Economic and Juridical Aspects of
the Oil Transport with VLCC Ships

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Abstract: Through this paper we propose to address some issues related to maritime transport of oil by large ships. As well known oil represents an important energy source for both production and consumption for the household. Its importance has generated military conflicts and also the "shock", though did not lead to loss of life deeply affected the world economy and ultimately the welfare of the inhabitants of the planet. The high asymmetry of the sources of supply to those of the consumer involves the transport of oil that although it may seem like a simple activity is complementary, in reality constituted a very active area involved in the marketing of transport services market recorded a transport offer rigid, and his reaction is one with a delayed effect, due to a relative period required large construction vessels. In this context we achieve a short-term forecast of the evolution of spot rates for VLCC vessels. The work is within the scope of Econometric research including fundamental works of Tinbergen and Koopmans. The methods used are both quantitative and quantitative methods. As required any software we chose one free econometric namely an approach. Among Gretl the interdisciplinary work we believe the theme addresses a varied group of theorists and practitioners imply in the interdisciplinary approach field and modern econometric analysis tools we consider that adds theoretical clarification.

Keywords: VLCC vessels; transportation; oil products; consumption; asymmetry

JEL Classification: R40; R41; R49.

1. Contents

Oil represents an important source of energy for both industrial use and for the individual. A feature of this energy source is the dispersion of the production sources of consumption. Schematic representation of this asymmetry consumer

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production in the main areas of the world can be seen in Figure No. 1. Evaluated in terms of global market share as a percentage it can be seen that the largest share of production from the area is owned by Asia West while the highest consumption is recorded in Asia Pacific. Europa's consumption recorded a high percentage of those 15% of global consumption, while in terms of production records only 3%, while the economies in transition situation shows a situation resulting conclusion is contrary. We could conclude that there is necessary to transport and trade the oil between producers and consumers. This separation between resources from consume, which requires transport, it determined a businessman and owner of the vessels to assert that "God must have been a shipowner. He placed the row materials far from where they were needed and covered two thirds of earth with water" (Stophord, 2009, p. 417). Moreover, oil prices can be a true "barometer" of the evolution of global production, meaning that a low price can mean reduced demand caused by under-utilization of productive capacities. This still rely on energy dependence of oil and on the majority share of industrial consumption, compared to that individual one.
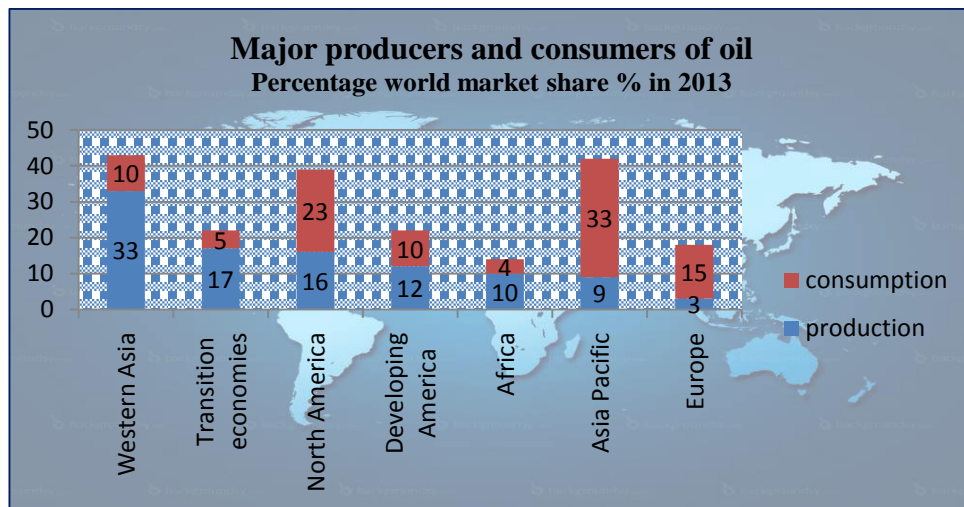

Figure 1. The Production - consumption asymmetry

Source of data: UNCTAD Review of Maritime Transport 2014

Evolution of the share of oil and oil products in total trade, calculated on the basis of global imports is shown in Figure No. 2. As it can be noticed, in the nearly twenty years the share of oil trading in global trade has tripled that which demonstrates an increase in the importance of oil trade.
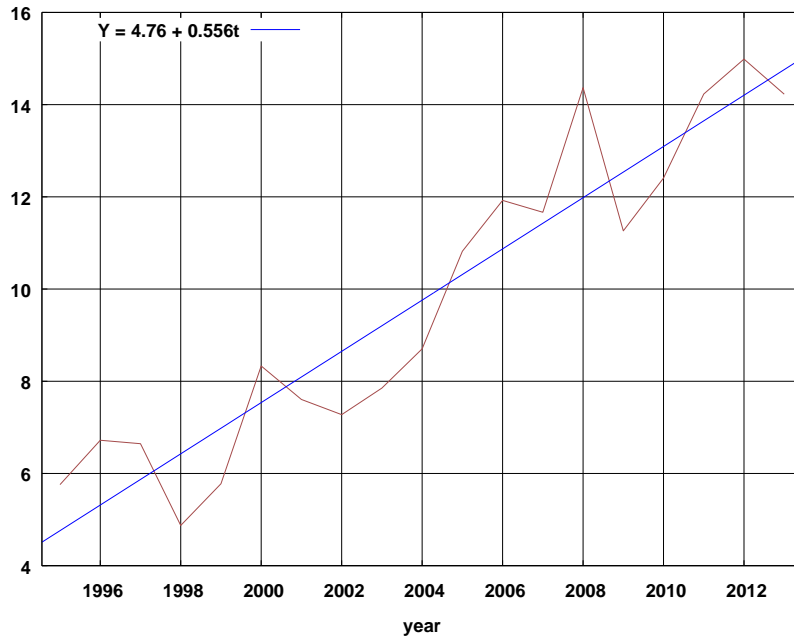
Figure 2. The evolution of the share of oil products in world trade

Source of data: UNCTADSTAT

This trend is also reflected in the market of transport services, in particular maritime transport. The transportation services have adapted to these trade flows and answered, in order to reduce transport costs by increasing vessel sizes, generating naval "gigantism", in order realizing economies of scale. So that, in this segment of transport petroleum products occurred following major categories of ships tank, see Figure No. 3.
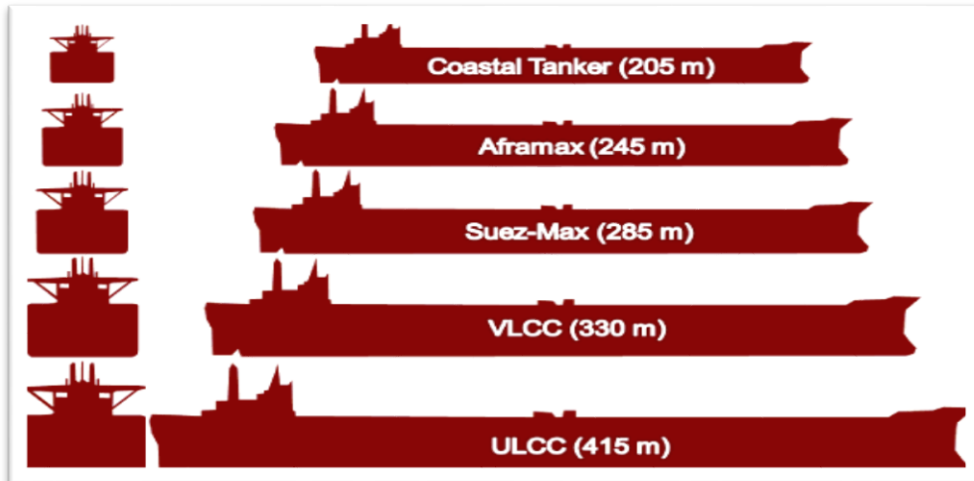
Figure 3. The main types of tank ships

Source: http://people.hofstra.edu

This segmentation tanker vessels does not consider only the size of ships, but creates its own market in turn one, given that large ships are operated only in terms of efficiency over long distances, too, that are subject to navigation restrictions, when passing through certain channels and straits, and certain restrictions of drafts. Generally speaking, in legal terms of a mutual agreement between the ship owner and an owner of cargo transported translates into a charter party agreement.

It exists in two versions namely Voyage Charter Party and Time Charter Party (Baatz and all, 2014). Under the conditions of these two variants, the owner commits to performing transport services, as they were required by the charterer and agreed with it, a ship equipped with the shipowner, navigation and leadership that owner remains liable for the entire duration of validity of the contract.

Time charter and voyage charter the whole ship imply a commitment by the charterer for one or more voyages, or for a specified period of time.

Voyage charter is particularly used in the transport of goods by sea. It can be adapted to any commercial transactions involving spatial displacement of a given quantity of cargo from one port to another. Currently, Voyage Charter is the natural consequence of a commercial contract of external sales, the charterer is either sour exporter which sold merchandise under CIF - port of destination, or the importer who bought the goods under FOB - port loading. On the other hand, most often those used Time charter brokers who want to exploit the vessel for a period of time without assume the financial risks involved possession of a ship or liability for navigation and technical management thereof.

Between Voyage Time Charter and there are essential differences regarding rights and obligations in connection charterer has operated the ship, freight calculation or the rent, the validity of the contract, etc. (Puscaciu & Puscaciu, 2000)

First, when chartering in Time Charter, the owner leases the vessel charterer for a specified period of time and the charterer of the vessel receives rent for the transportation of goods during the period of validity of the contract for a sum of money called rent (hire). On the other hand, when the voyage chartering, based Voyage Charter, the owner shall undertake a voyage, or more consecutive voyages, to transport freight consignments, provided by the charterer, in return for money called freight.

If the voyage chartering, specific problems of calculation of lay days, demurrage and dispatch- money site that does not appear in the case of full chartering of time. Loading and unloading operations are sometimes charged charterer, shipowner charged sometimes (depending on loading and unloading condition stipulated in the contract), while in case of a time chartering, loading, stacking and unloading of cargo unloading are always in charge charterer.

The voyage chartering tours assumes also some risks in connection with operation of the ship, such as its temporary restraining a port because of a strike action or lock, discharging cargo in a port other than port initially due to frost or armed conflict in the area etc. However, proper operation of the vessel charterer is not charged, but the shipowner.

The situation when the time chartering is quite different. In this case, the charterer is entitled to steer the ship from one port to another to load any goods desired, subject to the limits and restrictions stipulated in the contract. Thus, the Time Charter Party, with the code "Baltimore" - 1939 expressly stated commander obligation to follow the provisions on the operation of the ship charterer, its international shipping and other transport issues in question and the liability of the charterer fulfillment by the commander for the consequences of his orders and instructions, improper preparation of documents for the vessel, or for error and transport packages beyond the original destination station. For a while chartering the entire commercial operation of the ship is the responsibility of the charterer, shipowner bears only when responsibility for its technical operation.

As a result of increased duties that the Time-charter charterer has operated the ship accordingly, it supports therefore a number of charges related directly to the vessel voyages performing his order. As a general rule, the charterer shall bear the costs of fuel, boiler water, sewer fees, harbors etc expenses, when chartering based Voyage Charter Party shall be borne by the owner. Charterer in Time Charter assumes also particularly important responsibility arising from signing the master bills of lading, as a consequence of his orders.

Another important distinction between charter and voyage charter basis for calculation is the way Freight. As a general rule, the Voyage charter under a charter party, freight is calculated based on the quantity or volume of goods transport subject or as a lump sum for the entire voyage, depending on vessel capacity (lump sum), while in if a Time chartering under a charter party, freight takes a specific form of rent, which is calculated directly related to the time the ship is available to the charterer.

Depending on the shape of chartering and therefore form it takes its rightful remuneration shipowner (freight or rent), there are differences in terms of share of the shipowner and charterer risk that they incur in connection with the leak time. If the Voyage charter party, determining freight rates takes no notice of the time consumed for making the trip and, consequently, the possible delay due to ordinary risks of cargo ship supported in principle by the owner. On the other hand, if a time chartering, where rent is calculated according to how much time is available to ship charterer, loss of time incumbent, normally the latter. However, there are important exceptions to this general rule.

If the voyage chartering, part of the risk of delay in loading and unloading port is transferred to the charterer by specific clause regulatory provisions lay days and demurrage. On the other hand, if the time charter through specific clause suspending the rent ("suspension of hire"), part of the default risk is transferred to the shipowner is not entitled to rent if the delay is attributable to his or fault ship which it owns.

In principle, between the charter and the voyage time, there are essential differences regarding the validity of the contract though, the experience so far, when we talk about a long-term charter, we understand that it is a charter time, although just as well be a question of a charter voyages consecutive term.

Regardless of the legal forms of employment of vessels price of transport services is, influenced by a variety of variables, such as the situation of the market of these services, shipbuilding market, second-hand market of ships, exogenous shocks scrap market generated by fluctuations in international trade of goods transported, as the price of oil, which is both vessels concerned transported product and a very important energy sources in transport costs etc. (Beenstock & Vergottis, 1993, p. 2). The multitude of factors of influencing the price of transport and their sensitivity has determined the appearance of a field of econometric research (Karakiysos & Varnavides, 2014). Contributions pioneer and reference in the field is due to Tinbergen and Koopmans (Beenstock & Vergottis, 1993, p. 2). Tinbergen considers that transport demand is perfectly inelastic depending on the price of transport, ie freight rates, while demand responds positively to freight rates and also will change depending on size and transport fleet. Beenstock and Vergottis (1993, p. 73) show the implied elasticities derived from the model for fleet size is 0.94 - 0.23 for bunker prices, freight rates and 0.59 for. In other words, fleet size is

proportional to demand, which is inelastic with respect to freight rates and bunker costs.

In what follows, we analyze the evolution of spot freight rates associated with hiring voyage and time-charter rates for a period of 12 months for tank vessels of type VLCC.

Figure No. 4 spot is presented the monthly evolution of the rates for VLCC type tank vessels, during a while from January 2001 to September 2014. It is obviously, that oscillatory trend was recorded, with maxim levels in 2005 and 2008 that have as consequences the imbalances scored on the market for transportation services, as a result of the crisis scored at the world level.
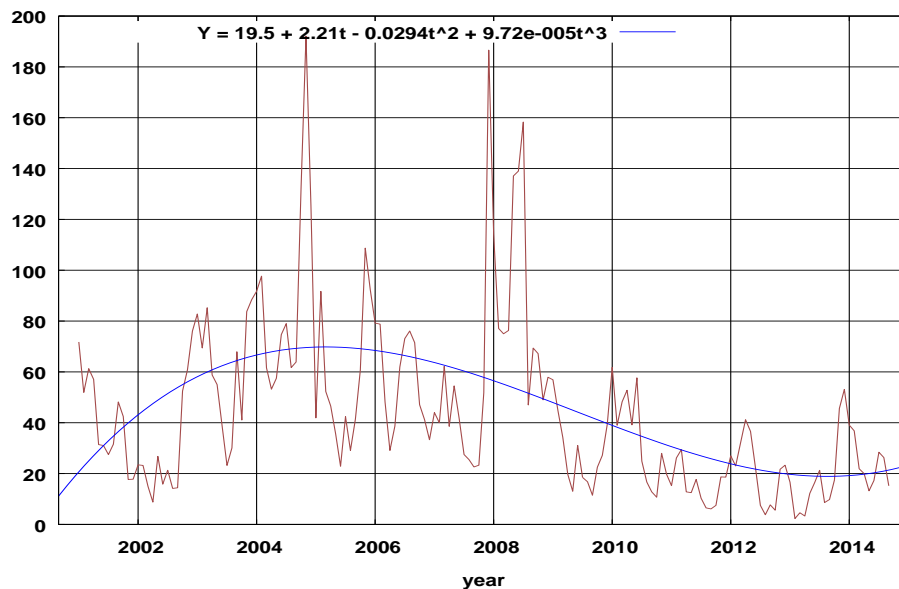

Figure 4. The evolution of the spot rates for VLCC tankers

Source of data: RS Platou Economic Reasearch a.s.

Evolution can be modeled based on a function of the third degree, but with significant errors. In these circumstances we propose an approach based on a model autoregressive and moving average, ie a type ARIMA model (p, I, q).

In this regard it was drawn correlogram time series, which includes information on the autocorrelation function ACF and partial autocorrelation PACF, see Figure No. 5.

From the study of two functions arising as the autocorrelation function decreases and the first five lags are significantly different from zero, which induces that is not

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stationary time series. Also, lag as the first partial autocorrelation function is significantly different zero, that which would entail a model AR (1).

In order to test its stationarity Augmented Dickey - Fuller used both as initial series order differential and along one series, see Table 1. After number can be seen in the first case p value is greater than the significance level 0.05, which means that the time series is not stationary. A first order differentiation leads to stationarity series. With other words will shape by following a first order differential, or otherwise I = 1.

For the election of p and q were performed simulations with maximum values of the composition of autoregressive p = 2 and q = 2 moving average differential series, see Table No. 2. In this table Akaike information criterion AIC are submitted and Bayesian information criterion BIC.
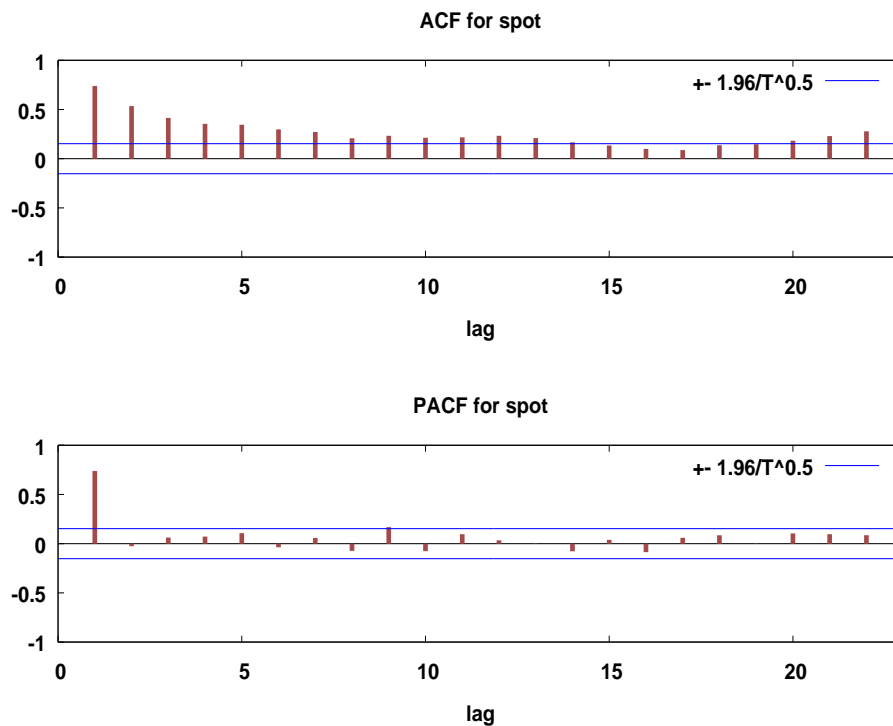

Figure 5. The Correlograma of the time series of spot rates

Table 1. The testing of the stationary while spot rates

Augmented Dickey-Fuller test for spot including 11 lags of (1-L)spot (max was 13, criterion modified AIC) sample size 153 unit-root null hypothesis: a = 1 test with constant model: (1-L)y = b0 + (a-1)*y(-1) + ... + e 1st-order autocorrelation coeff. for e: -0.000 lagged differences: F(11, 140) = 1.118 [0.3515] estimated value of (a - 1): -0.159757 test statistic: tau c(1) = -1.98393 asymptotic p-value 0.2942	Augmented Dickey-Fuller test for d spot including one lag of (1-L)d spot (max was 13, criterion modified AIC) sample size 162 unit-root null hypothesis: a = 1 test with constant model: (1-L)y = b0 + (a-1)*y(-1) + ... + e 1st-order autocorrelation coeff. for e: -0.029 estimated value of (a - 1): -1.29611 test statistic: tau c(1) = -11.1992 asymptotic p-value 4.296e-023

AIC and BIC is the relative measure of the quality criteria of statistical models and also means the selection of several models. The preferred model with the lowest values of these criteria, in our case a model with AR (1) and MA (1).

Table 2.

Armax (2, 2, d_spot, null, 1, 1, 0, 1, 0)

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Information Criteria of ARMAX(p,q) for d_spot
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p, q	AIC	BIC	HQC
0, 0	1512.5172	1515.6170	1513.7756
0, 1	1513.7419	1523.0415	1517.5172
0, 2	1503.9501	1516.3496	1508.9839
1, 0	1514.8409	1524.1405	1518.6162
1, 1	1495.8695	1508.2689*	1500.9032*
1, 2	1497.2095	1512.7088	1503.5016
2, 0	1511.5767	1523.9762	1516.6104
2, 1	1497.2479	1512.7472	1503.5400
2, 2	1494.6182*	1513.2174	1502.1688

===
* indicates best models

In these conditions ARIMA model is of the form p = 1, I = 1 and q = 1, or in other words an ARIMA model (1, 1, 1). For time series represented the evolution of spot rates for tank vessels type VLCC will receive:

Model: ARIMA, using Observations, 2001: 02-2014: 09 (T = 164)

Estimated Using Kalman filter (exactly ML)

Dependent variables: (1-L) spot

Standard errors based on Hessian

coefficient std. z   p-value error

const	-0.260380	0.121528	-2.143	0.032	**
phi 1	0.712343	0.0557827	12.77	2.41e-037	***
theta 1	-1.00000	0.0332783	-30.05	2.21e-198	***

As you can see, all coefficients are significant model, recording values of p less than 0.05 - level of significance.

Based on the model was adjusted data and forecasts were made for the following action 15 months, respectively for the period October 2014 - December 2015. The colored zone represents the range of forecasting with a probability of 95%. As can be seen in the forecasting while of time, the level of spot rates will remain in narrow limits, as there are prerequisites for a substantial change.
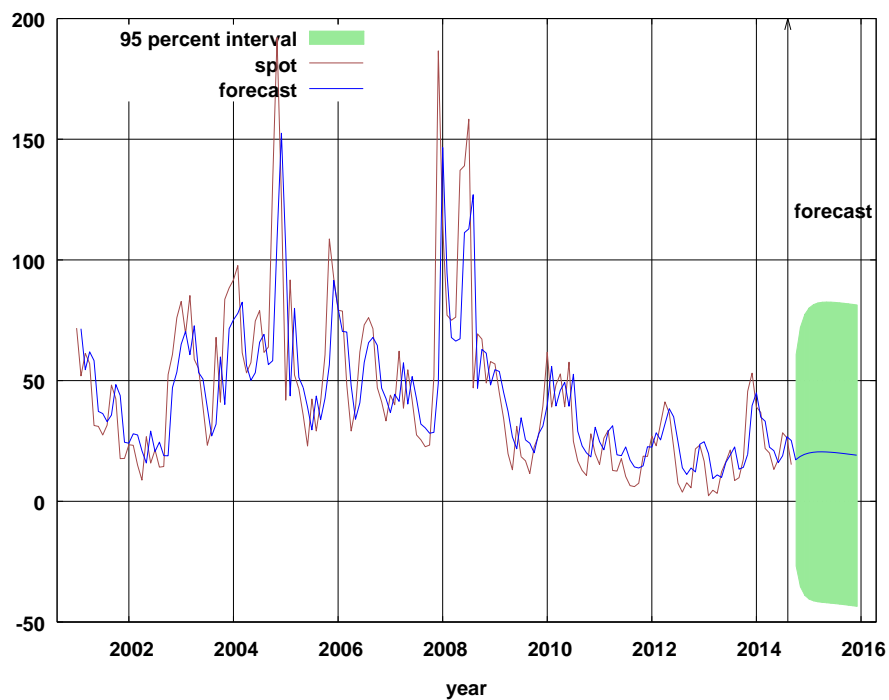

Figure 6. Evolution of the spot model rates ARIMA (1, 1, 1)

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2. Conclusions

By way of conclusion, it can mention that the market of transport services in general is dependent on many factors, and treatment approaches involve detailed economic, legal and technical methods of approach and requires both quantitative and qualitative aspects. In particular, market petroleum products transportation services adapted dimensional and have their own particularities segments generated economic, legal and technical. Thus, based on research undertaken large ships will register in the coming months is a tendency stationary, without scoring significant shocks the transport. Our prices which will be reflected in our sales price indicates that there will be no shocks in the price of petroleum products. Our approach of the evolution of prices of transport and also requires that econometric approaches in this area to an area will form the distinct maritime econometrics. Also said that the whole work was based on Gretl program, econometrics and dedicated software which is free.

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