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The Liberalization process of the Ferry System in Greece, 2001-2014 (August): What are the benefits to users of Aegean Sea Transportation?

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Abstract

The great deficits created in the pursuit of the Keynesian welfare state led to governmental failure. This increasingly posed a greater risk to financial system than market failure, due to the increasing scale effects. Competition ceases to exist. The operations of markets first described by Adam Smith (1776) and confirmed by Alfred Marshall (1920). As a result of the increasing risk of governmental failure, legal barriers to 'entry' removed (*liberalization*) and private ownership promoted (*privatization*). Here, we investigate the impact of the 'liberalization processes of (*private)'* 'Aegean Ferry System' since 2001, and look at the effect on passenger fares and private cars freight rates under 'free entry'. Quality of service was never regulated…We showed the existence of increasing returns to scale in the ferry system and in the individual ship, basing our arguments on empirical data and on theory. The fixed cost of the ferry system is 68%, indicating failure of the ferry market, when prices had to be determined by *marginal cost* leading to operational losses, since average cost is twice greater than marginal cost. Despite the hopes of the users that Greek Aegean ferry system's liberalization would lead to reduction in fares and freight rates, this did not happen. Reforms paralleled those in air transport in USA, and a similar "hub and spoke" network system proposed and adopted careless by Greece, following the ΣΕΘΑΜ study. Fares and private car freight rates rose in a series of waves, owners frequently blaming the rising oil prices…

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1. Introduction

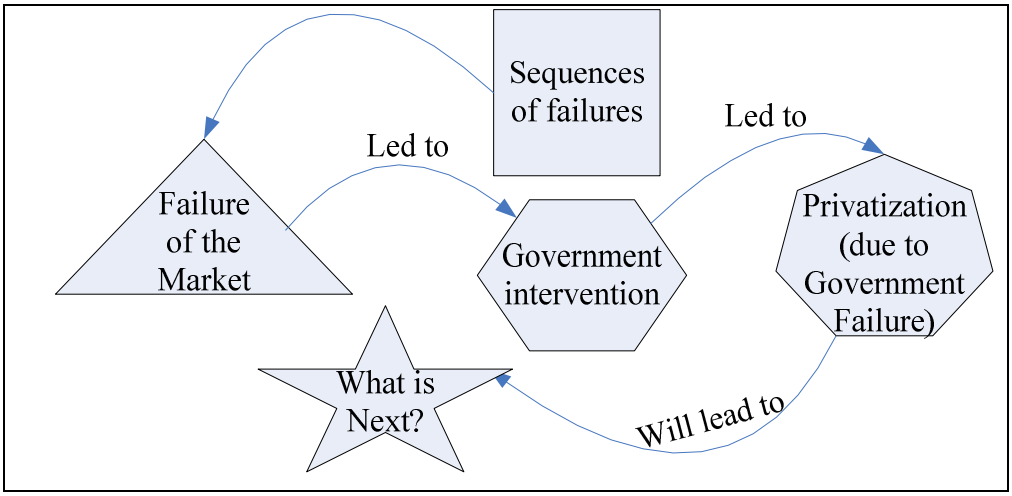
1.1 Failure of the intervention by State in economy and society

Failure of Keynesian economics (Keynes, 1936), which established the 'Welfare State' as an institution, and the 1929-1933 economic crisis, led to policies of

liberalization (=removal of legal barriers to entry) and privatization[1] (=preference for private over public ownership) in the public domain (Jackson and Price, 1994). Notable, the size of the 'UK public sector' increased from 25% of GDP in 1946 to 52% in 1970…

We suspect, however, that a circular acting prevailed in this issue (Diagram 1).

Diagram 1. Does one failure cause next?



As shown (Diagram 1), market failure led to government intervention, while government failure led to privatization…Is this better? Economists provide no single answer and they reply with empirical results, distinguishing short term and long term, examine static and dynamic efficiency, the distribution of income and wealth and adjustments to cyclical fluctuations and structural adjustments (Jackson and Price, 1994).

Keynesian economics, we believe, did not fail for the reasons advanced by Marx, who accused capitalism as a crisis-generating system. Keynes admitted Marx. Keynes defined the profession of economists as that of the 'engineers of the economy'. Economy suffers, due to falling 'marginal efficiency of capital' and reduced 'confidence' due to crisis, but Keynes claimed that it can be fixed.

Moreover, no one disputes today the re-occurrence of serious economic crises since 1975, which culminated in the crisis of end 2008. The failure of the welfare state was due, in our opinion, not to its rational use, but rather to its *irrational* use, and its exploitation to extreme limits (unemployment benefits reported to have motivated people *not to work;* Stiglitz, 2000). The loss by the State of its social role destined to

[1] Privatization is narrowly defined as *selling public sector assets ('family's silver')*. It includes deregulation, opening up of state monopolies to greater competition, contracting out, private provision of public services, joint capital projects -using public and private funds- reducing subsidies and increasing or introducing user charges… Privatization is not panacea; *it creates new problems while solving old ones*, or recreates difficulties, which '*nationalization'* and '*increased public activity'* sought to solve. *It provides an attractive solution for governments, who wish to reduce (or stabilize) fiscal deficits* (Jackson and Price, 1994). Strangely the Aegean Ferry system, destined to be liberalized, was and is private…The issue really was abolishing the 'cabotage privilege' and 'State's determination of fares and freight rates as well the provision of licenses.

affect also Greek coastal shipping by adjusting fares up in 'economy class' destined for the new poor.

1.2 Privatization

Helm and Jenkinson (1998) argued that the emerged 'privatization wave' posed two distinct, but related, problems: (1) how to regulate monopoly and (2) how to introduce competition. Privatization, deregulation, opening up of markets and expansion of contracting state, are *worldwide phenomena*, which some claim begun first in Chile in 1980s.

Deregulation of (private) Aegean ferry system began in 2001[2] (not on 1st January 2004- date specified by EEC directive 3577/1992) and by law (No 2932) after a 12 year transition period (1992-2004). In 2002, Greek State liberalized fares of all ship's seats and cabins (law 2941), except 'third economy class' (designed for the new poor travelling on deck in summer, as mentioned). This last measure was a governmental effort to retain the pre-existing *social role*[3] of ferries. The complete liberalization took place in May 2006. This meant abolishing all 'service licenses' provided by the state and also any 'state determination of fares and freight rates'. The quality of service was never regulated and thus was never deregulated… (sic).

Here we evaluate the Aegean ferry system (private cars and passengers - a 'Ro-Ro' system[4]) from mainland ports to Greek islands, and between Aegean islands, as developed after opening it up to 'free entry' and 'deregulation' of fares and freight rates.

Market deregulation was expected to have the same effect as air transportation elsewhere, where market liberalization led to reduced levels for air tickets in certain cases, and increase in user's surplus. Passenger fares and private car freight rates *increased* for certain destinations by as much as 60% in Greece... To be exact, fares differed from company to company, as well from those in Europe, for journeys of same distances…

Greek Government and EU claimed that deregulation (meaning mainly 'free entry' of the European ship-owners and labor into Greek ferry system) would lead to *better quality, lower fares, increased frequency of service, a multiplication of ports of departure, faster journeys for all users*… We examine here what went wrong, and why these high expectations were never realized.

[2] Greeks tried to liberate by law Aegean ferry system on 1st January 2003-a year earlier than they had to (as directed by EU in 1992) - so that to avoid liberalization to coincide with Olympic Games (August, 2004).

[3] This was an effort to beatify the cartel of the ferry system, we reckon.

[4] System where ships are designed to have side doors with ramps; also doors in front and/or back, so that to enable traffic on wheels (cars, lorries, bikes, bicycles, campers/trailers with tends or whatever else moves on wheels) to enter rolling-in the *garage* of the ship and rolling-out of it at destination. This enabled people on vacation to bring own car or other transport means, and visit places in large islands, with no or deficient public transport. This system replaced the 'roll up, roll down' system of 1960s, where cars had to be lifted up by cranes on ship's deck…The new system decreased also ship's loading/unloading time. The new system benefitted also Lorries for the transport of goods to islands. Tourism (demand) certainly demanded these changes (improved mobility). Technology came in the Greek ferry system slowly given the use of second hand ships.

2. Literature Review

Stigler (1971) argued that as a rule, *regulation* is required by industry and is designed and operated *primarily for its benefit*, *meaning an increase in industry's profitability*. Graham, Kaplan and Sibley (1983) argued that the implications of the liberalization of airlines in USA were *mixed*. Air tickets increased on short distance routes. On longer routes, and those with more passengers, fares were reduced. Also competition that emerged, *forced* the introduction of *discounts* to passengers.
Dresner and Tretheway (1992) studied certain international air routes (1976-1981). Air tickets were reduced only in *economy classes* after deregulation by 35%. Goulielmos and Lekakos (1992) analyzed the economic structure of Greek coastal passenger shipping as an historical, informal, *cartel*. In this system, the Minister of Merchant Marine assumed the role…of supply. Goulielmos and Milliaraki (1994) talked about the economic and sociological implications of the mobility of EU seamen on board vessels belonging to EU ship-owners.

Maillebian and Hansen (1995) examined North Atlantic air routes (1969-1989), and found reductions in tickets from 35% to 45%. Rietveld, Schipper and Nijkamp (2001) studied air liberalization results (1988-1992) over various routes with different levels of demand and distances. They concluded that rates were 34% lower after deregulation. Kahn (2002) argued that liberalization led to reduced rates from 10% to 18%, and higher productivity. Rates per mile are higher on *high competition routes* with *lower demand*. However, rates in the 8 major hubs were 19% higher than other routes from other hub airports.

Goulielmos and Sambrakos (2002) stated that in the proceedings of a special committee, Greek state approved fares in 1954, so that to cover the expenses of the ship. This fare system was a continuation of that of 1949, which has been called 'the new fares system after World War II'. The 1949 arrangements set fares to be in harmony with the then prevailing cost[5] of ships.

The same, or very similar, pricing system is sometimes described, in economic literature, as '*full cost pricing*', an empirical method where 'profit maximization' may emerge by evolution, or by chance (Earl, 1995). In such a system, the average cost (per passenger), called prime or direct cost, is determined by theory, and augmented by a percentage to cover fixed cost (on-cost or indirect cost) and a percentage (~10%) is added for profit. The cost of capital is not included, or is covered by profit. Notable, in 1992, Greek ferry ship-owners, in a study commissioned to KEPE (State center of planning and economic research), tried to include the cost of capital into fares in the form of annual amortization, but without success.

Cole (2005) argued that if owners of means of transport exhibiting economies of scale put uniform prices equal to average cost, this is something *sub-optimal*. If price equals marginal cost, given that marginal cost is less than average cost, this leads to losses. Wilfred (2006) studied ten routes in Philippines with different market characteristics and levels of competition (1981-2003). She concluded that the average rate per kilometer on routes served by at least two companies was 10% lower (and this affected about 90% of the passengers).

[5] It is worthwhile asking the cost of what ship? Probably this was the so called 'marginal ship' bearing the higher cost among all other vessel.

3. Increasing returns to scale

3.1 Market failure

The most important 'market failure', which leads to public production of private goods, is when markets are *not* competitive[6] (Stiglitz, 2000). The common reason for markets not being competitive is the existence of '*increasing returns to scale*' (falling average long run cost). Average costs of production decline[7] as production increases (Diagrams 3-4).

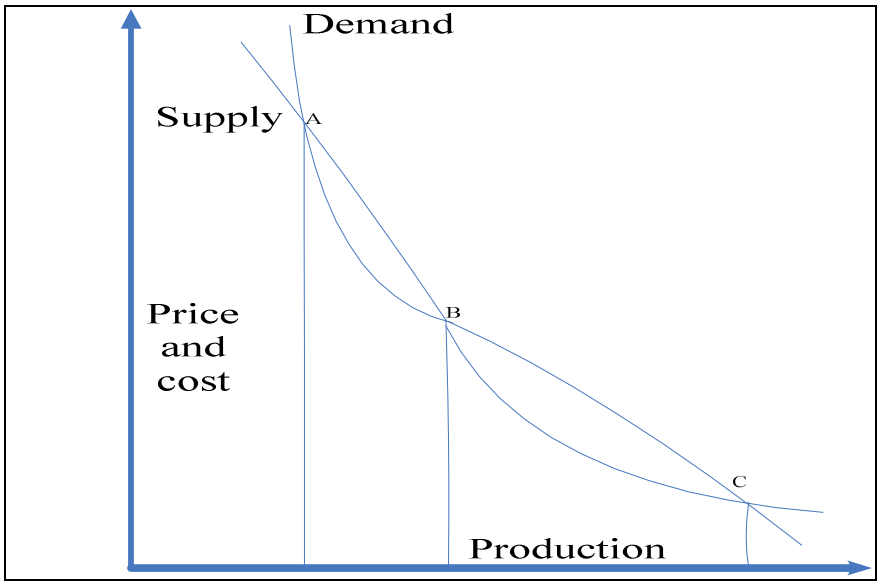
This notion is as old as Adam Smith[8] (1723-1790), who argued that 'agricultural products rise in price, while the price of manufactured articles tends naturally to fall' (*Wealth of Nations, 1776*; Blaug, 1997) and this is the origin of the famous classical notion that 'agriculture operates under conditions of *diminishing returns*' (increasing costs), while 'industry enjoys *increasing returns* (falling costs)'; returns are here defined in a historical sense. For Adam Smith costs are reduced due to improvements in the means of transportation and communication, which also appeared 100 years later in Marshall's Principles, and also discussed by Stopford (2009) for sea transport. More important today is that economists know that increasing returns can cause multiple equilibria and possible inefficiency (Diagram 2).

[6] This is the original cause for governmental undertaking of postal services, telecommunications, water, ports, electricity, sea passenger transportation, gas, buses, lighthouses, pilots, canals, rivers, bridges, parks, rails, airlines, education and others.

[7] If there is a part of total cost independent of production (fixed cost), then that will be divided by gradually more units as production rises, and the *average will be falling*. If another part of the total cost increases with increasing production, (variable cost, covering, for ships labor/crew cost, fuel, port dues, i.e. costs depending on the number of voyages), then that cost will rise with production. Which of the two parts will *dominate* and give total cost a certain form, is not made, however, clear by economists. Economies of scale can be expected in the first case, and they can be physical/real (returns to scale) or expressed in money terms (costs to scale) (here the large scale purchases that lead to 'volume discounts' play a role, as also happens in ocean shipping in many areas of cost and especially in bunkers, supplies, etc.). Implicit assumptions are made here, including the idea that larger production means larger scale. In shipping, larger production means faster ships, or larger ships, but also more ships under same company.

[8] Smith was Scottish political economist and the author of the book "An inquiry into the nature and causes of the wealth of nations" (1776). Economists consider Smith to be the founder of economic science, establishing 'political economy' (meaning economics of the state/society) as a separate science. Smith looked after the question why certain nations are wealthier than others. Smith established growth of economies exclusively on specialization in 'resource industries', ignoring 'knowledge industries'. These last we need, in Greece, for further growth. Greece based its progress, almost exclusively, on expanding Tourism and Merchant Marine, and on the wrong growth policy based on 'attracting foreign direct investment' instead of by 'purchasing industrial know-how'.

Diagram 2. Multiple equilibria in production according to Marshall (1920).



Source: Marshall (1920), appendix H.

In Diagram 2, we see three (A, B and C) equilibria, and a falling Supply curve.

(2) Increasing returns to scale in Greek ferry industry

The allocation of shipping costs in the ferry industry, (1988-1990), as percentages, are shown in Table 1.

Table 1. Allocation of Costs in Greek Coastal Shipping %, 1988-1990

Crew costs: 41.5%	**Repairs, maintenance, stores: 14.4%**	**Insurance: 3.5%**	**Administration cost-general expenses: 8.8%**	**Total fixed cost: 68.2%**
Fuel, lubricants: 22%	Port expenses: 9.8%	---	---	Total variable (voyage) cost: 31.8%
Total→				100%

Source: Study based on questionnaires filled by most ferry companies, 1992, Hellenic Center of Research and Planning: "The economic analysis of Greek coastal shipping companies".

Table 1 confirms the dominance of fixed cost (68% rounded) over marginal cost. This implies that if pricing is not carried out on average cost (second best), but on marginal cost (32% rounded) (First best; dictated by the theory of maximizing profits), and given that average cost is twice higher than marginal cost, companies will experience losses; in the long run, they will leave the industry. This outcome is surely not desirable (Diagram 3).

Diagram 3. The impact of divergence between Marginal and Average Cost

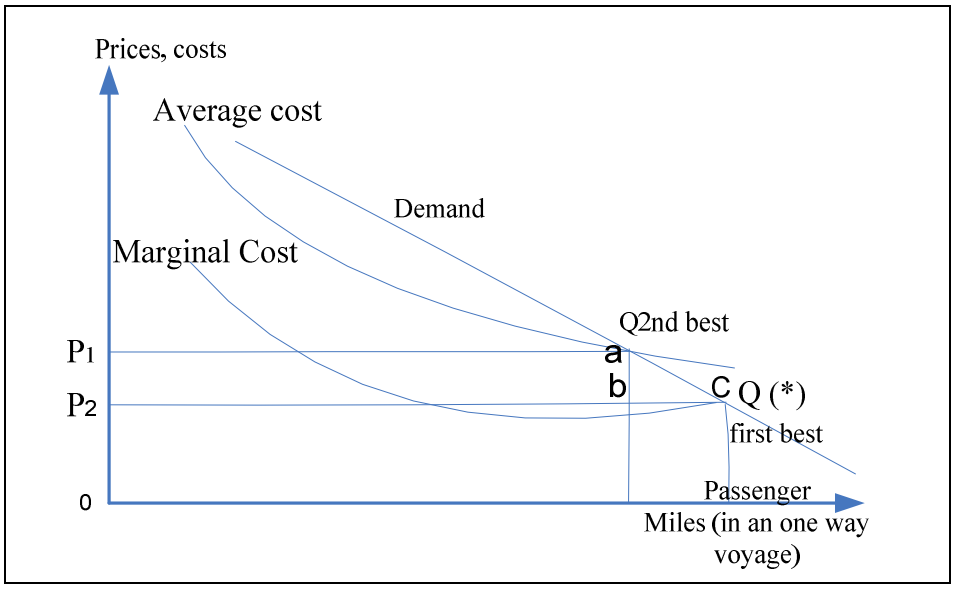
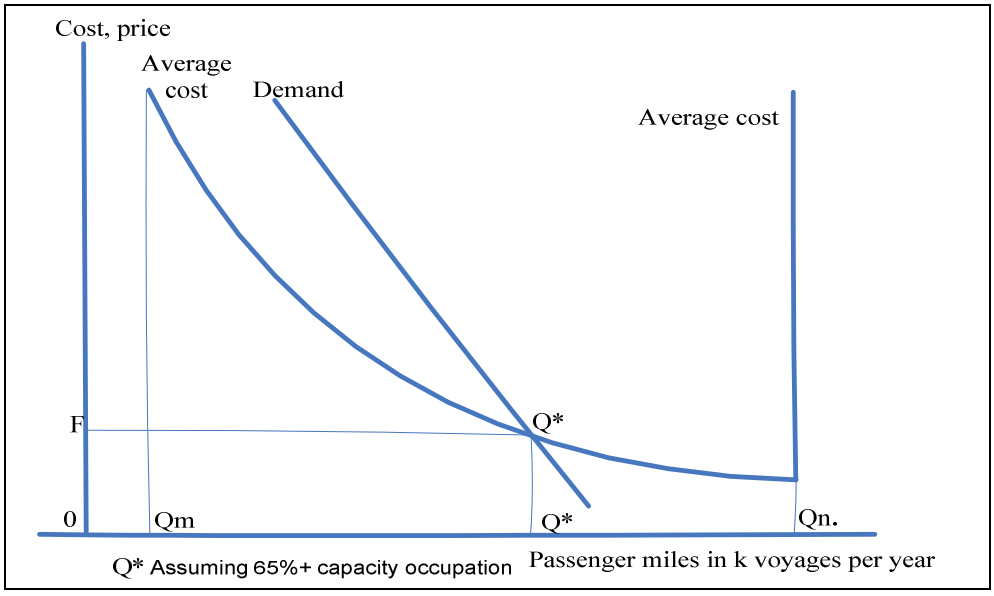


Diagram 3 shows that marginal cost is less than average cost (AC>MC); average cost is more than twice the marginal cost (Table 1). So, pricing based on marginal cost, as theory suggests, will end in losses [$0P_1Q$ (2nd best) - $0P_2Q(*)$ (1st best)]. This shows the way competition fails. So, Greek ship-owners… were right to demand, by intuition or experience, fares equal to average cost in order to avoid losses…Falling average cost is not an exclusive characteristic of a ferry company, but also of the ferry per se (Diagram 4).

3.2 Increasing returns to scale in a ferry

Diagram 4: Voyage Economies of Scale in a Ferry



In Diagram 4, the curve representing ship's average cost (e.g. total cost divided by passenger miles) is drawn[9]. This curve is continuously falling (after Qm[10]), until ship's capacity utilization of transporting passengers over the distance required for one way voyage reaches 100%; thereafter average cost rises vertically[11]. Equilibrium (the point where the quantity of passengers maximizes profits) is achieved at Q* (where also MC=MR; not shown); this is the number of passengers per voyage that satisfies demand at the booking office. The ship has a minimum number of seats/cabins/garage spaces to be occupied[12] (say 65 %+) in order to have a profit adequate to motivate ship to perform a next voyage. Marginal cost may be defined (in one of several definitions) as the cost of an extra voyage, equal to voyage's variable cost. Yearly production in ferry transport is equal to the 'number of voyages' from Port A to Port B, (C, D etc), which is a discrete number in calendar time. Marginal cost may be also defined as the cost (or the addition to total cost) of an extra passenger transported one way, which again in money terms is something low.

Each ferry has a different marginal cost. So, to arrive at a company's marginal cost we must add up the costs of all its ships. A shipping company can be defined as a set of vessels. The peculiar point in the ferry sector is the difficulty of adapting supply *completely* to demand[13]. To achieve full adaptation, a company's fleet must have many types, many sizes and many speeds so that demand to be *exactly* satisfied. And this given the preferences of demand, distances, load factors and whether journey is during day or night. In ferries, supply is rather indivisible *unlike to what happens in road transport*. The second hand ships used are designed for other routes; or ships change routes at will/or by economic necessity. In road transport e.g. is easier to adapt supply to demand, since the means of transport are made suitable for transporting the particular unit load or maximum cargo. In practice, ferry fleets are specialized in one or two uniform types of ships – e.g. conventional (slow speed) vessels or e.g. Blue star/fast ferries transporting only passengers or passengers and private cars. In general, ferries are astonishingly *inflexible* being all of almost similar size, over different distances and port limitations, and over different economies of scale. We believe that a multi-sized multi-speed super fast newly-built fleet will be much more profitable[14]. In Greek ferry system, preferences of users were never taken into account given the existing low elasticity of demand, while Aegean air-transport never challenged ferries seriously, unlike to what certain economists believe. Ferry owners guided mainly by

[9] Selecting passengers as the unit of analysis has no particular significance.

[10] A ship is not going to offer services if the estimated capacity utilization is not at a bare minimum. At this bare minimum of the number of passengers and prior to it (0Qm) production is zero and the ship does not pre-announce any voyage. This level is determined by the point when loss from the voyage is greater than the loss from not providing service. This last decision for licensed ferry is taken by law per year, or after a number of voyages, when concrete conclusions can be drawn. In the past, in Greece, interruption of a service for economic reasons required State permission. In 2014, a study carried out by McKinsey, proposed slow steaming as one way to improve profitability including the use of LNG instead of heavy diesel for bunkers. This first proposal means lower quality. For the second proposal, the study means newly built ferries we presume. Slow steaming has been applied in container ships during recent depression with outstanding savings in fuel cost and great reductions in CO2 emissions. Shippers, however, were complaining for great delays.

[11] The only way to transport more passengers is to exceed the limit placed by State for safety, something illegal.

[12] JetBlue, in air transport, within six months of its founding, turned into profit, but ended by 2001 in black. Its load factor was 78%, which constituted a benchmark for all other airlines in 2001, even after 11th of September (Besanko et al, 2004; 2010).

[13] In airlines, when traffic volume rises, the 150-seat Boeing 737 is replaced by the 300-seat Boeing 767.

[14] There is perhaps no point in having a fast ferry with speed 60 knots per hour between Piraeus and Crete, where passenger wants to depart late in the night and being in Crete early in next morning.

economies of scale and 'economies of capital' (2nd hand ferries) with the exception[15] of Super-fast ferries and Minoan.

The part of the cost to the right of the cut (Q*) (Diagram 4) with demand curve is the 'wasted capacity' –excess supply[16]. This part, 0Q* to Qn, is due either to a wrong estimate of demand or wrong selection of ship's size for the particular voyage, or both.

Production costs, with the exception of the rather low variable voyage costs (fuel consumed, port of destination dues, cleaning expenses, cost of perishable catering, etc.) are incurred, whether a voyage is carried out or not (fixed cost); these become fixed as soon as ship is ready to sail at the port of departure. After maximum capacity utilization, Qn (which is set by safety regulations, varying between winter and summer in Greece), there is no *way* to transport additional passengers during one voyage and at the same time conform to law, as mentioned. As shown, realizing real economies of scale is always a matter of demand. Leaving now theory, we come now to real life.

4. Deregulation results of Aegean Ferry transport (2006; 2001-2009)

4.1 History

Ferry transport in Greece passed through various phases: from full state ownership to full private ownership[17]. It is also the most researched sector of Greek shipping, since 1836[18], where a great number of Committees[19] has been established to solve the so called 'coastal shipping problem', but without success; this we reckon is due to the fact that ship-owners and users have great opposite interests.

Originally, and especially during the World economic crisis of 1929-1933, the question was whether the State should intervene given that the unregulated competition was catastrophic, destroying quality, creating discontinuous and unreliable supply of services, undermining safety and introducing discriminatory treatment of users (Kahn, 1988). A price war could easily appear, even in absence of regulation, and moreover losses are also likely, as we have shown, when pricing is based on 'marginal cost'. An example is the price wars also raged in the always 'liberal' coastal transportation between Greece and Italy (Goulielmos-Gatzoli, 2004; 2009). One elegant and disguised way of waging a price war nowadays is *discounts*. Another is by choosing to serve a route during only high demand days and popular hours of departure (cream skimming).

4.2 State regulation (1976)

The most influential regulatory instrument in the pre-liberalization era was the Presidential Decree 684/1976. This piece, which really arose out of necessity, emerged after 1974 at a time when dictatorship failed in Greece, and when an oversupply of 'ship licenses' were in circulation. At that time, a kind of 'state license' used to be

[15] Attica enterprises were the first to introduce into Ferry system a series of what we may call newly built 'ferries like cruise ships', while Minoan introduced one ferry like a 'luxury ferry'. These ships were faster –approaching 25 knots- and were suitable to impress high income tourists visiting Rhodes, Santorini, Mykonos, Crete and Italy.

[16] This is not greater than 5% of ship's overall capacity, allowing for future demand and competition.

[17] Onassis applied, without success, for the exclusive exploitation of the Aegean ferry system in 1946. In 1939 the 'Common direction of the coastal transport system' was established.

[18] Royal Law: 14/11/1836 for Merchant Marine.

[19] 1934, 1943, 1954, 1957, 1958, 1959, 1963; and 1982.

provided only by banks, which provided 'a letter certifying an approved ship loan'. Supply of ship services at that time was in the hands of banks, no doubt influenced by politicians.

This decree regulated: (1) the entry into the ferry system, and (2) fares and freight rates charged. Most of the regulatory regimes, in Europe and USA, regulated also quality of service. In Appendix I we present the paper work followed to obtain a license (in 1993), where elements of quality of service, apart from ship's speed and age, were all absent (e.g. air conditions, stabilizers, modern passenger seats, provision of cabins and other comforts, catering, cleaning etc).

This 1976 system replaced in fact the *supply curve,* which was set by… the Minister of Merchant Marine, who acted mostly on political grounds. If one assumes that fares were determined by cost, where distance is a proxy, one had to obtain a negative straight line relationship between fares per sea mile and distance in miles. But this was not achievable then, and it is not even now. *Other forces but distances determine fares and a freight rate is our basic conclusion*.

The route 'Piraeus-Paros', for example, charged €0.62 per mile in 2008, while 'Piraeus-Rhodes' charged €0.21 (250 sea miles); 'Piraeus-Naxos' charged €0.53 (same distance as going to Paros) and 'Piraeus-Iraklion' charged €0.26 (154 sea miles). These examples imply that other factors played a role in addition to cost/distance (i.e. demand, competition, fare discrimination, historical structure of fares etc.).

4.3 Steps towards liberalization, 2001-2006

In 2002 (Law 2941) the state maintained only the control of the fares for 'economy class' (due to social concern, since these seats are used by the new poor, as mentioned). These fares were the basis for determining also the fares for Classes A and B using a multiplication coefficient. Uneconomic lines were *subsidized* by the passengers in the remunerative lines by paying an (unfair from our perspective) fee of 3% on fares paid. Later this abolished.

In May 2006, fares were fully liberated for voyages that had certain characteristics: ports of destination and departures with traffic of at least 150,000 passengers per year. Such a route had to be served by at least two ship-companies independent one from the other (tentative duopoly). A possible monopoly, however, was allowed, if passenger traffic was 300,000 passengers and over p.a. The old system transformed into one of a 'hub and spoke' network, as this was in air transport (presented briefly below), taking into account mainly the interests of ship-owners. This system had been suggested by a study commissioned (called ΣΕΘΑΜ in Greek). The study was partially wrong, and worked to the detriment of users, as it is shown.

Our experience and scientific acumen told us that liberalization will cause diminishing frequency of services, higher ticket prices, diminishing number of the ports of departure and destination, multiplication of un-remunerative itineraries (except during austerity years) that are then *passed-on* by ship-owners to the state as 'social services', and a great rise of state subsidies for these un-remunerative destinations (except during austerity years).

The proposed system tried to increase the economies of scale of the ferries, which is not wrong in itself, provided ports adjust to, which was not so in this country; at the same time fares for the new poor passengers and owners of low cubic capacity cars/motorbikes/cycles, were fixed. After end 2008, subsidies either have been reduced or not paid due to austerity programs. Sometimes subsidies were 'provided' to certain owners on political grounds.

Our opinion is that the social aspects of the ferry system should be undertaken by non-speculative municipal companies, carefully designed and staffed, where total costs are equal to total revenues and economic and monopolistic profits are zero. The era when Greek ship-owners provided a 'package deal', serving 'popular' and 'isolated islands' together, has passed for ever.

During 2001 and 2008, the tickets of ferry services rose by 43% due to 'liberalization spirit', while the consumer price index rose by 24%. Between 2004 and 2006 the following specific rises occurred, *in advance of liberalization*:

Table 2. Rises in fares and car freight rates in Aegean Sea transportation prior to liberalization, 2004-2006

Destination:	Date /fare	Date/Rate	Data/fare	Date/fare
Vathi (Samos)	May 2004/ €23.6 economy class, a medium quality ship	2006 € 30.0 Rise €6.4	Cos island, May 2004, economy class/ € 27.0	2006 € 37.4 Rise €9.6
Piraeus-Iraklion	2004 car freight rate with 4 passengers economy class/ € 346.4 single € 386.4 return	2006 €428.0 single (+€81.6) € 472.0 return (+€85.6)		

Source: companies' internet sites

As mentioned, not only fares and freight rates for cars were originally regulated by the state, but also the percentage increase in them, with ship-owners applying for increases from time to time. The Ministries of Commerce, Merchant Marine and Finance and Economy, had first to approve requested rises. In the past, rises above inflation rate were unlikely to be approved unless companies could demonstrate, to a state inspector, rises in their costs, including the cost of bunkers. In certain years in the past (1981 and after) bunker cost was subsidized by the state. Ship-owners never accepted the re-design of the ferry ticket system, which showed serious distortions in certain routes.

4.4 Liberalized fares (2006)

Fares and freight rates for cars at the outset of full liberalization, in May 2006, during May-July, and for 11 lines with ships departing from Piraeus, and for economy class, are shown (Table 3) (fast ferries are excluded).

Table 3: Prevailed fares and freight rates and their percentage increase soon after liberalization in May-July, 2006, in Economy Class

Destination/ Company	Fares pre of liberalization €	Fares after Liberalization €	Difference % (rounded)	Car freight rate € pre-	Car Freight Rate € after-	Difference % (Rounded(*))
Cos island						
Blue Star Ferries	35.8	39.5	~10	97.7	97.5	~0
Rhodes						
Blue Star f.	42.5	46.0	~8	97.7	97.5	~0
GAFerries	35.5	39.4	11	95.7	100.4	~5
Syros						
Blue Star f.	20.7	23.0	~11	66.6	66.5	~0
Hellenic Seaways	17.3	19.5	~11	---	---	---
Tinos						
Blue Star f.	22.2	24.5	~10	70.3	70.5	~0
Mykonos						
Blue Star f.	24.2	26.5	~11	75.8	76	~0
GAFerries f.	20.3	22.4	~10	74	77	~4
Hellenic Seaways	20.2	22.5	~13	-	-	-
Paros						
Blue Star f.	24	25.5	~6	75	75	0
Amorgos						
Blue Star f.	23.8	26	~9	57.3	67.5	~18
Samos (Vathi)						
GAFerries	26.3	29.2	~11	88.7	93.1	~5
Santorini						
Hellenic Seaways	23.3	26.7	~15			
Patmos						
Blue Star f.	29.1	29.0	~0	97.7	97.5	~0
Leros						
Blue star f.	30.3	30.5	~0	97.7	97.5	~0

Source: data from companies' internet sites. (*) Freight rates for private cars were considered over-priced even before liberalization and so rises –as shown- were moderate, or zero. Freight rates for cars were close among a great number of destinations, independently of distance. Intensity of demand however influenced rates (e.g. Rhodes, Mykonos, Paros) as well island's size (e.g. Samos, Cos), which requires a car. *Quality of service* played also a role in pricing, since ferries of Blue Star and Hellenic Seaways (exclusive for passengers) are newer and faster than G A Ferries, *and so they charged higher fares*. These better ships are the price-leaders. Inferior ships charge lower, but close to leader, as these inferior ships are also wanted by demand; the trans-ship/cross elasticity of demand is negative (Goulielmos, 2002).

As shown (Table 3), on the outset of liberalization, passenger fares increased from 0% to 15%. Freight rates rose from 0% to 18%.

4.5 Variations in fares and freight rates, 2006-2008

4.5.1. In Summer 2007

The whole liberalization climate caused higher costs to users, as mentioned, as owners charged discounted rises; this in 2001 and in 2003 (41% on average), 2005, 2006 (7%) and 2007. Rises noted also due to intensity of demand during high season (July-August) (in 2007), especially for destinations like Cyclades and Dodecanese. Also, ships priced a joint service (passenger seat *plus a* car place) higher than the corresponding single fares (passengers); so fares and freight rates went up due to joint demand, though quality of service remained as it was … Fares increased to destinations like Mytilene, Rhodes, and Mykonos (economy class) by up to 16% and freight rates for cars (maximum 6m in length) to Syros, Paros, Rhodes and Samos went up by up to 10%.

4.5.2 2006-2008 (June-April)

The liberalization of 'economy class fares' and 'freight rates of private cars' started on 1st June 2006 for all destinations (from Piraeus). Oil prices have not yet increased. The highest rises were adopted by older tonnage destined to Syros and Mykonos (intense demand). Companies also found the opportune time to apply discriminatory pricing specifying substantially different fares between passengers in 'economy class' for: (a) a seat on deck, (b) an airplane-type seat (10% to 18% more in high season) and (c) a seat inside the saloon of the ship (75% dearer). Table 4 presents the situation (1st June 2006 - 16th April 2008).

Table 4. Economy class fares between 2006 and 2008 in Aegean ferry system

Destination from Piraeus	Economy class fares before liberalization (2006)	Economy class fares after liberalization 2008	Rise % (rounded)
Syros	€ 17.3	€ 26	~50
Mykonos	€ 20	€ 30.5	~51
Paros	€ 20	€ 25	25
Rhodes	€ 22.4	€ 43	92 (!)
Naxos	€ 20	€ 25	25
Samos	€ 26.3	€ 38	44.5 (!)
Iraklion	€ 26.6	€ 32	~20

Source: Companies' internet sites.

As shown, the social policy was renounced by ship-owners after liberalization and economy class, destined for new poor, adopted rises amounting to more than 51% in 2 years in intense demand destinations like Mykonos and 92% for Rhodes. The 2006 fares for passengers are so close between them, and is possible to reflect distance (cost), while in 2008 they reflected 'what the traffic can bear'; we cannot imagine that costs could increase by as much as fares have increased in two years, even with rising oil prices. This outcome justifies the pre-existence of regulation –given also that ΡΑΘΕ (antimonopoly state agency) has been dislocated.

4.5.3 2009-2010 (July-August): comparison with 2006-2010

The fares for passengers and freight rates for cars in 8 high demand destinations from Piraeus, after liberalization, in summer 2009, are shown (Table 5). One should expect fares to be proportional to distance for all companies.

Table 5. Mean deviation in passenger and car fares in Aegean ferry system, July 2009

Destination (from Piraeus):	Deviation from mean *passenger* fare among companies in €	Deviation from mean freight rate for *cars*, among companies, in €
1. to Chania	0.70	- - -
2. to Rhodes	18.30	2.30
3. to Mykonos	29.10 (!)	0.60
4. to Samos	8.30	9.30
5. to Iraklion	11.60	6.10
6. to Santorini	29.50 (!)	27.00 (!)
7. to Mytilene	6.60	3.60
8. to Chios	5.80	2.70

Source: companies' internet sites.

Companies after liberalization paid more attention to *demand*, as popular destinations maintained the greater mean deviations in passenger fares, and large islands attracted more passengers with cars (e.g. Samos vis-à-vis Mykonos). Santorini did both. If factors like competition, demand, level of quality of service (proxy of crossing hours and speed), as well maximum willingness to pay[20], were similar, we believe that fares should be equal among companies and destinations. *But they are not*. In Crete, for example, M/V 'Crete 1' provides inferior quality, (higher crossing time, greater age), and charges more than M/V 'Festos Palace'. This is surely not a cost based pricing, but 'what the traffic can bear'. The demand and quality of eight popular destination services are shown by proxies (speed, demand) in Appendix II.

Expecting beforehand that deregulation would lead to higher fares[21], than lower, we compared ticket levels of certain routes of Aegean ferry system in 2006, 2008 and 2010. For conventional vessels, a high increase in average tickets was (2006-2008)

[20] Economics tried to become exact science adopting mathematical and econometrical tools, but the whole effort ruined by psychology. 'Willingness-to-pay' is such a concept as well the property of 'homogeneous products' etc. In the first concept, 'perceived value' is higher than 'actual value' (price), and thus one considers oneself *benefited* if one takes the service rather than not. The most serious concept of Economics is 'demand curve', we reckon. How is this curve constructed for an individual? If the fare was €100, then 10 voyages will be demanded per year to the islands of say Mykonos; if price was €50 then 25 voyages would be undertaken; and if €200 only 2 voyages would be taken. If this is a true reflection of user's preferences, the carrier *knows* what user is *willing to pay*… Why not extract this? How? By creating a user's surplus. The user's surplus is the amount by which say the €200 fare can be reduced in an actual payment. So, maximum willingness-to-pay is less than actual payment by an amount equal to user's surplus.

[21] Ferry owners told press, before 2006, that prices in Greek ferries were 40% lower than the ones existing in EU! So everybody was prepared that there would be increases after 2006 to reach harmony with EU.

44% and a slighter one (2008-2010) was ~5%. This was due: to the sharp rise in prices during the first two years after full liberalization (2006-2008), the global recession (end of 2008) and to the acute economic problems of Greek citizens due to austerity programs (2009-2010).

After liberalization, prices rose for conventional vessels on average (4 years; 2006-2010) 49%! For high-speed vessels the increases of tickets were smaller (~21.5%). This, because these fares were already high before liberalization (Sitzimis, 2011). Ticket levels were reduced by 7%, as a consequence of a more elastic demand, compared with conventional vessels (2008-2010) (Sitzimis, 2012). There was a preference of the ferry users to reduce costs because of economic crisis (users desired to make the same trip for less money, even at a lower quality –higher age, less speed and fewer comforts). The owners of ferry companies tried to make tickets more affordable to users (especially car-owners) due to a decline in demand.

The increases in tickets after liberalization are presented in Diagrams 5 and 6. All destinations show a rise of charges after liberalization (2006-2010). The highest prices along with the largest price increases appear in "Piraeus – Rhodes". Also, an intense demand is demonstrated in «Piraeus-Mykonos».

Is it true that the longer the distance, and the higher the demand, the higher the fares (Goulielmos 1996; Sitzimis 2011; 2012). There is a difference of €19 in the transportation charges of conventional and high speed vessels to Mykonos. Making an assumption of 1.000 economy class passengers per trip, this is equal to € 19.000/trip".

Diagram 5. Comparison of passenger fares (€) in economy class (in 7 routes from Piraeus) of conventional vessels after liberalization (2006)

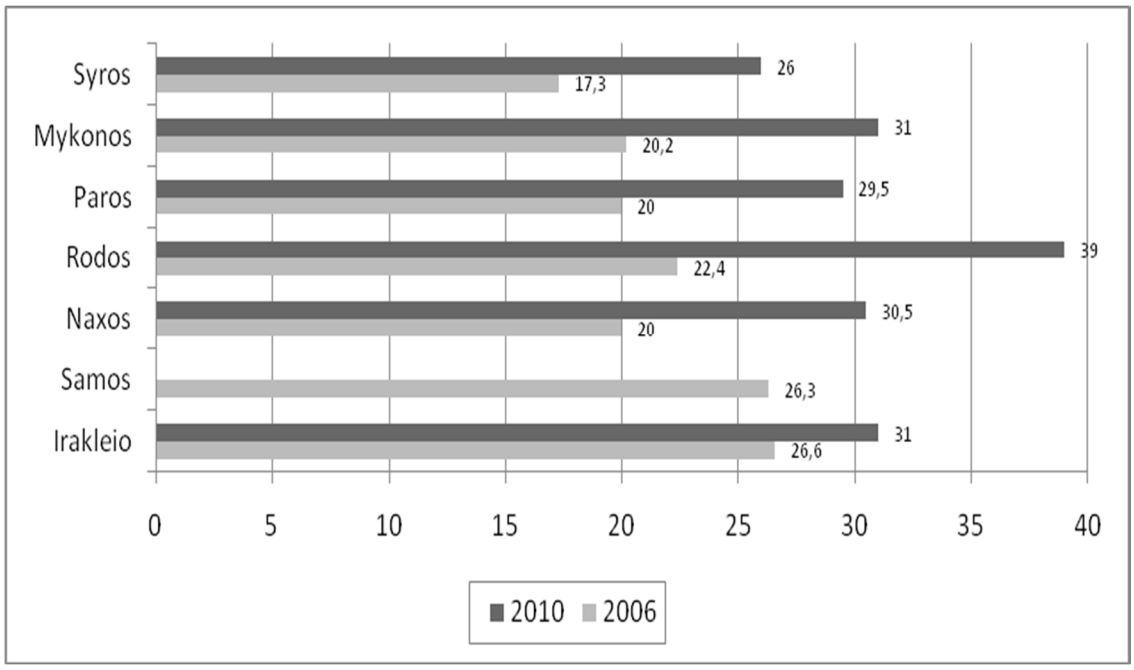
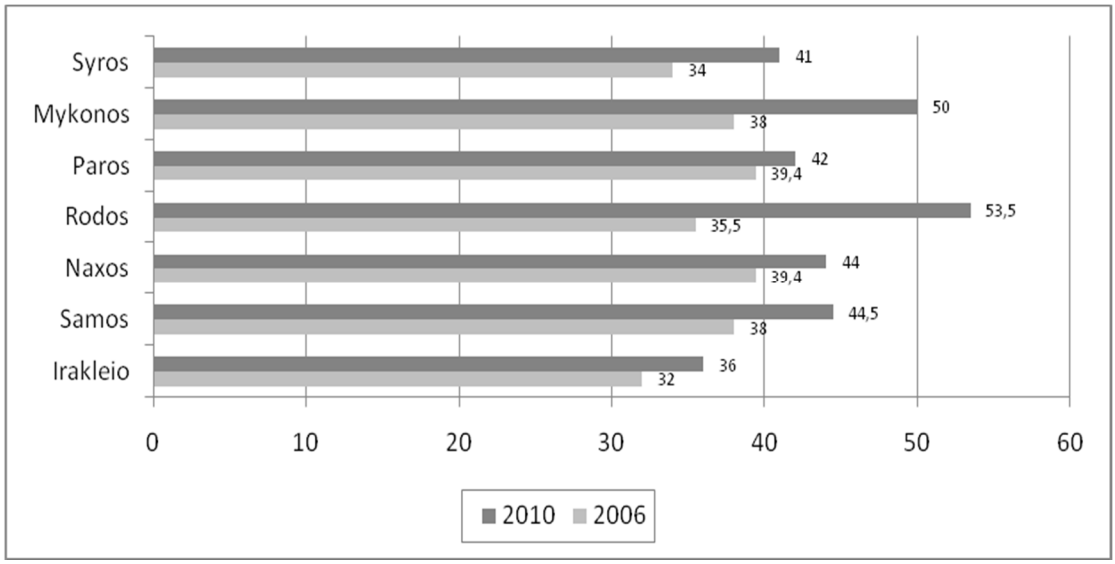


Diagram 6. Comparison of passenger fares (€) in economy class (in 7 routes from Piraeus) for high-speed vessels after liberalization (2006)



4.5.4 2010-2014 (July-August)

Did liberalization process create any competitive conditions among owners? Are the tickets lower than before abolishing 'cabotage privilege'? The answer is negative! We selected 10 high-demand routes and compare their tickets for a round trip with a conventional vessel for a family of 4 members (2 adults; 2 children) (Table 6). We assume that they booked a cabin of four beds with a car. In cases that there was more than 1 Ferry Company in the route, we chose the vessel with the lower ticket. The results show that there is a deviation in ticket levels, (2010-2014, August), of about €100 (27%).

The largest increases took place in Cyclades and the smallest in long distanced islands (Kos and Rhodes) (where, however, tickets were already high). Demand plays an important role in the ferry market. This is in accordance with our theory.

Table 6. Deviation of ticket prices (€, %) in 10 high-demand routes (2010-2014) (July-August)

	Route	2010	2014	% Deviation rounded
1	Piraeus-Paros	€ 347	€ 520	*50*
2	Piraeus-Sifnos	€ 277	€ 414	*50*
3	Piraeus-Naxos	€ 347	€ 499	*44*
4	Piraeus-Santorini	€ 581	€ 615	6
5	Piraeus-Mytilini	€ 540	€ 610	13
6	Piraeus-Chios	€ 495	€ 533	8
7	Piraeus-Mykonos	€ 347	€ 504	*45*
8	Piraeus-Kos	€ 569	€ 579.5	2
9	Piraeus-Amorgos	€ 347	€ 489	*41*
10	Piraeus-Rhodes	€ 569	€ 609,5	7
	Average	**€ 441,9**	**€ 537,3**	**22**

Source: Companies' internet sites.

Oil prices rose 113% (2006-2013) (XRTC, 2013). This, in addition with global economic recession, negative growth of the Greek economy[22] (-4.5% in 2013), poor financial condition of ship owners (2006-2012; Table 7), caused a decrease of companies' profits of 254% and a decline in passenger and vehicle traffic (24% and 5% respectively) (XRTC, 2013). These conditions in ferries contributed to significantly higher tickets; a more appropriate pricing based on a negative elasticity of demand could, however, boost revenue. Moreover, ship owners tried to recover losses from loss-making routes.

Table 7. The financial situation of the 5 groups of ferry companies in crisis period (2008-2012) (million €)

EBITDA	2008	2009	2010	2011	2012
ANEK	27.30	24.20	-11.40	12.30	4.24
ATTICA	47.70(*)	29.10	-2.50	-8.85	10.16
HELLENIC	31.50	31.50	-1.20	5.57	-7.89
MINOAN	41.50	7.33	-35.90	-13.89	-7.21
NEL	-16.27	-4.66	-27.30	-48.44	-62.40
Total	131.73	87.47	-78.30	-53.31	-63.10
Total without NEL	148.00	92.13	-51.00	-4.87	-0.70

Source: XRTC LTD. (*) Attica performed better.

As shown, the situation became more crucial in 2010-2012, coinciding with the austerity programs and the timid recovery of tourism, which rose mainly in 2013 and in 2014. Interest paid is not subtracted from EBITDA (as well taxes and retained profits for amortization[23]). Given the interest shown by the banks, commissioning also a rescue study, we assume that interest payable on loans will be high.

More important is the structural fact that the ferry fleet declined[24], as in 2000 there were 119 vessels (125 in 2001; 19.5 years average age) and in 2013 fell to 75 (!) (16.8 average age) (falling to 69 in 2010; 16.5 average age), not due so much to quality (age). Quality judged by age improved from 19.5 years in 2001 to 16.8 in 2013 (13.5 in 2002; the lowest) in all 4 companies, but NEL. Interesting is that fleet's decline started in 2005 by selling ships (112-85=27 ships) probably on pressure from the banks and the vertical fall in demand after Olympic games (2004) and not so much by the end 2008 crisis…Thanks God there is a second hand market to sell ferry family's silver…This picture was as follows:

[22] The GDP of Greece varied from 235 b€ in 2009 to 235.5 in 2013. A complete stagnation. Source: medium run austerity program: http://www.minfin.gr/content....

[23] This is dangerous as the replacement of the ferries will be prohibited in future as amortization will be on paper. Companies will resort on bank finance again.

[24] Data from XRTC Ltd.

Table 8. Sale of ferry family's silver- 4 Coastal Shipping Groups, except NEL, 2000-2013

Year	Number of ships	Difference	Total bought +/sold-
2000	119	---	----
2001	125	6	6
2002	123	-2	
2003	122	-1	
2004	112	-10	-56
2005	85	-27	
2006	84	-1	
2007	83	-1	
2008	81	-2	
2009	81	---	
2010	69	-12	
2011	89	+20	20
2012	81	-8	-14
2013	75	-6	

A possible indication of the decline of the ferry income from cars is the fall in the index of 'arrivals of foreign tourists', which was equal to 100 in 1994 and fell during 2008-2013 to: 164, 150, 141, 155, 147 and 160; renting of cars index[25] on the other hand was for 2008-2013: 273, 246, 229, 254, 241, and 278 (Hertz data, 2013); the car fleet reduced from 28,600 cars to 21,200 (2009-2013). As shown, renting rose much faster than tourist arrivals, indicating domestic passengers. The correlation (Pearson's) of EBITDA of Table 7 and the index of the arrivals of foreign tourists (Hertz data) is equal to 0.89 (rounded) with R square equal to 0.79 (rounded). Renting provided to HERTZ about €31 million on average per year (36% of total) (2009-2013) (35 m in 2013 and 34 m in 2008).

Above data indicates recovery in 2013 and 2014, due to the recovery of foreign tourism. In the past, two ferry companies bankrupted when President of USA warned tourists (travel warning) not to visit Greece, indicating the strong all time dependence of ferry income on foreign demand, as shown also above.

4.5.5 'What the traffic can bear'

Perfect price discrimination[26] involves determining fares according to what each unit of traffic can bear (Kahn, 1988), and the basis is the differences, not in cost, but in

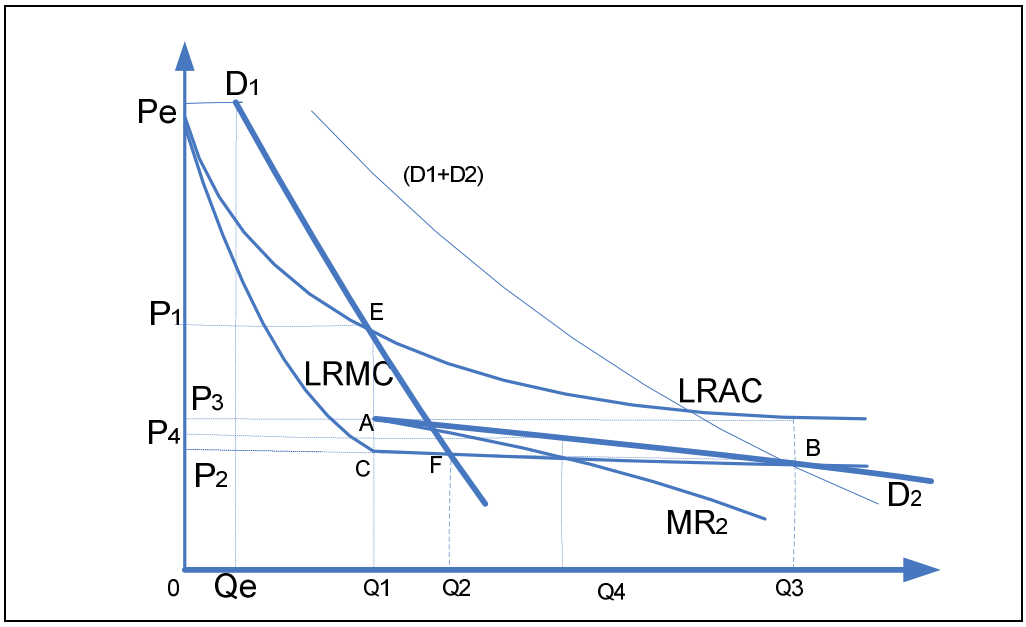
[25] We believe that when ferry freight rates for cars are excessive, passengers prefer to rent a car at destination instead of transporting their own.

[26] Demand equation is P1=f(Q1). If the price is P^{o}_1 and the user buys Q_1^{o} units, the total expenditure on the service will be $P^{o}_1 Q_1^{o}$ (€). The area under the demand curve, up to point Q1= Q_1^{o} represents the sum of money that the user would be *willing to pay* for Q_1^{o} units *rather than not having this service*. As mentioned, the difference between what the user is willing to pay and what he (she) actually pays, is *'consumer surplus'*, denoted: $\int_0^{Q_1^{o}} f(Q_1)dq_1 - P^{o}_1 Q^{0}_1$; a measure of benefit. We assume that ship-owners want this difference to be as small as possible, but convincing at the same time the user to buy the ticket (elasticity of demand). Marketing calls this 'delivered value' and economists call the whole situation 'discrete choice model of consumer behavior'… Psychology again.

demand, i.e. in the value of each unit of service to each purchaser. Differential charges are determined on the basis of the respective elasticities of demand, in which case, users can also be *segmented*. Users are charged on the basis of the value of service, ability to pay or benefits derived (monopolistic exploitation) (Diagram 7). The other option is to charge on the basis of cost (marginal cost). Charging on willingness to pay involves ship-owners trying to extract maximum pay from each class of users. Marginal cost is less than the amount passengers are willing to pay to secure a seat rather than not making the journey.

Suppose (Diagram 7) one ferry is planned to be built. Her (expected) marginal cost for economy class is everywhere below average, but there is one price ($0P_1$) at which the expected total average long run cost (LRAC) is covered (for say saloon seats). This price, $0P_1$, however, is not optimal (Kahn, 1988), since it is not at the lowest LRAC (Q_3), and thus an excess capacity is created. One solution for the ship is to sell a number of economy class passenger seats close to, or closer to, the optimum $0Q_3$, by charging different prices to possible other classes of users (e.g. airport type seats and deck seats), thus increasing the number of users.

Diagram 7. Decreasing costs and price discrimination (static long run decreasing costs)



Source: Modified from Kahn (1988).

The vessel 'realizes' (Diagram 7) that there are two potentially separable classes of customers that possess different demand curves: D_1 (inelastic[27]) and D_2 (elastic) and they want to buy beyond 0q1 seats, i.e. Q_1Q_2 and Q_1Q_3 seats at a price Q3B, which covers the *long run incremental cost* (i.e. LRMC) for additional (Q_1Q_3) production. Here marginal cost is defined within the ship, instead of assuming, as we did previously, the cost of an extra voyage to be equal to marginal cost. Q_1 can be used as the start of a new set of axes for D_2, as Kahn showed. The theory suggests that all pay Q3B or 0P2, assuming a common demand D_1+D_2 (shown) and the resulting MRs (not shown).

[27] Such pricing is not fair. Inelastic demand people pay higher fares instead of lower. This criticism applies also to Ramsey prices using same mentality.

In this latter case, losses (a deficit) are produced, as LRAC is greater than LMMC. Society loses are an addition to its welfare equal to CEF. And it would be even better if price $0P_2$ was paid also by D_1 users. The ship now earns $0P_1$ times $0Q_1$ plus Q_1Q_3 times $0P_2$, which is greater than $0P_1$ times $0Q_1$, and at the same time the ship achieves full capacity in economy class.

In our opinion, in practice, the ship will try to charge a little over 0Pe for $0QeQ_1$ passengers and a little over $0P_3$ for QeQ_3, provided that elasticities of demand allow this; as we know elasticity of demand is greater than 1 there (D_1 is linear), and it is better for *revenue to lower price than increase it*. Measuring elasticities of demand for 7 popular destinations we derived following results:

Table 9. Elasticity of demand in 7 popular destinations, 2006-2008.

Period	Destination Share (rounded)	Fare €	Quantity (Passengers)	Elasticity (rounded)
2006-2008 slow speed	Syros (13% share 2006)	17.3-26.0	324,172-310,065	-0.11
2006-2008 high speed		34.0-44.0	138,931-132,885	-0.17
2006-2008 slow speed	Mykonos (16% share 2006)	20.2-30.5	400,747-397,328	-0.02
2006-2008 high speed		38.0-51.5	171,749-170,284	-0.03
2006-2008 slow speed	Paros (16.5% share 2006)	20.0-25.0	409,644-384,416	-0.29
2006-2008 high speed		39.4-51.0	175,562-164,750	-0.25
2006-2008 slow speed	Rhodes (12% share 2006)	22.4-43.0	287,984-225,075	-0.39
2006-2008 high speed		35.5-53.0	123,422-96,461	-0.62
2006-2008 slow speed	Naxos (12.5% share 2006)	20.0-25.0	310,328-296,771	-0.20
2006-2008 high speed		39.4-54.5	132,998-127,187	-0.14
2006-2008 slow speed	Samos (5% share 2006)	26.3-38.0	123,423-115,022	-0.19
2006-2008 High speed		38.0-42.5	52,895-49,295	-0.63
2006-2008 slow speed	Iraklion (25% share 2006)	26.6-32.0	623,436-572,979	-0.46
2006-2008 high speed		32.0-39.0	267,187-245,563	-0.43

As shown in the above Table, the most demanding destination was Iraklion with lion's share 25%. Paros outperformed both Mykonos and Rhodes and Syros outperformed Naxos. All fares increased from 2006 to 2008. High speed ferries charged increased fares at a much lower demand. Demand fell from 2006 (3.54 million) to 2008 (3.3) and 3.16 in 2010 at lower fares in most destinations. All elasticities are less than 1 and in certain destinations high speed ferries have higher elasticities than slow ferries as expected. Slow ferries are alternatives to high speeds.

Elasticities show that ferries were wrong to lower fares in certain destinations because this leads to less revenue.

5. What is yet to be expected from liberalization?

5.1 Greece

Research (ΣΕΘΑΜ), as mentioned, suggested the hub-and-spoke system in the Aegean Ferry system, which has been copied from airline industry, applied there since 1978 (Besanko et al, 2004; 2010). A ship, however, is an excellent place for 'economies', but not only for the classical economies of scale, but also because she provides many different services (a combination of passenger, car and lorry transport). If above services had to be produced (each service) on its own (separately), the total cost would be higher (= economies of scope).

Moreover, services are routed to and from several markets (islands). The distribution of above services has been organized around hub-and-spoke network, as mentioned. The ferry will transport passengers from a number of spoke ports (Mykonos, Rhodes) through one central hub (Piraeus or Rafina). The pairs of origin–destination, like 'Piraeus-Mykonos' and 'Piraeus-Rhodes', must be thought of as distinct services to distinct markets.

However, a ship is a place where 'economies of density' are also present. Economies of density are economies of scale *along a given route*. This means that average cost (= cost per revenue passenger mile) reduces *as traffic volume on the route increases*. This traffic volume is defined as the number of passengers on the route multiplied by the number of sea miles. This is so as any voyage cost has a fixed component like costs of voyage, crew, fuel, ship's servicing, etc. Ship's size plays here a great role. Costs like passenger catering and ticket handling are low vis-à-vis fixed cost. The ship, however, is trying to increase her load factor (=passengers/available seats or the % of seats filled).

More frequency and higher load factors are *contradicting*. Increased frequency operates to the advantage of user. Higher load factors are at the expense of the user. This last presupposes *fewer ports* to increase the total number of passengers – one way and in round trips. Departures can be rationalized on two hubs (Piraeus; Rafina), but destinations cannot. This is the price of having many beautiful islands. Achieving both, at the same time, is what is demanded, but this in not attainable in the Greek ferry system due to the great number of islands that have to be served…Economies of scale seem to be right if passengers chose one departure hub and one destination spoke.

5.2 Comparisons across Europe

Table 10 below compares the fares in Greece with those in Europe over comparable distances (2008).

Table 10. Fares (€) in Greece and in Europe in 2008 *over comparable distances*

EUROPE Route	DISTANCE Sea miles	FARE €	GREECE Route	DISTANCE Sea miles	FARE €
Liverpool-Dublin	136	184 1.35/per mile	Piraeus-Iraklion	154 1.66/per mile	256
Holy head-Dublin	66	164 2.48 p.m.	Piraeus-Serifos	73 2.97	217
Nice-Bastia	126	5 0.04	Piraeus-Naxos	103 0.53	55
Majorca-Ibiza	79	197 2.49	Pireaus-Sifnos	79 2.78 (!)	220
Dover-Calais	20	28 1.40	Piraeus-Aegina	18 4.17 (!)	75
Civitavecchia-Palermo	249	188 0.75	Piraeus-Rhodes	250 1.17 (!)	293.50
Napoli-Palermo	193	245 1.27	Piraeus-Mytilene	188 1.86 (!)	349
Ancona-Split	139	20 0.14	Piraeus-Ikaria	143 0.29 (!)	41.50

Source: Companies' Internet price lists appeared in Naftemporiki.

6. Conclusions

It seems that one economic failure brings another. Increasing returns to scale cause failure of competition, as well market failure. Governments failed under the weight of large deficits; the institution of 'welfare state' abandoned. Marx returned; since economists, 'engineers of the Economy', as called by Keynes, failed to fix the capitalist economy and 'allowed' another deep crisis at end 2008.

The Greek ferry system, connecting several large and small islands, mainly from Attica, had to abandon the entry restrictions and price determination of the state since 1976. This has been done under pressure from EU (1992); no North European state could understand the Greek ferry system, since those, in the North, had no cabotage[28] (transport of cargoes). A 12-year long transition period was granted to Greece as recognition of similar problems in all South European states, and par excellence in Greece. Greek companies reacted to 'cabotage waiving' by creating 5 groups consisting of the existing 25-30 single companies; this was helped by the fact that certain companies entered, since 1994, in the Athens Stock Exchange[29].

[28] A term coming from French simply meaning to restrict/reserve coastal trade and transportation, to ships having the flag of the nation to which coasts belong.

[29] 'Attica enterprises' was in Athens stock exchange years ago in another sector. This evolution allowed Italian Grimaldi to control Minoan. Also, Attica enterprises to control blue star ferries. But the fear that foreign shipowners will come collectively to Aegean sea did not realize.

Economies of scale exist both at vessel's level and at ferry sector. In Greek ferry system marginal cost is about 1/3 of total cost. Then, the long celebrated pricing principle of making price equal to marginal cost/revenue does not lead to the desirable maximization of normal profits, but to losses, since average cost is greater than price (and MC). In fact Greek ship-owners, by instinct or experience, had a feeling that the state fare system, demanded from the outset, *had to cover all operating costs*. Demand and bunker cost were always outside the control of either state or ship-owners.

Strangely, quality of service was regulated everywhere in the World, except in Greece; Greek quality expired only to varying over time entry age limit (15 years nowadays). Ships were also required to leave operation at the age of 35 years (diminishing per year; 33 years nowadays) following the M/V "Samina Express" accident. State admitted wrongly its responsibility for the accident for allowing over-aged ships –while no limit exists in EU- to run in the Aegean. The accident was due to navigation error committed by the mate of the ship (Goulielmos et al, 2009) not by State.

Users of Greek Ferry system since first law in 2001, for liberalization, drafted by lawyers on the basis of an non-existing 'ante portas' competition, nurtured the hope that fares would *reduce*, *frequency of service would increase, hubs would multiply, and quality of service would improve*… New poor would find their protection, in what remained of the welfare state, in the low fares provided in the 'economy class'. But as the economy class was suitable for the application of the principle 'of what the traffic can bear', with 3 different fares, it has been differentiated to produce user's surplus. Users disappointed. Moreover, inelastic demand passengers paid for a seat in ship's saloon at fares 75% higher than that on deck, as well in airport-type seats (economy class).

Fares rose continuously since 2001, when liberalization planned to start. So, not only the laws issued, but also the climate formed, *led to fare increases.* Fares increased by a maximum of €29.50 in July 2009. A 4-person family fares with car, increased by €85.60 (2004-2006). Between May and July 2006 rates rose by 15% and 18% for cars. Economy class suffered the most, since rises amounted to a maximum of 51%.

During recent 5 years (2006-2010), fares rose on average 49% (conventional vessels). The same happened between 2010 and 2014 (August). There was an average rise of about € 100 (27%). Moreover, companies suffered great losses between 2010 and 2012 of €65 million on average per year (EBITDA) vis-à-vis €132m in 2008. Companies, but NEL, tried to survive mainly by selling ships -44 (!) units sold (2000-2013).

Greek fares were dearer by €2.77 per head as compared with fares in other parts of Europe over similar distances. The principle applied of 'what the traffic can bear', is an example where *psychology* dominates economics. Consumer surplus is a psychological concept, and when you are provided one, you must be lucky (to receive a benefit) and pay the price asked, as the other option is to return empty-handed (refrain from travelling).

The future for users is not bright –despite depression- as economies of density will dominate over economies of frequency, we reckon, and thus shipping companies will seek economies of density on each and every one of their routes.

We could end with further recommendations –which the careful reader can easily extract-but our exposition is longer than had to.

Appendix I. The procedure to obtain a license for a ship to serve Aegean islands prior to free entry

An *application* had to be submitted to Ministry of Merchant Marine/appropriate division of the 'ferry transport'. Company had to submit also: (1) the appropriate fee (law 1914/1990), (2) a bank letter of guarantee (same law; this usually deposited later or avoided altogether or replaced by company's cheque due to the high sums involved), (3) a techno-economic study and (4) a certified copy of company's constitution/by-laws. The company had to mention whether the proposed ship is replacing one, and the islands *intended* to serve. Also, size (e.g. 4500 GRT, 1700 NRT), speed (20 knots), maximum length, breadth and draft (meters). Year of built (1974, or 19 years of age; limit 20 years). Capacity: 1500 passengers and 250 cars. Date to be ready: within 1994. Price purchased: $8 million. Will modifications or repairs be carried in Greek shipyards? This ship requesting license is second hand obeying the age limit at the time. To get a license, a Committee must recommend that to Minister. The committee recommended to the Minister granting of the license, which he approved, but the ship *had to* serve 7 additional (*) islands once a week on top of the 4. Required also: a certificate of seaworthiness and protection of the environment, compliance with MARPOL IV, incinerator, food supply pulpifier, if meals provided, etc. Greek class. Five years stable % ownership, unless approved by the Minister to the contrary. Compliance with the license must start within one month from the time of notifying approval (May 1994); and not later than end 1994. The time which elapsed from application to approval was ~8 months. Ship's company objected in March 1994 for serving 7 extra islands as decided by the Committee; the original approval time was (end Sept.-end February) 5 months). (*) The committee, which tried to save subsidies for thin lines and thus the fertile islands, were combined with thin islands in this case-study.

After free entry, thin lines –the number of which has increased dramatically after liberalization- became a state problem and ship-owners were called to bid for them, often colliding among them, and trying to raise the amount of compensation –which increased substantially by concerted actions.

Appendix II

Table A. Differences in Fares and connection with: speed/crossing time (as proxy of quality) and intensity of demand

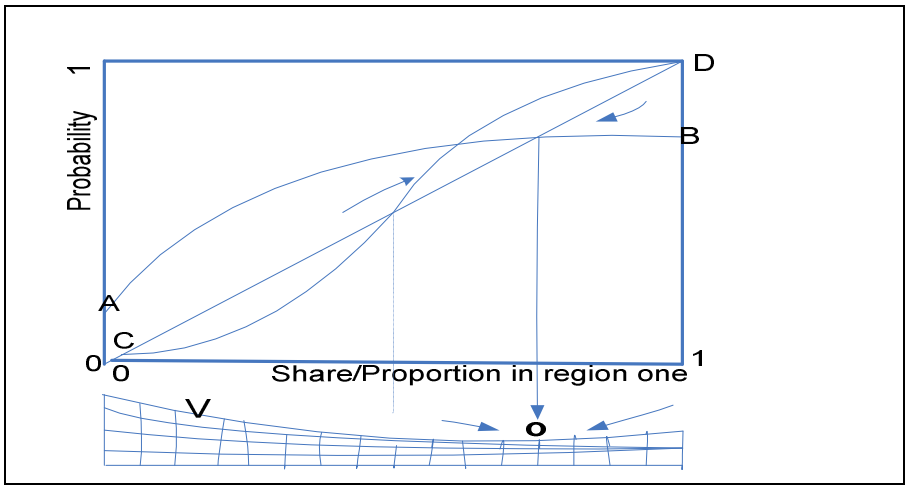
Demand	Fares (ship passengers), ship's name	Level of service/crossing time	Remarks
Stable- Piraeus/Chania	€ 67,5 Lato € 68,2 Elyros	8,5 hours 8,5 hours	Small difference of €0.7 in fares; equal quality.
High- Piraeus-Rhodes	€ 89,2 Blue star 1 & 2 € 70,9 Preveli	Up to 12 hours 10-12,0 hours	Higher quality of Blue stars.
High- Piraeus-Mykonos	€58,5 High Speed 2, 4 €29,4 Blue star Ithaki	Up to 4 hours 3-4 hours	Intensive demand.

High- Piraeus-Samos	€63,7 Nissos Mykonos €55,4 Corsica Express	Up to 8 hours 41/2 hours	Demand.
Stable- Piraeus-Iraklion	€61,2 Pheastos Palace €72,8 Crete 1	6,5 hours Up to 7-8 hours	Higher level of service & lower crossing time.
High- Piraeus-Santorini	€60,8 Blue star Paros €31,3 Ierapetra	Up to 8 hours 6-8 hours	Higher quality.
Stable- Piraeus-Mytilene	€64,4 Nissos Chios €71,0 Lissos	Up to 8 hours 41/2 hours	Lower crossing time.
Low- Piraeus-Chios	€ 55,1 Nissos Chios € 60,9 Lissos (*)	7 hours 9 hours	(*) Required to satisfy demand. Complements.

Appendix III. "Economies of market share".

Economists chose exclusively in their expositions 'diminishing returns to scale', since they provide stable and attainable *unique* equilibria, based on *convexity* principle of the curves involved (Diagram A).

Diagram A. Probability functions vis-à-vis potential function V for 2 events (or shares)



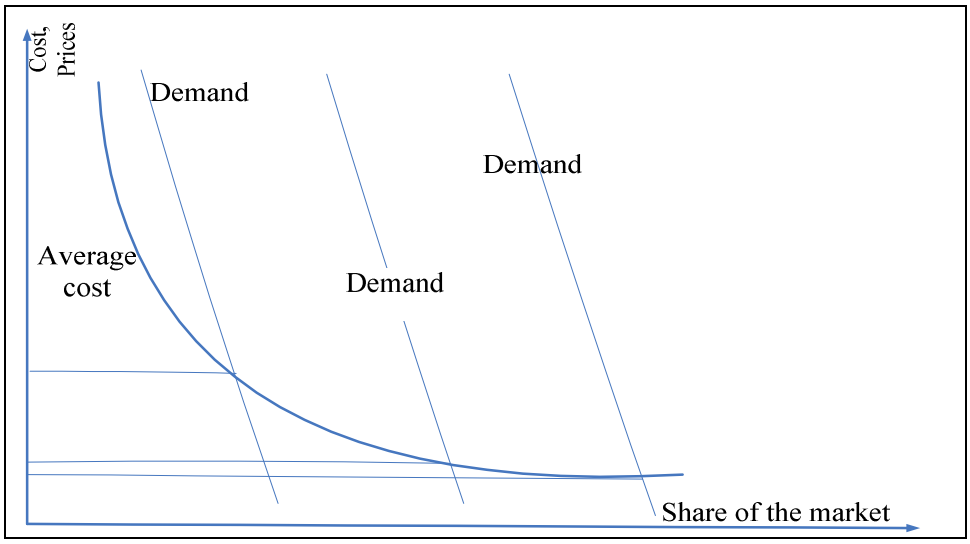
Source: Urban systems and historical path dependence (Arthur, 1987).

With each probability function, AB, for an event to appear, we associate a potential function V (drawing on Arthur, 1987), the downhill gradient of which equals the expected motion of sharing between two events/shares. Intuitively, we can think of the process as behaving like a ball (**o**) *attracted* by gravity to the lowest point on a potential function, subject to *random fluctuations* which die away. The 'potential function' being *convex* has a unique minimum or a unique determinate outcome at **o,** the expected motions of which lead towards to; historical chance cannot influence this attraction (Goulielmos, 2005). Curve CD with 3 equilibria (a la Marshall) corresponds to a potential non-convex function, in which case *history matters*.

Interesting is the argument advanced by Arthur and Ruszczynski (1994), which is as follows: 'in many markets competing products are subject to *increasing returns* in the sense that their 'natural usefulness' or 'perceived attractiveness' or 'potential

profitability' increase with the *share of the market'* (Diagram B). This is called 'increasing returns to market share'. As above authors argued, conventional economic theory is largely built on the assumption of *diminishing returns (increasing costs) on margin* (or local 'negative feedbacks'). In contrast, 'positive feedback' or 'increasing returns' (diminishing costs) on margin should be rare, despite the sizeable literature between 1920 and 1940, mainly in such areas like: international trade, industrial organization, regional economics and economic development[30].

Diagram B: Falling average cost of production as the share of market rises



Source: Inspired by Arthur (Ed.) (1994).

Self-reinforcing mechanisms derive from 4 sources (Table A):

Table A. Generic sources for self-reinforcing mechanisms

1. Large set-up or fixed costs,	2. Learning effects,	3. Coordination effects,	4. Expectations,
→which lead to the advantage of falling unit costs to increased output	→which act to improve products or lower their cost, as their prevalence increases	→which confer advantages to 'going along' with other economic agents taking similar action	→where increased prevalence on the market enhances beliefs of further prevalence

Source: inspired by Arthur (1994).

[30] 'Self-reinforcement' is another title, covering increasing returns, cumulative causation, deviation-amplifying mutual causal processes, virtuous and vicious cycles, threshold effects and non-convexity.

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