reduce the time capital is instantiated as a commodity, that is, the time goods are caught up in production. Second, they can reduce costs by redirecting production to territorial entities with lower labor or input costs (Harvey 1982). These two approaches tend toward the acceleration and regular relocation of production, producing an ever-shifting terrain of capital accumulation.

Harvey, however, engages in a narrow focus on the capitalists' perspective. As Herod (2001) argues (citing Aronowitz), we must also consider the evolution of the capitalist landscape from labor's viewpoint. Labor, too, struggles to direct the circulation of capital. From the perspective of the worker, capital is required for social reproduction. Capital in the form of commodities (C) is consumed to generate labor power (LP), which is combined with the means of production (MP) to earn wages (W) that are spent on new commodities (C') for consumption: $C \rightarrow LP + MP(= P) \rightarrow W \rightarrow C'$. This sequence defines the consumption circuit. Labor can accumulate greater capital within its circuit at least four ways. First, it can reduce the price of commodities by reducing producers' profits. Second, it can increase wages through struggle at the point where labor power is combined with the means of production in the production process, the workplace. Third, labor can engage in political struggle to introduce or strengthen government regulation of prices and wages. Fourth, it may also receive a social wage through government redistribution.

Though capitalists can have goals other than accumulation (Schumpeter 1983), their bottom line is generally profits (Offe 1985). Thus, the goal of the capitalist is to maximize the flow of capital in the first circuit. Workers, too, often have goals other than accumulation, but in the context of capitalist society, their priority is also often accumulation. Thus, the goal of the worker is to maximize the flow in the second.

Governments, to the extent that they operate as capitalist enterprises, also strive to maximize flow within the first circuit. To the extent that they represent the workers as their constituents, governments work to maximize the flow in the second.

There are thus two complementary types of flow: consumption and production. The consumption flow is associated with workers, while the production flow is associated with employers. Because these must manifest themselves physically (Harvey 1982), each is further associated with a concrete space. The means of production and labor power must come together in concrete sites of production, e.g., factories and offices, and commodities are consumed in concrete sites of consumption, e.g., homes and restaurants. Though these sites demonstrate a certain fixity, they too are circulating capital, as some portion of their value is transferred to the goods or services produced or consumed. The distinction, which sometimes puts them at odds is the "different spatio-temporal horizon compared to the standard form of capital circulation" (Harvey 2006, 101).

The material instantiation of these two forms of capital circulation constitute what will be referred to here as the "economic terrain." This dissertation will define terrain as the momentum, or inertia, of capital flows associated with a particular economic activity over a concrete space. Momentum is considered the quantity of capital passing through a given space over a given period of time. For our purposes, an increase in the volume or turnover of capital in a given area corresponds with an increase in momentum, which is essentially economic growth in that space. For example, keeping all else constant, if a business were to move its activities from one city to another, the momentum would decrease in the first and increase in the second, altering the flow of capital and hence the terrain. Or, if that business were to simply produce larger quantities of a good each day, momentum would increase. Note, however, that momentum has to be broken up into its constituent flows to

determine the actual beneficiaries of accumulation.

If we consider these two types of terrain with regard to a single product, they constitute two categories that Levinson (1967) calls "product market areas" and "areas of effective production." The product market area is that concrete space over which a product is sold and enters the consumption circuit, while the area of effective production is that concrete space in which a good or service is produced. For instance, prior to containerization the product market area for the delivery of freight[2] was an entire region, while the area of effective production was limited to piers. Similarly, in mining, the area of effective production is limited by the source of minerals, but the product market area is national or international in scope. In contrast construction tends to have local areas of effective production and product market areas. In this way, each product's circulation is defined by and defines two types of terrain as their momentum varies across concrete space.

1.7.2 Territory

Terrain is to be distinguished from territory. While terrain describes the countours of flow, Jessop, Brenner, and Jones (2008) define territory as a form of sociospatial structuration associated with efforts to bind, parcel, and enclose. The object of such efforts is appropriately left open, but for the purpose at hand, we will focus simply on flows of capital. Unlike Brenner and Elden (2009), who would like to constrain "territory" to a specifically political context on the basis of presumed historical origins and Harvey (2006), who is only considering such entities, this dissertation adopts a broader conception based in White's (1992) theory of identity and control. A territory is here defined as a monopoly over some aspect of concrete space on the basis of

[2]Marx and Fernbach (1981) perceptively considered transportation to be a form of production, akin to workers moving goods around the shop floor.

conceived or perceived common interest. The territorial logic of power then refers to an entity's strategies for defining and sustaining a geographical monopoly in order to accumulate power. This broader definition allows for the constant negotiation and reproduction of overlapping territorial claims that may conflict, complement, reinforce, or weaken each other. For instance, a gang may claim a territority in which it possesses a monopoly over the sale of drugs that overlaps with one or more police precincts and perhaps a merchants association, which has defined a territory defined by the commercial activity of a particular street in which it would like to maintain standards of appearance and behavior. Each organization makes territorial claims to control specific socio-economic aspects of a concrete space that constantly interact to define that space. From this perspective, organized labor is treated as a territorial entity akin to organized states.

For our purposes, territory is oriented toward monopolizing (or at least containing) the flow of capital and increasing its momentum within a given concrete space, that is, it is oriented toward accumulation within a delineated concrete space. This is achieved in three ways. First, a territorial entity can increase the quantity of capital by keeping it from passing outside its boundaries. For instance, import substitution keeps capital that would leave an administrative territory for processing elsewhere from leaving the territory. This, in effect, lengthens the circuit of capital within that territory. Second, a territorial entity can increase the volume of capital by diverting it inside its territory from outside. An example of this would be convincing a new factory to locate within the territorial jurisdiction. Third, by increasing the velocity of capital, primarily through improved efficiency, a larger portion of capital is retained within the territory. For example, a process improvement will at least for some time increase a companies' profits that would otherwise have passed out of the territory with the product.

Territory is more or less easily defended as the common interest of the actors who define it is stronger or weaker. That is, if the members of a social group share a common interest, they are better able to band together in defense of that interest than are the members of a social group with conflicting interests. This conception is rooted in White's (1992) idea that identity underlies control while at the same time being an object of control. Its practical application derives from Offe's (1985) reaction to Olson's (1971) argument on the logic of collective action. Offe argues that it is easier for capitalists than workers to organize collectively not just because they are fewer in number but also because they share a much narrower range of interests, most particularly profits. Workers, on the other hand, have to collectively organize a common interest not only in accumulation but also in a vast range of other dimensions that infuse their lived experience, like obtaining job security, overcoming racism, and enjoying work and home life. The difficulty in coordinating non-accumulation interests undermines workers' ability to maintain a common front in the face of workplace challenges. The same argument could be made for government entities, particulary subnational government entities. They may share a common interest in national economic growth, but they may differ in their opinion on how it should be distributed or in which policies would lead to local economic growth.

1.7.3 Technology

Technology is embodied in specific means of production, which dictates that it be located at specific points in concrete space. As a means of production, technology thus becomes the primary site for the negotiation of process and profits between workers and employers. If workers can establish a territorial monopoly over the means of production, they can divert a portion of capital (profits) into the consumption

circuit. If they cannot, employers can divert capital from the consumption circuit to the production circuit.

The same holds true for governments. Because technology must be embodied in specific locations, its form determines the area of effective production. Means of production that require only a machine that can be operated virtually anywhere, e.g., a laptop computer, have an effectively unlimited area of effective production and thus are more difficult to monopolize. A technology like container shipping, which requires a pier with deep berths, has a much more limited area of effective production and is thus easier to monopolize. If a government is able to monopolize the sites at which a specific technological process can be employed, it can divert a greater portion of capital generated by that production process into the circulation of capital within its boundaries.

Technological innovation can be used as a tool to alter relations between labor and capital. For instance, labor-reducing technologies cut down the total number of jobs, creating a surplus of workers that allows employers to pay lower wages. Technological innovation can also be used to alter the economic terrain, shifting some stages of production to regions with more pliant workers (cf. Gordon 1978).

1.8 Structure of dissertation

The dissertation consists of nine chapters, including this introduction. It builds an argument for port rationalization as an effective counter to global shipping's extractive power by showing how containerization was employed to strengthen capital's position vis-à-vis labor and governments to the latters' detriment. The various methodologies employed in the volume—quantitative analysis of historical data, examination of historical documents and secondary sources, and interviews—are described in Chapter 2.

Chapter 3 traces the development of containerization and intermodalism with a focus on the twentieth century. The systems approach to technology studies pioneered by Hughes and Luhmann is employed to illuminate the way in which containerization emerged as a second-order system that tied previously existing logistics infrastructure into one global system and the attendant organizational changes. The spatial impact of intermodalism on the economic terrain of the U.S. freight system, essentially the restructuring of ports, is explored in Chapter 4, which shows how freight traffic has shifted westward and how warehousing activities have moved away from the coasts to a band a few hundred kilometers inland. Chapter 5 then illustrates how the shift in terrain has weakened the bargaining power of ports vis-à-vis global shipping companies, resulting in massive subsidies for these companies. The claim that these subsidies are justified due to their role in job creation is examined in Chapters 6 and 7. These chapters fill a gap in efforts to evaluate the impact of ports on employment by looking at time trends rather than static extrapolations of current employment figures. Chapter 6 looks at direct employment in port industries, while Chapter 7 looks at the relation of a broader range of economic activities to freight infrastructure. They conclude that direct employment is declining and that economic activity has decoupled from the nation's freight infrastructure, indicating that governments that host ports see little in the way of employment benefits. Having concluded that ports have been losing money chasing non-existent job creation gains, Chapter 8 turns back the clock to better understand how longshoremen were able to build a territorial monopoly over a port range and obtain better working conditions. Finally, Chapter 9 argues that port authorities should follow the example of early twentieth century longshoremen to build a territorial monopoly of their own through port rationalization. It is suggested that this will not only stop destructive incentive competition but also has the potential to more equitably distribute the gains of economic growth.