Alliances and Concentration: The Economic Consequences of Market Structure in the Liner Shipping Industry

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Over the last twenty years a wave of consolidation has swept through the oceanic liner shipping industry, leaving the industry dominated by a small number of large firms organized into a handful of strategic alliances. As liner shipping is the dominant form of international transportation these changes have likely had a substantial impact of the global trading system. This paper empirically examines the relationship between strategic alliances in liner shipping on trade flows, using a unique data set with a geographic and temporal coverage not available in previous works. The empirical results suggest that strategic alliances as a group are inhibiting trade, although some strategic alliances seem to be encouraging trade. An analysis of the major alliances provides suggestive evidence that the economic impacts of an alliance depend on how strongly the alliance can control its member firms' activities.

Introduction

Modern oceanic shipping is characterized by two types of services: specialized single good (bulk) transport, and "common carrier" liner shipping[1]. Liner shipping is the most economically important type of oceanic shipping and a vital component of the global economy; most sources estimate that liner shipping carries 60-70% of world trade by value (Hummels 1999). The liner shipping market has always had a unique market structure; historically the industry was characterized by long standing and legal price fixing cartels known as "conferences." However, a string of recent regulatory changes and increasing demand for globalized shipping has effectively destroyed the conference system (Brooks 2000; Lewis and Vellenga 2000; Federal Maritime Commission 2012)

The modern industry is now organized into a handful of collaborative ventures known as "alliances." A wave of mergers has left the industry dominated by a small number of large firms, almost all of whom are involved in strategic alliances with other large firms. If one views alliances as anti-competitive forces then this shift in market structure has created substantial concentration in the liner shipping sector. To date, despite widespread interest in the liner shipping sector, there have been few formal efforts to examine how changes in this vital sector's market structure have impacted the global trading system. Most of the literature analyzing shipping concerns itself with how changes in market structure impact the profitability of shipping firms, without considering the possibility of impacts on the wider system of trade, while most trade literature downplays or ignores transportation issues. The trade literature's lack of interest for the shipping market is surprising, given that it is widely acknowledge that trade costs are vitally important in the modern economy and that transportation costs are a substantial determinant of trade costs (Hummels 2007)

1. The terminology used to describe the players in the shipping industry can be confusing. Despite the fact that the industry is called the shipping industry, "shippers" refers to firms who need to have goods transported, i.e. the customers. Firms that actually operate vessels are called "carriers" or "shipping firms."

This research seeks to fill this gap in the existing literature by empirically examining how shipping alliances have impacted bilateral trade flows, utilizing a unique data set which tracks liner shipping firm's activities with a much wider temporal and geographic coverage than any previous research has been able to generate. The empirical results suggest that, on net, shipping alliances appear to be inhibiting bilateral trade in a manner consistent with the exercise of market power, although this negative result does not hold for every alliance. Analysis of the major alliances reveals that they do not substantially vary in their commercial behavior but do substantially vary in how frequently alliance members deviate from the alliance structure, suggesting this result is being driven by differences in how effectively an alliance can control its members. These results have important regulatory implications for the ongoing debate about liner shipping and more broadly suggest that trade economists should consider placing a greater weight on transportation issues.

1 Liner Shipping

Liner shipping is an oceanic transportation industry which transports what are known as "general" cargo, any goods which need to be packaged for transportation and are not shipped in large enough quantities to fill a ship's hold, requiring the liner firm to carry a large variety of different goods on every voyage (Sjostrom 2004). Liner firms transport cargo using strings of ships which operate on fixed time schedules between set ports, sailing regardless of whether or not the hull is full. Modern liner shipping is almost entirely "containerized," loading all cargo into thousands of standardized 20- or 40-foot containers. The last twenty years has seen the industry go through a wave of mergers that has left the market largely dominated by the top 20 largest firms, who collectively control roughly 87% of total worldwide shipping capacity (Sheppard and Seidman 2001; Fusillo 2006; Sys 2009)

Firms in the liner shipping industry were historically organized in "conferences," cartels that set price schedules for their members, restricted output, and

engaged in price or quantity wars with outside entrants (Clarke 1997). Conferences were generally legal, with most nations granting the shipping sector anti-trust immunity in the name of preserving that nation's maritime power. There is a long running debate in the literature over the economic impact of these institutions. Many authors argued that conferences acted in a manner consistent with profit-maximizing cartels and were inhibiting the development of the international economy (Fox 1994; Francois and Wooton 2001; Hummels, Lugovskyy, and Skiba 2009). A smaller subset of the literature argued that conferences were a necessary evil because liner shipping suffered from an "empty core," a situation in which there is no competitive equilibrium. These authors believed conferences were an effective check against the inherent instability that would plague the market in a purely competitive situation (Sjostrom 1989; Pirrong 1992; Sjostrom 2004).

A string of recent regulatory changes has largely ended the conference system. In 1998 the United States passed the "Ocean Shipping Reform Act" (OSRA), which required conference to allow their member firms to confidentially deviate from the conference system (Lewis and Vellenga 2000). In 2006 the E.U. when further and outright stripped conferences of any anti-trust immunity (Federal Maritime Commission 2012). These legal changes in two of the major economic centers of the world left the conference system legally infeasible.

In response to the end of the conference system firms in the liner shipping industry have begun entering into collaborative ventures known as "alliances." Alliances vary widely in their organizational structure, but broadly speaking an alliance is composed of a set of individual firms that co-ordinate their vessel deployments and share space on their vessels, allowing them to reach a wider range of destinations and customers (Brooks 2000). Alliances also operate alliance services, in which the members carry their loads using a pool of commonly provided ships, which makes it easier for members to justify building larger and more efficient vessels, as they can fill the ships with other firm's cargo on each trip to fully utilize the space. Compared to conferences, alliances are less restrictive in their actions, as they are barred from directly setting prices and

allow independent competition amongst their members. However, alliances are much larger in scale than the traditional conferences, as many alliances collectively span the globe and the combined membership of some alliances control substantial portions of the global shipping market.

Alliances are at this point the dominant organizational form in liner shipping. There are four major alliances named 2M, Ocean Three (O3), CKYHE, and G6, whose membership consists of sixteen of the twenty largest shipping firms by capacity, collectively controlling 75% of global shipping capacity. If one views alliances as a means to achieve technical efficiency while still competing commercially then this trend is an obvious net positive; there are substantial economies of scale in liner shipping that these new super-alliances will be able to utilize, especially in regard to the potential for generating sufficient cargo to justify using "mega" size shipping vessels and offering a more diverse portfolio of potential services (Imai et al. 2006; Leach 2015). However, if one views shipping alliances as conferences or cartels in all but name- a charge that has been leveled against them by industry sources (Shingleton 2012)- then alliances amongst these larger firms have created enormous concentration in the shipping industry, much more concentration than ever existed in the conference system.

To emphasize the scale of the modern alliance system, table 1 shows two sets of Herfindahl-Hirschman Indexes (HHI) for the liner shipping sector. The "optimistic" HHIs treat alliances as purely operational agreements, calculating market concentration by treating each firm separately. The "pessimistic" HHIs treat alliances as mergers in all-but-name, calculating HHIs while treating each alliance as a single large firm. Whether or not the liner shipping faces concentration concerns depends heavily on how one views shipping alliances. If alliances are purely technical arrangements with no anti-trust implications then there is little sign of growing concentration in the sector; on the other hand, if alliances are able to co-ordinate in an anti-competitive way then the recent expansions of the alliance system have substantially increased concentration in this economically vital sector.

For the most part regulatory agencies have left shipping alliances lightly

Table 1: HHI indexes for liner shipping

Year	Optimistic HHI	Pessimistic HHI	Percentage Increase
2011	582.7	911.59	56%
2012	641.67	1,077.97	68%
2013	620.14	1,073.44	73%
2014	620.46	1,106.3	78%
2015	667.87	1,714.15	156%

HHIs based on capacity data from January of each year for the twenty largest firms. All data are drawn from Alphaliner's "Top 100 Firms" capacity rankings.

regulated, focusing their efforts on conferences or individual firms. However, there are growing concerns in the major regulatory bodies about the potential competition concerns posed by collaborative ventures between the largest firms (Bonney 2015; Dupin 2015). Quantifying the economic impacts of these shipping alliances will allow regulatory agencies to make informed decisions.

2 Literature Review

The liner shipping industry has received fairly little attention in trade economics literature (Button 2005). More broadly, the trade literature has paid relatively little attention to transportation issues in general. Despite the lack of direct engagement with transportation issues, however, in many ways the trade literature has established that transportation issues are critically important to the global trading system.

Theoretically, a long and diverse literature has established that the global economy is heavily impacted by the costs associated with moving goods across national borders, usually called "trade costs." Trade costs are the critical parameter in almost theoretical model related to geography or trade vital (Fujita, Krugman, and Venables 1999; Combes, Mayer, and Thisse 2008; Melitz and Ottaviano 2008). The equilibrium in these models are generally function of preference parameters (especially the elasticity of substitution) and trade costs. As preferences are generally viewed as either fixed or exogenous the evolution of the system is thus dictated by the evolution of trade costs.

However, despite the central importance of trade costs in these models, the extant literature shows shockingly little interest into the actual determinants of trade costs, especially in the transportation sector. The vast bulk of published theoretical research treats transportation as another exogenous cost. This is not a trivial assumption: unlike other barriers such as geography or tariffs, transportation costs are endogenous, determined by market interactions between shippers and carriers. Those authors who have incorporated an actual transportation sector have found that its' inclusion can produce qualitatively different results (Behrens, Gaigne, and Thisse 2009; Behrens and Picard 2011; Takahashi 2011). Despite the lack of direct attention, considerable theoretical research suggests that transportation issues will significantly impact the distribution of trade.

Empirically, an immense amount of evidence demonstrates that trade costs are a significant determinant in the level of trade, especially for poorer nations (Limão and Venables 2001). With the notable exception of Hummels (1999), there are very few attempts to directly estimate transportation costs primarily because of data issues. Most empirical research instead estimates overall trade costs, which are an aggregation of all potential costs, including transportation costs, geographic barriers, and political barriers (Disdier and Head 2008; Anderson 2011). Most of this research into trade costs has been focused on political issues, such as free-trade-agreements or tariffs (Baier and Bergstrand 2007).

However, there is considerable evidence that transportation costs are now the largest component of trade costs, eclipsing tariffs and other "traditional" trade barriers (Hummels 2001; Fink, Mattoo, and Neagu 2002; Hummels 2007). For example, Hummels (2007) found that in 2004 the median individual exporter to the U.S. paid $9 in transportation costs for every $1 they paid in tariffs. As tariffs and other traditional barriers have slowly decreased transportation issues become increasingly important to the international trading system.

In short, while the extant literature has not directly engaged with liner shipping issues, current literature supports the concept that transportation issues can have substantial economic effects. The market structure of their industry

will naturally influence the choices transportation firms make, which in turn will have important impacts on the entire global trading system. Thus, market structure in the liner shipping industry almost certainly has significant impacts on the global economy and should be a matter of concern for the broader economics literature.

3 Empirical Specification

To examine the connection between liner shipping alliances and trade flows this work integrates variables which measure the intensity of shipping alliance activity into a gravity model. These empirical tests examine if areas dominated by shipping alliances have higher or lower trade for a fifty month period between January 2011 and February 2015. "Alliance activity" is measured by the capacity fielded by each shipping alliance; a region is "dominated" by shipping alliances if those alliances control most available capacity[2].

The decisions to measure shipping output using capacity data rather than output or price data is the result of both data constraints (data on shipping output or prices are not widely available) and a theoretically motivated belief that capacity is the critical decision variable for liner shipping firms. In a classic result, Kreps and Scheinkman (1983) demonstrated than when firms precommitted to a certain level of output (which they call "capacity") and then sold that output under Bertrand price competition, the Nash equilibrium result was equivalent to the Cournot result. Intuitively, because these "pre-sale" decisions impact all later decisions they define how the firms will behave when they do face market competition. This implies that if a firm has to make significant decisions before market conditions are known, there will be a direct relationship between these decisions and firm behavior. Later research has confirmed that this is a fairly general result when major capacity decisions must be made in

2. In the shipping industry capacity will be given in "twenty foot equivalent units" or TEUs. A TEU represents the space occupied by a standardized twenty foot shipping container and the number of such spaces available on a vessel is standard measure of ship size in liner shipping.

advance of market conditions being known (Lepore 2012). Due to the expense and time commitment of new shipbuilding, liner firms make most major capacity decisions months in advance and it is perfectly reasonable to believe that their behavior can be accurately summarized by looking at how their capacity is arranged, with their actual volume and price decisions largely determined by those capacity decisions.

When examining how shipping capacity decisions could impact trade flows there are two geographic levels at which shipping activity could be measured. The lowest geographic level would examine alliance behavior on a "route" level, directly examining how much capacity each alliance is operating between each nation-pair in the sample. Alternatively, alliance behavior could be analyzed at the "trade" level, examining how much capacity each alliance is operating on the wider trading region that contains each nation-pair. There are three of these major "trades" or trading regions, generally referred to as the "East-West Trades:" North America-Europe (Transatlantic), Europe-Asia, and Asia-North America (Transpacific). A trade level measure of capacity would look at the total capacity operated in the wider region that contains that nation-pair. For example, on a route level the extent of alliance behavior between the United States and Japan is the shipping capacity controlled by that alliance between the two nations; on a trade level, the extent of alliance behavior is the total shipping capacity controlled by that alliance in the trading region between Asia and North America.

Intuitively, route level data would seem more representative of alliance activity than trade level data, as they match alliance behavior to a specific nation-pair rather than aggregating across nation-pairs in a broader region. However, it is unclear if route level data are really an accurate representation of the available capacity between any nation-pair. The modern liner industry makes heavy use of hub-and-spoke routing strategies in which most goods are moved between larger ports and then distributed amongst nearby nations using smaller ships. This means that the capacity of ships which directly travel between two nations can be a misleading measure of the capacity available to transport goods be-

tween those nations, as a much larger amount of capacity might be available via routing through a major hub.

For example, there are few direct sailings from Australia to the United States and, consequently, the amount of capacity operated between them is negligible. This is not because liner shipping firms do not carry cargo between them, however; it is instead because it is more economically practical to route goods from each nation to other southern Asian nations such as Singapore or Hong Kong and then ship those goods to their true destination from those hubs. The direct capacity between these two nations is not representative of the available capacity between them, a situation that is common given complex modern shipping chains. It may well be the case that overall trade level data are more representative of actual available capacity, as shippers are able to access most of that capacity by shipping through a hub.

Each empirical test in this research was estimated twice, using specifications measured at each geographic level, to ensure that results were qualitatively similar regardless of the level. Formally, the following gravity model based specification was used to measure the trade-level impact of shipping alliances on trade between nations i and j in month t

$$ln(Y_{ijt}) = \beta_0 + D_i + D_j + D_t + Aln(y_{jt}) + Mln(y_{it}) - kln(d_{ij}) \qquad (1)$$
$$+\lambda_1(\text{Capacity}_{ijt}) + \lambda_2(\text{Alliance Market Share}_{ijt}) + \epsilon_{ijt}$$

where the ys are output in each nation, d is the distance between nations i and j, "Capacity" is the total weekly TEUs of capacity fielded by all liner shipping firms on that trade in that month (scaled to 10,000 TEU), and "Alliance Market Share" is the percent of total weekly TEU capacity in each trading region controlled by one of the four major alliances[3]

To account for the possibility that these results may be different if measured

3. Every empirical test also included exporter, importer, time, and language fixed effects, as well as a fixed effect accounting for the impacts of the U.S. West Coast labor strike in 2015. For ease of reading all trade and output data are scaled to a billion dollars, while distance data are scaled to a thousand kilometers.

on a route level, each empirical test included a second regression which augments 1 with a variable called "IndividualCapacity," defined as the total weekly TEUs of capacity controlled by one of the four major alliances which operate between nations i and j (scaled 10,000 TEU level)

4 Data

This section briefly describes the data used to estimate equation 1. The nation-pair sample was defined as any nation which included one of the hundred largest ports in the world as defined by Containerisation International (Containerisation International 2014). The nation-pairs used excluded any nation-pairs on the same continent to avoid the possibility of significant non-maritime trade, leaving a sample of 1,716 bilateral pairs. Temporally, data were gathered on a monthly basis for a fifty month period between January 2011 and February 2015 (a period in which all four of the current major shipping alliances were founded).

Data on liner shipping capacity are from Alphaliner, a consulting firm which monitors the activity of each liner shipping company. Each liner shipping company's market activities can be summarized by a list of schedules, which in the industry are known as "services." A service is a set of dedicated ships who move between all of the ports in the sailing schedule on a fixed timetable. Depending on the number of ships involved, ports reached, and speed each service will have an average TEUs of capacity launched from each port every week, which is the measure of capacity used throughout this research. Examining the current layout and historical changes in the distribution of each service operated by one of the four major alliances generated data on how much weekly capacity each shipping alliance operated in each major trading region and between each nation pair for each month in the sample. Data on the overall capacity operated by every liner shipping firm in each major trade were gathered directly from Alphaliner.

Bilateral trade data are from the UN's "Comtrade" database, measured using import data except in cases were nations failed to report data in a month,

in which case data are based on reported exports[4]. GDP data are based on yearly GDP data from the IMF's "World Economic Outlook" Database, extrapolated linearly into monthly GDP data. Bilateral distance data are based on the "population-weighted" distance measure created by Keith Head & Thierry Mayer, which measures the distance between two nations as a function of the distance between each nation's major population centers, weighted by the population shares those centers represent. Both these data and language data are from CEPII, a French think tank devoted to international economics.

5 Core Empirical Results

5.1 Shipping Alliances Effects on Bilateral Trade

This section presents the core empirical results for estimating the impact that shipping alliances have had on trade as a group, estimating the trade- and route-level economic impacts using equation 1 with the four major shipping alliances combined. Section 5.2 examines whether or not this overall impact varies amongst the four major alliances. The results from these estimations are shown in table 2.

The choice of geographic level does not significantly impact the results, which are essentially identical at both the trade and route level. Unsurprisingly, an increase in overall capacity in a trading region is correlated with higher trade. Specifically, the addition of 10,000 TEU of capacity increases bilateral trade by about .7%, an effect that is substantial given that the weekly overall TEUs in the major trades frequently expands by 5-10,000 per year.

These results for the alliance variables suggest that alliance are utilizing market power, although in both regressions the total effect of shipping alliances is

4. Using overall bilateral trade to examine transportation issues faces the risk that this number may not be an accurate measure of the bilateral trade transported by liner firms, due to the possibility of other forms of transportation. In this sample the risk would come from either the air or bulk transportation sectors, as land transport is not possible. However, empirical tests based on a subset of product level goods which can only feasibly be transported by liner firms (available upon request) produce qualitatively similar results.

Table 2: Overall Shipping Alliance Effects

Variable	Coefficient	Std. Err.	Variable	Coefficient	Std. Err.
lnDistance	-1.209**	0.010	lnDistance	-1.224**	0.010
lnExportGDP	0.479**	0.162	lnExportGDP	0.459**	0.162
lnImportGDP	0.942**	0.162	lnImportGDP	0.925**	0.162
AllianceMarketShare	-0.120**	0.042	Capacity	0.007**	0.000
Capacity	0.007**	0.000	AllianceMarketShare	-0.126**	0.042
Intercept	-7.332**	1.050	IndividualCapacity	-0.048**	0.004
			Intercept	-7.173**	1.049
N	72811		N	72811	
R^2	0.830		R^2	0.830	
$F_{(142,72668)}$	2493.7		$F_{(143,72667)}$	2483.315	

Significance levels : † : 10% ∗ : 5% ∗∗ : 1%

ambiguous. On a trade level, the empirical results suggest that if the combined market share controlled by shipping alliances in a nation pair's trading region increases by 10%, while capacity remained constant, then bilateral trade is expected to fall by roughly 1.2%, an economically substantial loss in trade volume. However, the assumption that capacity remains constant may not be tenable; it may well be the case that alliances allow firms to deploy larger vessels, such that capacity would rise as a result of the formation or expansion of an alliance. In that case, the formation of a shipping alliance has two impacts on trade. Overall capacity would grow, increasing trade while at the same time alliance market share would rise, decreasing trade. The net effect is thus ambiguous.

For example, if a 10% increase in alliance market share simultaneously caused the addition of about 17,000 TEUs in new weekly capacity then the alliance would have a neutral impact on trade volume; if it led to an even larger expansion in overall capacity then the alliance would increase trade volume. This 17,100 increase in TEUs represents a substantial but not completely implausible growth; weekly transpacific capacity in 2015, for example, averaged roughly 450,000 TEUs, so this expansion would require about a 4% increase over current capacity levels[5]. These results cannot definitively prove that shipping alliances are depressing global trade; it is at least possible they are still beneficial to

5. Increasing capacity by a certain amount of TEUs will in general require more than one vessel of that size, as there must be sufficient ships to carry out weekly rotation through multiple ports.

trade if their technical benefits are substantial enough to justify large increases in capacity levels. Still, the trade level results do cast doubt on the economic value of shipping alliances and at the very least suggest that in the absence of expansions of capacity alliance dominated regions have consistently lower trade volumes, implying that alliances are utilizing some market power.

The implication that alliances appear to be utilizing market power is reinforced by the results on a route level. Holding alliance market share and overall capacity constant (effectively representing an alliance focusing more heavily on that specific nation-pair), an increase in alliance-controlled capacity of roughly one ship's worth of capacity is expected to lead to a 0.5% decrease in bilateral trade volume. While the magnitude of the effect is not large it is statistically significant. If alliances were able to achieve gains in efficiency by coordinating then expanding the capacity specifically linking two nations would presumably lead to an increase in bilateral trade, as firms shipping between those nations would directly benefit from the gains in transportation efficiency. The fact that capacity expansions have no positive effect implies that either alliances are not achieving significant efficiency gains or that they are utilizing market power such that those gains do not encourage an expansion of trade. In short, while at both levels these results are ambiguous there is little sign that shipping alliances are overall positive for the international trading system and the negative effects of both trade level alliance market share and route level capacity are at least suggestive that the alliances are exercising market power.

5.2 Testing for Differences Amongst the Alliances

Up to this point the empirical results have been based exclusively on data measuring the impact of all four major alliances combined (that is, examining the impacts of shipping alliances as a group rather than individually). This section presents results from empirical tests which examine the four major shipping alliances (2M, G6, CKYHE, and O3) separately.

These results repeat the empirical tests from section 5.1 with the alliance

Table 3: Shipping Economic Impacts by Alliance

Variable	Coefficient	Std. Err.	Variable	Coefficient	Std. Err.
lnDistance	-1.216**	0.009	lnDistance	-1.228**	0.010
lnExportGDP	0.434**	0.164	lnExportGDP	0.480**	0.162
lnImportGDP	0.907**	0.163	lnImportGDP	0.947**	0.162
Capacity	0.005**	0.001	Capacity	0.007**	0.000
2MCapacity	-0.067**	0.017	AllianceMarketShare	-0.122**	0.042
CKYHECapacity	0.002	0.003	2MIndividualCapacity	-0.087*	0.041
G6Capacity	-0.001	0.003	CKYHEIndividualCapacity	0.012	0.009
O3Capacity	0.087**	0.025	G6IndividualCapacity	-0.100**	0.008
Intercept	-7.001**	1.068	O3IndividualCapacity	0.063	0.067
			Intercept	-7.340**	1.049
N	72811		N	72811	
R^2	0.830		R^2	0.830	
$F_{(145,72665)}$	2442.364		$F_{(146,72664)}$	2434.757	

Significance levels : † : 10% * : 5% ** : 1%

variables decomposed by alliance. For the trade-level regression alliance market share is replaced by variables which measure the capacity fielded in that trade by each of the four major alliances scaled to the 10,000 TEU level. For example, the variable "G6Capacity" is equal to the total weekly capacity fielded by the G6 alliance on that nation-pair's trade. For the route level regression individual capacity is decomposed into the individual capacity fielded by each alliance: for example "O3IndividualCapacity" is equal to the weekly TEUs linking the bilateral nation pair operated by the Ocean Three alliance. Table 3 displays the results from these tests.

There are substantial differences in the economic impact of the major shipping alliances. The 2M alliance (the newest and largest of the four) consistently depresses trade; both sets of results suggest that a capacity expansion by 2M is correlated with a 7-8% decrease in bilateral trading flows. In both regressions even if 2M expanded by adding new capacity the expected effect on trade flows is negative. Conversely, there is no sign that either the Ocean Three or CKYHE alliances inhibit trade; their effects are in both sets of results either positive or statistically insignificant. Given the potential for efficiency benefits from a shipping alliance, even a statistically insignificant effect can be interpreted as a weakly positive outcome for the alliance, as the alliance does not actively in-

hibit trade and may be utilizing resources more efficiently. The results for the G6 alliance are slightly more complex. On a trade level there is no sign that G6 inhibits trade; however, on a route level expansion of G6 capacity strongly inhibit trade. While this result must be taken with a grain of salt due to some of the issues with utilizing route-level data, on net this at least weakly suggests that the G6 alliance inhibits trade.

These results show a consistent trend on both geographic levels; the 2M and G6 alliances appear to inhibit trade, whereas the Ocean Three and CKYHE alliances are either weakly positive or at least not actively trade inhibiting. On an individual route level, furthermore, the estimated magnitudes suggest that alliances have economically substantial impacts; an expansion of either 2M or G6 capacity of roughly 10,000 TEUs implies an almost 10% decrease in that nation-pair's bilateral trade. These results add important nuance to the initial empirical conclusions: while as a *group* shipping alliances appear to be inhibiting trade, that conclusion does not apply evenly to every alliance. Exactly what differentiates these two sets of alliances and what that implies about the mechanism via which alliances impact bilateral trade flows is a point that is explored in detail in section 7

6 Robustness Checks

6.1 Endogeneity Concerns in Liner Shipping

The largest potential concern with the validity of the empirical results in sections 5.1 and 5.2 is that they may not represent a causal relationship due to potential endogeneity in alliance capacity choices. It is possible that some unseen force is creating the correlations these results demonstrate between alliance behavior and trade flows, in which case these results could not be taken to suggest that alliances *cause* changes in the volume of trade.

For example, it might be the case that alliances are usually only formed on less active routes where there is insufficient volume for firms to survive without

collaboration; in that case there would be a negative correlation between alliance capacity and trade volume even if alliances in no way actually inhibited trade. Alternatively, it might be the case that in a hub-and-spoke system shipping firms appear to "over-commit" to routes between hubs, leading to capacity on those routes which cannot be justified by the bilateral trade between that specific nation-pair. In short, these potential concerns are based on the fact that liner shipping capacity decisions are not made randomly; rather, these decisions are the results of conscious efforts by profit maximizing firms. This opens up the possibility that underlying economic factors may be driving both sides of any observed correlation.

Without addressing these concerns it is impossible to definitively state that the empirical results accurately measured the causal relationship between alliance activities and shipping volumes. In this section I carry out empirical tests meant to demonstrate that these results are in fact representative of a causal relationship. To do this I exploit a plausibly exogenous regulatory shock to the alliance system to examine the impact of alliance decisions in a subset of the data in which the structure of the alliance system was largely dictated by regulatory rather than economic factors. Estimating the earlier tests in this period produces qualitatively similar results, suggesting that the empirical tests capture a causal relationship.

6.2 Veto of the P3 Alliance as an Endogeneity Check

One way to deal with potential endogeneity concerns is to locate a period in which the distribution of shipping capacity and especially alliance capacity was being driven by non-economic factors. In such a period there would be no link between underlying economic factors and capacity decisions, ensuring that it was impossible for unobserved factors to be creating spurious results. In this section I argue that in the aftermath of a recent regulatory shock to the alliance system, the behavior of the major alliances was largely the result of scrambling to deal with a regulatory shock rather than the result of careful planning. Thus,

in this period there was only a minimal connection between economic factors and alliance decisions.

To briefly summarize the events in question: in the summer of 2013 the three largest carriers in the world, Maersk, MSC, and CMA-CGM announced plans to form a strategic alliance which was formally named "Pacific Three" and quickly dubbed P3. As the name implies the alliance was meant to be oriented towards Asia, especially in the Europe-Asia trade in which the alliance would have controlled over 40% of capacity (Bowman 2013). Reaction to the formation of this alliance was immediate, with many shippers and other carriers expressing concern or outright fear of the potential market power possessed by this alliance, whose structure was considerable tighter than most traditional alliances (Giles, Waha, and Daniels 2014; Raun 2013). Regulatory agencies had equally dramatic responses; holding a "Global Regulatory Summit" in direct response to the potential P3 alliance (Alphaliner 2013c). Despite those responses, U.S. competition authorities ultimately approved the alliance fairly quickly by a vote of 4-1 and after some deliberation European competition authorities followed suit in approving the alliance (Alphaliner 2014). The still-not-fully approved P3 alliance began actively announcing the routing structure the newly formed alliance would undertake (implicitly assuming they had cleared the significant regulatory hurdles with U.S. and E.U. approval), while their rival firms began altering their own shipping patterns to ensure they could compete with this newly formed "super alliance."

However, in late 2014 China unexpectedly vetoed P3, citing the potential for market power and their belief that the P3 alliance was structured in a way which made it "essentially different" from other shipping alliances (Manoj 2014). This veto came as a surprise, as it was only the second time China had ever vetoed a merger or joint venture in any industry on competition grounds (Bilby 2014). In the aftermath of the veto, the three carriers quickly cancelled the planned alliance; given its Pacific focus it would have been unworkable without access to Chinese ports. The shock of China's deeply unexpected veto left each firm scrambling to meet their shipping commitments. Ultimately, Maersk and

MSC formed 2M alliance, while CMA-CGM, the "left over" member, formed the Ocean Three alliance with shipping firms UASC and CSCL; both alliances were quickly granted regulatory approval by the major shipping regulators.

The alliance capacity system that emerged in the immediate aftermath of this veto is arguably exogenous to economic factors. The firms who were going to form P3 had already committed to certain transportation shipments and their post-P3 decisions making was heavily constrained by the need to ensure that the new routing pattern was capable of meeting those obligations, despite having access to less available capacity due to the smaller alliances they ultimately formed. It is plausible to believe that in the short run their decision making was sufficiently constrained that they were unable to carefully match capacity decisions with bilateral economic factors. The other two major alliances (G6 and CKYHE) had made capacity decisions based on an overestimation of the competition they would face and faced similar constraints as they attempted to reallocate their shipping patterns (a time consuming process) while meeting the commitments they had taken on under a higher level of anticipated competition. The distribution of capacity during this period, especially across the different alliances, is unlikely to be driven by direct economic factors given that each alliance faced heavily constraints on their ability to freely allocate their capacity in response to economic factors.

6.3 Results in the P3 Period

This section presents results from repeating the empirical tests reported in sections 5.1 and 5.2 during the time period immediately after the P3 veto (July 2014 to February 2015). Table 4 shows the trade and route level results for all alliances combined (as in section 5.1), while table 5 shows the trade and route level results decomposed by alliance (as in section 5.2)

The results for all alliances as a group in this "post-P3" period are qualitatively similar to the earlier results; alliances inhibit trade, with both overall alliance market share and individual capacity correlated with lower trade flows.

Table 4: P3 Overall Results

Variable	Coefficient	Std. Err.	Variable	Coefficient	Std. Err.
lnDistance	-1.200**	0.025	lnDistance	-1.218**	0.025
lnExportGDP	3.055†	1.597	lnExportGDP	3.120†	1.595
lnImportGDP	0.242	1.587	lnImportGDP	0.392	1.586
Capacity	0.006**	0.001	Capacity	0.006**	0.001
AllianceMarketShare	-0.170†	0.099	AllianceMarketShare	-0.173†	0.098
Intercept	-15.611	10.405	IndividualCapacity	-0.035**	0.007
			Intercept	-16.523	10.395
N	10430		N	10430	
R^2	0.833		R^2	0.834	
$F_{(100,10329)}$	516.037		$F_{(101,10328)}$	512.385	

Significance levels : † : 10% ∗ : 5% ∗∗ : 1%

Indeed, in most cases these overall results are both qualitatively and quantitatively similar, with nearly identical coefficients for most terms

On a firm level the results are again qualitatively similar; the 2M and G6 alliances both inhibit trade, while the Ocean Three and CKYHE alliances either encourage or at least do not actively inhibit trade. Here the results are less quantitatively similar and in some cases considerably less significant, but the basic pattern is largely unchanged. At the least, there is nothing in these results that contradicts the earlier conclusions.

In short, in the aftermath of the P3 veto the essentially random nature of the resulting short term capacity re-allocations produced qualitatively similar effects on trade. This suggests that the earlier results were not spuriously driven by unobservable economic factors, as there are similar effects in a period were the connection between those factors and alliance decisions was extremely tenuous if not non-existent.

A clear overall picture emerges from examining these empirical results. While it is not possible to conclude definitively from these results that alliances are trade inhibiting, at the very least alliances must be able to produce a high level of technical benefits to justify their existence, as in the absence of such benefits these results suggest they are inhibiting trade. However, these empirical tests also suggest that this overall conclusion does not apply indiscriminately; certain alliances seem to exhibit substantial economic benefits or at the very least do

Table 5: P3 Results by Alliance

Variable	Coefficient	Std. Err.	Variable	Coefficient	Std. Err.
lnDistance	-1.209**	0.024	lnDistance	-1.225**	0.025
lnExportGDP	1.528	1.686	lnExportGDP	3.009†	1.597
lnImportGDP	-0.849	1.640	lnImportGDP	0.301	1.588
Capacity	-0.014†	0.007	Capacity	0.006**	0.001
TwoMCapacity	-0.047*	0.019	AllianceMarketShare	-0.157	0.099
CKYHECapacity	0.077	0.054	TwoMIndividualCapacity	-0.059	0.041
G6Capacity	-0.005	0.028	CKYHEIndividualCapacity	0.044†	0.023
O3Capacity	0.071*	0.029	G6IndividualCapacity	-0.101**	0.019
Intercept	-4.238	11.217	O3IndividualCapacity	0.014	0.067
			Intercept	-15.625	10.419
N	10430		N	10430	
R^2	0.834		R^2	0.834	
$F_{(103,10326)}$	502.34		$F_{(104,10325)}$	498.279	

Significance levels : † : 10% * : 5% ** : 1%

not appear to be actively inhibiting trade. Indeed, these results consistently divide the major alliances into two distinct groups: the 2M and G6 alliances, who appear to inhibit trade, and the Ocean Three and CKYHE alliances, who appear to encourage trade. This suggests that it would be wrong to conclude that shipping alliances are an *inherently* detrimental concept; at least some alliances appear to be encouraging trade, suggesting the potential value of this organizational form is not illusory. The following section examines these two sets of alliances in detail to attempt to determine what is causing the differences in their economic impacts.

7 Alliance Structure and Anti-Trust Concerns

7.1 Basic Information on the Four Major Alliances

While direct empirical testing can establish whether or not an alliance inhibits trade, it cannot easily establish why this might be the case. While establishing that some alliances seem to be inhibiting trade is important, understanding the source of these differences is vital, especially for regulatory purposes. Examining the extent to which these alliances are visibly different could explain what mechanism drives how alliances impact trade flows, which would have impor-

tant anti-competitive implications when regulatory bodies are forced to evaluate a specific alliance ex ante. Based on the alliance-level results in the empirical section, the following sections examine the four major alliances in detail, with a specific emphasis on examining whether there are consistent differences between the alliances which seem to enhance trade (CKYHE and O3) and the alliances which seem to depress trade (2M and G6). Overall, this analysis shows that there is a surprising degree of homogeneity between the major alliances, suggesting that the differences between them are driven by internal factors. Examining the frequency with which members of each alliance undertake commercial behavior outside of the alliance structure provides strong suggestive evidence for this conclusion, with the members of the trade-enhancing alliances being far more likely to operate outside of their alliance. This suggests that differences in alliance impact are driven by the extent to which the alliance can control their members.

This section examines each alliance's characteristics (size, national distribution, etc), while the following two sections examine each alliance's commercial behavior. Based on Alphaliner's data on total capacity amongst the top-twenty largest shipping firms in 2015, O3 and CKYHE are the relatively small alliances, with combined member capacities of 14.8% and 17.1%, respectively, of total world capacity, while G6 and 2M are the larger alliances with, respectively, 18.4% and 29.1% of world capacity. However, there is no consistent trend in individual firm sizes; the "trade-inhibiting alliances" do not necessarily consist more heavily of the world's largest firms[6].

There are also some differences in the national origin of each alliance's member firms, although given the global nature of the industry it is unclear whether national firm origin is still relevant for business decisions. 2M and G6's members tend to be from comparatively richer nations; 2M's members are Dutch and

6. Numerically, 2M's members are 1st and 2nd in world capacity ranking. G6's are 4th, 10th, 11th, 12th, 14th, and 18th. O3's are 3rd, 7th, and 15th. CKYHE's are 5th, 6th, 8th, 13th, and 16th. Overall, there is no obvious difference between the two sets; the trade-inhibiting alliances are in total 1-2, 4, 10-12, 14, and 18th, while the trade-enhancing alliances are 3, 5-8, 13, 15-16th.

Swiss, while G6 members are from Korea, Germany, Hong Kong, Singapore, and two from Japan. O3 and CKYHE members include a higher proportion of firms from poorer and less developing nations; O3's members are French, Chinese, and Arabic, while CKYHE's members are from Korea, China, Japan, and two from Taiwan[7]. The only European firm in the trade-enhancing alliances is CMA-CGM, a French firm, and their entry into Ocean Three was a somewhat hasty response to the rejection of the P3 alliance, which would only have included European members. The two trade-enhancing alliances seem to draw more heavily from the developing world, whose firms are relatively young and were historically outsiders from the conference system.

It might seem intuitively appealing to examine the internal structure of the major four alliances; perhaps trade-inhibiting alliances have a more regimented structure whereas trade-enhancing alliances are less directly organized. However, from the outside there are no substantial differences in the organizational structure of any of the major alliances. This can be shown by examining the documents each alliance has to file with the U.S. Federal Maritime Commission to gain operational approval, specifically FMC Agreements 012293, 012300, 012194-002, and 012299 for the 2M, CKYHE, G6, and O3 alliances respectively. These agreements specify the mechanism each alliance uses to establish "widespread" changes, defined as those which impact all members such as significant changes to capacity levels or route selections, or to amend or dissolve their existing agreement. In all four cases these mechanisms are either an executive committee vote or an unspecified process of reaching agreement amongst the members overseen by a committee who can recommend ideas but not implement them. Indeed this "committee" structure is so widespread that some financial analysts have criticized it as being too inflexible to allow alliances to utilize more complete forms of co-operation (such as co-operating negotiations with port owners) to achieve higher profits (Tirschwell 2014).

7. Technically, UASC in the O3 alliance is from the United Arab Emirates, but it was founded as a joint venture between various Arab nations along the Persian Gulf and "Middle Eastern" or "Arab" is a more accurate description of its origin.

Table 6: Current Alliance Behavior

Trade	Statistic	2M	Ocean Three	CKYHE	G6
Transpacific	Number of Services	5	5	19	17
	Number of Ships	76	47	161	145
	Total Weekly Capacity	44,563	43,469	122,837	121,001
	Mean Weekly Capacity	8,913	8,694	6,465	7,117
Transatlantic	Number of Services	5	0	4	4
	Number of Ships	29	0	48	32
	Total Weekly Capacity	31,402	0	26,534	21,732
	Mean Weekly Capacity	6,280	0	6,634	5,433
Asia-Europe	Number of Services	11	8	9	8
	Number of Ships	135	87	105	87
	Total Weekly Capacity	138,901	82,783	90,253	83,978
	Mean Weekly Capacity	12,627	10,473	10,028	10,497

As of February 2015, based on data from Alphaliner.

In short there is little available information on exactly how these alliances reach decisions; their deliberation processes are based on internal negotiations which are not publicly visible and cannot be directly examined. From the outside nothing differentiates each alliance's decision making process, although it is entirely possible that the bargaining system that emerges within each alliance may be radically different. In general, while there are some differences amongst the alliances in their worldwide characteristics, they are not consistent enough to be anything more than suggestive.

7.2 Current Alliance Service Distribution

In this section I examine the geographic distribution of each alliance's current service structure. Table 6 summarizes the activities of the four major alliances currently in operation along the three major trades, showing the number of services, the total number of ships operating by all services, and both the total and mean weekly capacity in TEUs for all services

Table 6 shows that there is a surprising degree of homogeneity in alliance behavior, especially between the two younger alliances (2M and O3) and the two older alliances (G6 and CKYHE). CKYHE and G6 exhibit extremely similar levels of overall capacity and very similar geographic distributions, although

they differ substantially in the number of ships used and the number of ports visited. CKYHE uses more ships, which implies that their average vessels are smaller than G6's average vessel, which allows them to reach more ports. G6 services are more focused, visiting a smaller number of ports with larger vessels.

The two newer alliances, 2M and O3, are also quite similar in their structure on the Transpacific and Europe-Asia trades, with the important caveat that 2M is larger than O3; both newer alliances are heavily focused on the Europe-Asia trade, with smaller commitments to the Transpacific trade. They differ significantly only in the Transatlantic trade were O3 does not operate. Both alliances utilize larger individual vessels than the older alliances, with 2M's average Europe-Asia vessel size exceeding 10,000 TEUs of capacity. While there are differences between the various alliances, they do not cut evenly between the trade-enhancing and trade-inhibiting alliances, and it is not obvious from examining table 6 what might be driving differences between *those* two sets.

7.3 Historical Alliance Service Distribution

Table 6 summarizes the current distribution of alliance services. 2M and O3 have only existed for a short period of time and have not yet experienced any substantial variation in their service structure. G6 and CKYHE, however, are older and their service structures have undergone substantial changes over time. This section presents information on how those services have changed in the last five years. Table 7 shows the average total weekly capacity by major trade for both the CKYHE and G6 alliances by year from 2011-2014 while table 8 shows the average total capacity on each major trade for the same years.

Tables 7 and 8 both demonstrate a convergence in alliance behavior as both alliances shifted towards a global focus in the last five years. Initially, CKYHE and G6 are quite differentiated, with CKYHE heavily focused on the Transpacific trade and barely involved in the other two major trades, while G6 was similarly focused on trade between Europe-Asia and largely uninvolved in the other trades. This does not necessarily imply that the firms in either alliance

Table 7: Average Capacity Evolution over Time

	CKYHE			G6		
	Asia-NA	Europe - NA	Europe - Asia	Asia-NA	Europe - NA	Europe - Asia
2011	5,646	4,273	7,252	5,468	4,055	6,921
2012	5,574	4,844	8,433	5,597	4,249	7,911
2013	5,553	4,974	8,910	5,954	4,288	9,278
2014	6,138	5,930	9,549	6,501	4,966	10,393

Based on data from Alphaliner

Table 8: Total Capacity Evolution over Time

	CKYHE			G6		
	Asia-NA	Europe - NA	Europe - Asia	Asia-NA	Europe - NA	Europe - Asia
2011	84,225	12,819	14,503	37,005	24,328	68,609
2012	95,608	18,262	66,894	39,180	25,495	69,280
2013	99,936	19,987	89,844	52,805	25,728	75,671
2014	112,987	24,216	90,253	115,706	28,280	83,145

Based on data from Alphaliner

were not active in the other regions, only that their co-operation was highly trade specific; they likely operated alone or in smaller collaborative ventures on the other trades. As late as 2011-2012 many alliances were still largely regional, focused only on specific areas with only minor collaboration elsewhere.

Over time these distinctions began to dissolve as each alliance oriented itself more towards a world in which alliances were universally competing with other alliances rather than simply co-operating in their "home domain." The convergence in the distribution of services amongst these alliances emphasizes the increasingly global nature of the alliance system and demonstrates that these recent developments are fundamentally different than the previous structure of this market; even at the height of the conference system co-operation in liner shipping was largely on a region-by-region basis. Globally oriented co-operation is an invention of the last five years.

These results and the results in section 7.2 do not show any significant differences in commercial behavior between the major alliances; what gaps that did exist have steadily eroded over time, and it is difficult to believe that the relatively small capacity structure differences which still exist are large enough to

explain the differences in economic impacts across alliances, especially given that the gaps that do exist seem to be between the newer and older alliances, rather than the trade-enhancing and trade-inhibiting alliances. The relative similarity in each alliance's service structure suggests that differences in each alliance's economic impact are being driven by internal factors rather than commercial behavior. The final section of this paper examines a unique practice in the liner shipping industry which can be used to examine how internally focused an alliance is.

7.4 Alliance Slot-Sharing Behavior

While it is not possible to directly examine internal alliance negotiations, as such negotiations are proprietary, one way to examine the extent to which alliances are able to impose tight controls on their member firm's behavior is to examine the frequency with which alliance members seem to deviate from that alliance's structure. In recent decades liner shipping firms have made heavy use of a collaborative arrangement known as "slot-sharing." Slot-sharing is when one shipping firm purchases space ("slots") on another shipping firm's vessel(s). It is a cost-effective way to maintain a low level of capacity on a route without having to commission a new vessel. When purchasing slots on another shipping firm's vessel, the purchasing carrier is in effect acting like a customer, reserving a certain amount of space for a fixed period of time for some fixed payment. In this section I examine the average frequency with which members of the major alliances purchase slots on another alliance's services. While these sorts of "cross-slot" agreements are not necessarily something a specific alliance would object to, a high frequency of activity outside of the alliance might reasonably be taken to suggest a low level of alliance control, whereas a low frequency of activity outside the alliance suggests an alliance that is more tightly internally focused.

Table 9 shows, as of February 2015, how frequently members of each alliance purchases space on other alliances' services. Each entry shows the number of

Table 9: Alliance Purchase Matrix

		Purchased From			
		2M	G6	CKYHE	O3
Purchased By	2M	–	1 (3.8%)	0 (0.0%)	0 (0%)
	G6	0 (0%)	–	3 (10.7%)	0 (0%)
	CKYHE	0 (0%)	2 (7.7%)	–	10 (76.9%)
	O3	0 (0%)	0 (0%)	15 (53.5%)	–

Based on data from Alphaliner.

services upon which members of the row alliance has purchased slots from the column alliance, with the implied percent of the column alliance's services with slots purchased by the row alliance's members in parentheses. This table only include purchases of slots by members of the other major alliances, ignoring slot purchases by firms who are not a member of a major alliance. In the modern industry the small number of shipping firms who operate internationally but are not members of the major alliances are generally forced to rely on significant slot purchases to survive, as they do not have enough ships to offer a sufficiently diverse geographic coverage with their own services. Examining all slot sales risks diluting the value of the analysis by including firms who are more customers than rivals.

Table 9 demonstrates that there are clear distinctions between the slot purchasing behaviors of the different alliances; the trade-inhibiting alliances are largely closed, as they rarely either sell slots to members of other alliances or purchase slots on other alliance's services, suggesting a tighter level of control over the volume shipped on those services. In contrast, the trade-enhancing alliances are largely open, with many or even most of their services selling space to members of rival alliances. This is an important point, because if alliances are meant to achieve technical efficiencies there is no *per se* reason to avoid selling slots to any possible takers. The goal of a purely efficiency seeking alliance is to ensure sufficient cargo to fill a larger vessel's hold, thereby utilizing economies of scale in ship size; whom that cargo belongs does not impact that goal. A lack of cross-slotting is thus at least suggestive evidence for an alliance having goals beyond simple technical gains, such as focusing trade into a specific rout-

ing system or enhancing their member's bargaining positions. While one could argue that this is a result of more careful alliance planning among the closed alliances leaving member firms no reason to go outside of the alliance structure -there is an at least plausible explanation for this gap- the starkness of these results suggests that it instead represent a difference in alliance discipline.

In summary, it is difficult to pin the differences between alliances on any visible difference in their operations; in terms of legal, geographic, and even for the most part service structure the four major alliances are surprisingly similar. The only notable differences between the two sets of alliances are their overall sizes and the frequency with which their members deviate from the alliance structure. While not definitive, these results combined with the empirical results provides suggestive evidence that the differences may be emerging from fairly traditional market power sources, with larger and more disciplined alliances able to exert more dramatic market power.

From a regulatory perspective, the difficulty of establishing any hard-and-fast ways to distinguish between competitive and non-competitive alliances suggests that attempting to establish set rules for distinguishing when an alliance is acceptable or not. If there is not a strong connection between visible characteristics and economic impacts then regulations based on those characteristics are unlikely to accurately distinguish whether or not an alliance warrants regulatory action. Instead, practical regulatory concerns are likely better served by carefully monitoring the behavior and results of shipping alliances as a way to prevent them from becoming anti-competitive, accepting that the sources of anti-competitive outcomes are subtle enough that deterring them with formal standards is unlikely to be effective.

8 Conclusion

The liner shipping industry is notoriously difficult to analyze. The sheer geographical and cultural scale of international shipping makes it difficult to even keep track of, let alone deeply analyze, every part of the industry. Rarely is

the almost unbelievable *scale* of the global trading system made more obvious then when one tries to consider the complexity that accompanies the seemingly basic act of carrying output from port-to-port. Analysis is further complicated by the industries' long traditions of unusually high levels of co-operation and extreme secrecy, leaving analysts attempting to examine a very unique industry using data which can, at best, be described as "incomplete."

Despite these difficulties, this research has produced valuable empirical results utilizing a data set that is, to the best of my knowledge, the most complete measurement of the liner shipping sector ever used in formal research. These results suggest that skepticism about liner shipping alliances may be entirely justified: shipping alliances are correlated with depressed trade flows in a manner entirely consistent with the exercise of market power. However further analysis suggest that regulatory bodies should utilize a "wait and see" strategy: some alliances seem to consistently encourage trade, which suggests that the alliance concept itself can plausibly be economically beneficial. Furthermore, there is only suggestive evidence about the actual sources of alliance market power; hasty regulatory responses may well inadvertently prevent beneficial alliances from expanding or forming due to insufficient understanding of what differentiates alliances. Careful monitoring of shipping alliances, healthy skepticism, and more research are a far more prudent response.

In terms of the broader economic literature, liner shipping is an underexplored topic. International shipping is an important part of the global trading system and becomes more important every year as trade increasingly orients itself to longer distance movements. This research shows that transportation issues can have significant impacts on the actual volume of trade, which should make them an important part of the research into the economics of trade. More research is warranted into the trade implications of transportation issues to examine how this largely neglected subject might enhance our understanding of the economics behind international trade.

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