Oil, Fuel Prices And Their Effects On The Maltese Economy: An Analysis Of The Short- And Medium-Term Implications On Local Industry And The Economy In General, Given The Record-High Price Of Oil

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Abstract

This paper provides a thorough analysis of the intricate relationship between oil price fluctuations and the Maltese economy, examining various theories and hypotheses. It discusses the sectoral reallocation of labour, particularly in the tourism industry, in response to oil price changes and scrutinises the Obsolescence Thesis, which posits that rising energy costs render existing capital stock uneconomical, while noting lack of local data for validation. It also explores the concept of 'Revenue Recycling', highlighting the impact on Malta's terms of trade with oil-producing countries. The paper also examines the 'Uncertainty Factor', suggesting that firms may delay investments due to price volatility, while underscoring the challenges of timely policy formulation in Malta, given the delay in statistical reporting. OPEC's role in oil price determination is also examined, with an emphasis on its influence by global economic conditions and the USD exchange rate. The paper comes to the conclusion that the alleged link between oil price changes and macroeconomic performance may be overstated. It identifies sectors likely to be most affected by oil price volatility and calls for more timely statistical data for effective policy interventions. The paper ultimately underscores the complexity of the oil-economy nexus in Malta, highlighting the need for robust data and proactive policy measures.

Keywords

Peak oil, oil, fuel, Malta, economy, industry, labour market, volatility, economic impact.

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Introduction

Crude oil is a peculiar commodity indeed, and its peculiarity encompasses manifold areas. Apart from the fact that oil used to be the only thing with the power of turning Saddam Hussein into Mother Theresa [1] (when oil prices climbed above 30 US dollars [USD] a barrel), and to pit nations against each other on several occasions for the mere prospect of controlling it, today, ostensibly, few phenomena cause greater concern than rising oil prices; and yet, paradoxically, nothing gets forgotten more quickly than oil after its price settles again into the region generally deemed to be acceptable.

This peculiarity seems to be intimately related to the widespread belief that so-called "adverse oil shocks" have been responsible for the stagflationary periods of 1973 to 1975 and 1980, and on the foregoing consideration, the effects of oil price increases on the economy are matters that cannot be neglected. The latter takes on an increasing significance when applied to the Maltese scenario wherein the economic context is different from that in larger economies and studies on these grounds are, at best, meagre.

Since it is the intangible association between words and cognition that spurs human thought and steers it, and is therefore the major determinant of whether an argument is understood and subsequently evaluated correctly, it is in order, I think, to define some of the terms that shall be used henceforth prior to embarking on a treatment of this subject. This is done in the next section.

Working Definitions

In this essay, the terms short and medium-run shall allude to the macroeconomic definitions of the twain. Accordingly, the short-run shall be that period of time during which real Gross Domestic Product (GDP) can differ from its potential. During such an interlude, adjustments are being made so that real GDP is set moving (not necessarily monotonically) towards potential real GDP, but since these adjustments take time, their effect is not felt within the period of time in question. In practice, this movement towards a Lyapunov-style equilibrium might be more of a fantasy than a real world occurrence. However, if the latter is the case, the effects of relaxing this assumption will not significantly alter the results. Here is where the medium-run comes in: during the medium-run, not enough time has elapsed for real GDP to equal its potential, but movements in that direction are registered.

Economic shocks shall be taken to mean any events that shift an economy's savings, consumption, debt and investment functions substantially.

[1] *Vide* N. Chomsky, "Case Studies in Hypocrisy: Us Human Rights Policy", AK Press, 1997 p.56.

Consumer Price Index (CPI) and Retail Price Index (RPI) are two indices intended to gauge inflation. The former (as calculated by the US Department of Labour) is only representative of urban consumers and takes into account changes in consumption patterns as well as changes in the prices of goods included in the consumption basket [2]. The RPI (as calculated by the Maltese National Statistics Office [NSO]), which bears a close resemblance to the former is representative of the whole Maltese population and assumes a consumption bundle that is fixed betwixt the interludes of successive Household Budgetary Surveys (HBS's) [3].

Where terminology is undefined, it shall take the meaning usually ascribed to it in standard economic lexicons.

With the definitions now in order, the next section endeavours to delineate features making the Maltese political-economy unique, whereas the one thereafter attempts to epitomise the extant literature on the effects of oil pricing on the macroeconomy with a view to applying it to the domestic economic setup.

Malta's Unique Features

Much of the literature to be reviewed, by virtue of its having been developed with regard to the US, is not necessarily extendible to Maltese scenario. Malta is *sui generis* on a multitude of accounts and thus deserves particular attention to the characteristics that make it so. Notwithstanding the latter, irrespectively of whether the mechanisms described are at work in the Maltese economy, they affect it at least indirectly through the channel of international trade if they actually affect Malta's main trading partners [4].

At this juncture, it would seem that the most logical way of embarking on a perusal of the effects of fickle oil prices on the Maltese economy is to underscore the factors that differentiate Malta from other large economies. This exercise should help us identify the instances wherein a mismatch between extant working papers' findings and Maltese reality is apt to arise.

The first and most obvious such factor is government intervention. The Maltese government is on many accounts an interventionist government, and the energy sector is no exception. Government intervention was – and still is – mostly carried out through the national energy corporation, Enemalta. Through the latter, government subsidises energy prices thereby smoothing out the vagaries of the

[2] *Vide* http://www.bls.gov/cpi/cpifaq.htm#Question_1
[3] *Vide* http://www.nso.gov.mt/aboutus/Methods/RPI/introduction.htm
[4] To give a practical example, if output falls as a result of lower investment in energy-intensive capital goods, like, say, cars, Malta is not affected *directly* through the mechanism in question since it does not produce cars, but if the US and the EU, Malta's major trading partners, do produce cars, and the said mechanism affects them, then that impact will also cascade to the local economy.

prices obtaining in the energy market. This is still being done, though to a decreasing degree [5].

Secondly, by virtue of Malta's limited availability of land, oil reserves also have to be limited. Hoarding oil requires hinterlands on a scale that Malta does not have available unless it had to reclaim land, and is therefore, under circumstances such as those prevailing in Malta, uneconomic beyond a certain level. The volume of oil consumed on a daily basis, moreover, makes even a voluminous stock of reserves short-lasting.

A third distinguishing feature of the Maltese economy is that it is highly (almost totally) dependent on oil for energy production, and at the same time it has no domestic oil resources or close substitutes thereto on which it can rely in the eventuality of an oil supply disruption. Despite the fact that alternative energy sources could potentially be economic – especially if subsidised in the same way as oil is – their employment is still paltry. In this respect, it is worth mentioning that water production in the Maltese Islands, is also an energy-intensive activity, which, if liberalised and priced in accordance to costs, would eventually exhibit pricing patterns similar to those of energy.

Fourthly, Malta's heavy dependence on tourism cannot be discounted, albeit many a time this has been overstated in local debates.

Fifthly, because the overheads of the Maltese central administration are divisible over a smaller population than would have been the case for larger countries, and because through this mechanism, fewer human resources are devoted to the compilation of statistics, data takes longer to be published and the lag between a given event and the policy response thereto takes longer.

Sixthly, the Maltese Balance Of Payments' Capital and Current Accounts have been in deficit from 1984 and 1993 respectively, and government debt (exclusive of debt by parastatal entities for which government is a guarantor) stands at well over a billion Maltese liri.

Last, but by no means least, comes Malta's openness to trade. In order for Malta to maintain the standard of living it has managed to achieve so far, it has had to specialise in the areas in which investors in the local economy have seen the greater potential for eking out a return on their investment. This has meant that Malta has had to rely on foreign trade to meet all its needs.

Juxtaposing the paradigm now in place with the literature findings, and referring to local statistics for corroboration or refutation, we should now be able to peruse the effects of fickle oil prices on the Maltese macroeconomy.

[5] Locally, the fuel market has been limitedly liberalised as from the 22nd of November 2001 (Vide Budget Speech 2002, http://www.doi.gov.mt/EN/archive/BudgetEng/speech.doc, Nov 21 2001, DOI) with prices being adjusted on a quarterly basis. In the aforementioned budget speech, government gave an unequivocal indication that prices were not only going to reflect those obtaining on the international market, but they were also going to take externalities into consideration.

Insights From The Literature And The Application Thereof To Malta

A meticulous perusal of the existing literature brings it home to the literature reviewer that there is a pronounced dichotomy between the effects of an oil shock proposed in modern economics textbooks and those postulated in working papers.

The Mainstream Economics Viewpoint

On the one hand, standard economics textbooks have it that when the price of oil rises, an adverse inflation shock occurs. Before the inflation shock, the economy is in long-run equilibrium (point A in figure 1, below) where aggregate demand (AD), long-run aggregate supply (LRAS) and short-run aggregate supply (SRAS) intersect. At A, output is equal to potential output and the inflation rate is stable at π. A rise in the price of oil prompts an adverse inflation shock, which directly increases inflation so that the SRAS curve shifts to SRAS'. Equilibrium now occurs at point B, where SRAS' intersects the AD curve. The upshot is a rise in inflation to π' and a fall in output tantamount to Y* - Y', commonly referred to as a recessionary gap. The end result is a combination of stagnation and inflation called stagflation. A country's monetary authorities may then either do nothing, in which case the country will suffer a recession, but will gradually tend backwards towards equilibrium point A because of the existence of the recessionary gap, or decide to intervene in order to restore full employment more hastily, with the cost of such a strategy being a persistence of inflation at its higher level π'.

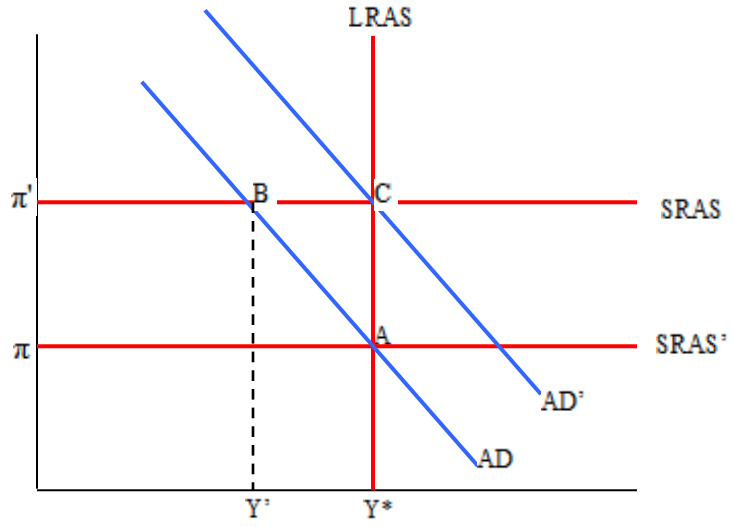

Figure 1: The effects of an adverse oil shock as per economics textbooks.

On the other hand, the working papers reviewed invariably discredit such a view. Authors provide alternative hypotheses apropos of the mechanisms by which changes in the price of oil could affect the macroeconomy, and there is no agreement as to which conjecture or conflation thereof is correct, but there

seems to be a wide-ranging consensus that the mechanism at work is not as simplistic and deterministic as that depicted in the standard economics textbooks. An exposé of the said hypotheses follows.

Exogenous Political Events

The first hypothesis revolves around political events in the Middle East [6]. According to this theory, political events in the Middle East, like the recent invasion of Iraq or the 1978 Iranian revolution, produce shocks in the price of oil, which, when strong enough, result in a recession in the major oil-importing countries. The postulated correlation, nevertheless, is far from obvious and is tarnished by long and variable delays between political events and recessions, albeit there is a clear relationship between oil price shocks and CPI inflation. Empirical evidence suggests bouts of inflation unrelated to political events in the Middle East [7]. Furthermore, the fact that the time lag between changes in the price of oil and the onset of recessions follows an irregular pattern militates against the monocausality of oil prices in determining economic performance.

Political events, by another very convincing reading, shift the demand for oil rather than the supply thereof. The demand for oil shifts because consumers attempt to stockpile oil when they perceive that the supply of oil could be threatened. This hypothesis might explain the variations in the timing and magnitude of very similar oil supply shocks that resulted in very different effects on oil price. According to this hypothesis, increased uncertainty about future oil supplies may shift the price of oil even in the absence of tumult-induced production cuts. Comparing 2002 data with that for 2003 suggests that the uncertainty premium associated with the recent Iraqi invasion is somewhere in the region of 5 or 6 USD per barrel [8]. Regrettably, though, since expectations are not directly unobservable, they do not lend themselves much to objective mensuration and are, on that showing, to some extent unfathomable [9].

Domestically, inflation patterns following political events in the Middle East, as illustrated in figure 2 and table 1 (see Addendum 1), are also irregular, thereby validating the claims that changes in the price of oil and the onset of inflation follow an irregular pattern, and making the inference that oil prices do not monocausally determine economic performance [10] seemingly applicable to Malta. Here, the fact that Middle East political events might have struck at different

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[6] *Vide* J. D. Hamilton, "What is an Oil Shock?" Journal of Econometrics. April 2003, 113:2, pp.363-398.

[7] *Refer to* R. Barsky and L. Kilian, "Oil and the Macroeconomy Since the 1970's" NBER Working Paper 10855, October 2004.

[8] *Ibidem*.

[9] To be sure, there is an interesting literature on relatively subtle schemes that could give individuals an incentive to reveal their true expectations, but most of these schemes are a very long way indeed from pragmatic application and are contested – and rightly so – over a wide array of reasons.

[10] Strictly speaking, changes in GDP are better indicators of economic performance than the rate of inflation. However, given that back datum (predating 1990) is not readily-available and that the methodology was upheaved (in 1994) in such a way so as to make the National Accounts data incomparable, inflation has been used as a proxy for economic performance on the understanding that economic growth and inflationary pressures move in consonance with one another as commonly postulated in economics.

times during the currency of Malta's hedging agreements for oil supply might be distorting the picture depicted by the data being used.

Gross Output and CPI/RPI Inflation

On similar lines, in another paper, the same authors [11] differentiate between gross output [12] and value added [13] inflation. They contend that the argument that an oil price shock is necessarily inflationary holds true only for CPI inflation; effects on value added inflation are ambiguous. Additionally, they postulate a reverse causality between global economic performance and the price of oil, explicitly contending that "oil prices (like other commodity prices traded in international markets) tend to respond to macroeconomic forces" [14]. This can be comprehended more effectively by employing a simple mathematical model.

Consider the function

$$Y = Q\,(K, L, O) \qquad (1)$$

Where Y denotes gross output and Q represents quantities of capital (K), labour (L) and imported oil (O). In words, gross output is a function of the quantities of the two classical factors of production plus oil.

Now let us allow for a change in the price of oil through the following paradigm. Initially, Q(O) in (1) will be that established by market clearing prices, which occurs when the market is in equilibrium, wherefore demand for oil (D_O) equals its supply (S_O) in (2). D_O will be determined by the price of oil (P_O) and a stochastic error term (U) in (3). B_1 represents the y-intercept, which is that P_O with a corresponding Q(O) of zero, whereas B_2 represents the price-elasticity of demand, which coefficient gives the demand for a given oil price.

$$D_O = S_O = Q(O) \qquad (2)$$
$$D_O = B_1 - B_2 P_O + U \qquad (3)$$

If P_O changes by δ, D_O will change by $B_2\delta$, the coefficient of P_O multiplied by δ in (4). For increases in P_O , $\delta > 1$ and for decreases in P_O , $\delta < 1$. After allowing for a change in P_O, K and L remain unchanged (5) [15].

$$D`_O = B_1 - B_2\delta P_O + U \qquad (4)$$
$$Y = Q\,(K, L, D`_O) \qquad (5)$$

[11] Refer to R.B. Barsky and L. Kilian, "Do We Really Know that Oil Caused the Great Stagflation? A Monetary Alternative", NBER Working Paper 8389, July 2001.
[12] As measured by the CPI/RPI.
[13] As measured by the GDP deflator.
[14] *Vide* R.B. Barsky and L. Kilian, July 2001 (op. cit.) p. 24.
[15] The cited paper explains this verbally. This explanation, with the exception of equation (1) is the current author's and although every effort was made to ensure accuracy, sole responsibility is claimed for any mistakes/misinterpretations that might have been committed in formulating the model.

Therefore, under perfectly competitive market structures, an oil price shock will have no direct effect on value added because the demand curves for labour and capital services as a function of the wage and rental rates measured in terms of value added do not shift.

The results obviously vary if mark-up pricing is allowed for. Under such circumstances, firms apply mark-up to all cost components [16] and the outcome is a price increase that lowers factor demand. If any capital-energy complementarities in production exist, an oil price increase will also lower real GDP by lowering the demand for capital and concomitantly for labour. This happens because O and K will be correlated and if K and L are correlated as well, as common sense would suggest, the fall in Q(K) will bring about a fall in Q(L) with it.

Having said this, however, the share of oil in output is "thought to be no larger than 4% and may be much smaller"[17]. Empirically, increases in oil prices appear to raise the share of oil in input – implying an elasticity of substitution less than unity and suggesting that the actual drop in output is even smaller.

Locally, since markets are naturally small [18], it is to be expected that market structures, in the aggregate, will tend to be less competitive than in larger countries. In industries where the minimum-efficient-scale of production is substantial, one would expect competition to be much less intensive than in countries where an industry has the same minimum-efficient-scale but is facing a larger market. True, competition against foreign firms in the same industry does mitigate the problems emanating from deficient competition, but then, again, certain items can never be imported by virtue of their specific production, consumption and/or distribution characteristics [19]. In the light of the foregoing facts, the present author is inclined to conclude that percentagewise, Malta will have a higher incidence of mark-up pricing than larger countries such as the U.S. Ergo, as long as demand and the money that makes that demand effectual are there, it will suffer a higher proportion of unemployment for a given rise in oil prices than other countries whose markets allow for a higher degree of competition. With the aim of identifying industrial sectors wherein factor demand could be most at risk from increases in the prices of oil, the current author has constructed a competition-intensity index designed to give an *indication* of competition intensity per "Nomenclature generale des Activites economiques

[16] See J.J. Rotemberg and M. Woodford, "Imperfect Competition and the Effects of Energy Price Increases on Economic Activity," Journal of Money, Credit, and Banking. November 1996, 28(4), Part 1, pp. 550-77.
[17] *Vide* R.B. Barsky and L. Kilian, 2004 (op. cit.) p. 5.
[18] The reasons being geographic insularity coupled with a scanty population and a small surface area.
[19] A case in point is fresh water, of which importation is possible but economically unfeasible, given the product's geometrical volume relative to its price. What is more, even if we had to assume that fresh water importation was economically feasible, there will always be the problem of distribution. Would another pipeline network have to be constructed? Would the cost involved be economically justified? If the Water Services Corporation had to be forced to share its pipeline network, would it be feasible for it to remain in business or would the new entrant inherit the monopoly status currently benefiting the Water Services Corporation?

dans les Communautes Europeennes" (NACE) category. All the pertinent formulae, the logic behind them and the results can be found in *Addendum* 2.

Another point worthy of consideration is undoubtedly the oil-price-related inflation and the strength of its pass-through into core inflation [20]. Firstly, since we are assuming fickle oil prices, the inflationary effect attributable to oil will depend on Enemalta's purchasing agreements, on whether Enemalta's cost or saving resulting from a change in oil prices is shifted onto the consumer, and if so, whether it is shifted entirely or partially, and on whether such costs or savings are shifted in a smoothed fashion (i.e. in the form of an average per established time period) or 'as is' (i.e. in the form of price adjustments whenever oil prices change). Given the fact that about 65% of the labour force is unionised [21], the pass through of any oil-price-related RPI inflation into core-inflation will tend to be substantial, with the obvious corollaries being an exacerbation of Malta's already-precarious competitiveness position vis-à-vis other countries and a time-lagged sectorally-asymmetric real-income catch up, with the asymmetry depending, *inter alia*, on unionisation or the lack thereof, the time distance from the expiry of the sectoral collective agreement (if applicable), and the labour supply for the relevant labour category. In this respect, wages adjust slowly, but costs and prices adjust more easily since their only constraint is the stock level at any point in time [22].

Other useful insights with respect to domestic inflation may be had by identifying those industry sectors that register relatively high fuel expenditures and by investigating the HBS weighting assigned to these sectors' produce. The results of such an exercise feature in *Addendum* 3. The fact that datum is available only for NACE categories 15 to 45, however, must be brought to the reader's attention. This certainly limits the breadth of our apprehension.

Sectoral Reallocation Of Labour

Another study [23] purports that higher oil prices depress purchases of energy-using goods (e.g. automobiles). The intervening shifts in the demand curves for all the affected industries results in a sectoral reallocation of labour that impacts value added for each sector negatively. Implicitly, the response of output should be symmetric for both oil price increases and decreases since demand curves for industry will still shift when the price of oil registers a decline, but there is no such corroboratory empirical evidence.

With no publicly-available datum for the local economy with regards to sectoral labour migrations, any conjecture is as good or bad as any other [24]. What we

[20] Core inflation is a measure of inflation that excludes items of which the prices are volatile. Oil, because of its price volatility, is excluded therefrom.

[21] Refer to http://www.deloitte.com/dtt/article/0,2297,sid%253D11410%2526cid%253D17067,00.html

[22] This need not necessarily apply if prices register an upward movement.

[23] *Vide* J.D. Hamilton, "A Neoclassical Model of Unemployment and the Business Cycle," Journal of Political Economy. June 1988, 96:3, pp. 593-617

[24] In this respect, the ETC does publish a rudimentary "gainfully occupied by sector" yearly table, but it is a far cry from what we would need to carry out such an exercise comprehensively.

may say for sure, here, is that if air fares change substantially due to changes in aviation fuel, the tourism industry might register a change in demand that could result in a change in demand for labour services within the tourism industry, the latter being a demand derived from the former. *A priori*, however, it is to be expected, because of labour hoarding and partial capacity utilisation considerations, that over the initial range of increase in demand for tourism-related services, the corresponding increase in the derived demand for labour services in the tourism industry will be minimal.

The Obsolescence Thesis

Another hypothesis about the effect of oil price increases on the economy goes as follows. When the price of energy climbs, the extant energy-intensive capital stock becomes uneconomic. This conjecture, often referred to as the obsolescence thesis has suffered outright rejection by several authors [25], and has henceforth lost its popular appeal on the understanding that insofar as energy-intensive capital becomes obsolete, economic activity to replenish obsolete capital will offset, wholly or partially, the recessionary effect of the oil price shock.

Regrettably, the data that would have enabled us to refute or corroborate this hypothesis for the domestic economy is unavailable. National Accounts datum for 1994 and subsequent years are not comparable to their pre-1994 counterparts [26]. This puts us in an uncomfortable position wherein we are unable to compare that portion of gross domestic capital formation ascribed to machinery, transport and other equipment following an oil price increase to other years in which there were no such increases. Recent datum (i.e. datum for 2001 to 2004), which could have potentially helped us solve the problem, are not yet available either.

Revenue Recycling

Yet another study [27] focuses on the transfer of wealth from industrialised countries to oil-producing countries (OPCs). For one thing, the latter seems to be a trivial 1% of GDP, and for another, part of the revenues thus transferred are 'recycled' back to the industrialised countries through the channel of foreign trade. These typically prop up aggregate demand in industrialised countries by a factor less than unity and will depend on the oil-producers' marginal propensity to consume (MPC) and the import component thereof [28]. It is worthwhile noting that even assuming that imports as a function of the oil producers' MPC is zero, the cost of energy is too small in relation to GDP to explain the productivity slowdowns witnessed historically.

From Malta's vantage point, the situation is conceptualised in the schema in Figure 5 in *Addendum* 4. During the year 2001 Malta imported 53.54% of its total

[25] The more acerbic criticisms levelled at this thesis have been spewed by D. R. Bohi "On the Macroeconomic Effects of Energy Price Shocks" Resources and Energy, June 1991, 13:2, pp. 145-162.
[26] See "Abstract of statistics 2000", National Statistics Office, 2003, p. 213.
[27] Refer to M. Olson, "The Productivity Slowdown, the Oil Shocks, and the Real Cycle", Journal of Economic Perspectives, Fall 1988, 2:4, pp. 43-69.
[28] That is to say, how much the OPCs import from industrialized countries for every lira of consumption.

imports by value (IM) from EU-15 countries [29]. Another 14.82% of IM came from Asian countries that do not produce oil, and a chunky 26.33% of IM come from OPCs. With regards to exports, 14.31% of total domestic exports by value (EX) for the indicated period ended up in the EU-15 [30] regions, whereas 65.93% of EX went to America and the West Indies, 6.78% ended up in Asian countries that do not produce oil, and 12.01% went to OPCs [31].

Everything else being constant, provided that this trading pattern does not fluctuate considerably from year to year, the direct effect of higher oil prices on the Maltese economy is likely to be a rise in IM from oil exporting countries representing a transfer of wealth thereto and an increase in EX to such countries, which increase should be smaller than the increase in IM. The converse should apply when oil prices fall. The following mathematical specification should allow us to comprehend this more effectively and succinctly.

Let IM_{μ} denote the value of total imports from oil-importing countries
Let EX_{τ} represent the value of total imports from oil-exporting countries
Let θ symbolise changes in IM_{μ} resulting exclusively from a change in the price of oil (i.e. keeping IM_{μ}
qualitatively and quantitatively constant)
Let α signify changes in EX_{τ} resulting exclusively from a change in the price of oil (i.e. keeping EX_{τ}
qualitatively and quantitatively constant)
For a rise in oil prices:

$\alpha > 1$
$\alpha(EX_{\tau}) > EX_{\tau}$
$\theta > 1$
$\theta(IM_{\mu}) > IM_{\mu}$
$\theta > \alpha$

For a fall in oil prices:

$\alpha < 1$
$\alpha(EX_{\tau}) < EX_{\tau}$
$\theta < 1$
$\theta(IM_{\mu}) < IM_{\mu}$
$\theta > \alpha$

Because $IM_{\mu} > EX_{\tau}$, had IM_{μ} to consist entirely of fuels, even if OPCs' marginal propensities to consume (MPC) had to be 1, thereby implying that $\theta = \alpha$, which is empirically improbable, EX_{τ} would still be less than IM_{μ} and the outcome would be an invariable deterioration in the terms of trade. This is not realistic, however, for not all the imports from OPCs consist of fuels [32]. Fortunately, we are in a

[29] This excludes the U.K. since the U.K. is an oil producer and is therefore included in the "oil producing countries" category.
[30] See footnote 30.
[31] Refer to *Addendum* 4.
[32] Figure 7 in *Addendum* 4 suggests that the prices for different fuels on the international market seem to move in tandem.

position to approximate the fuel-import component as a percentage of total imports from OPCs assuming the same oil import ratio. This has been calculated at 31.31 % [33]. Therefore:

Oil imports are given by $(0.3131)\ \theta\ \mathrm{IM}_{\mu}$

and exports to OPCs are given by $(\mathrm{MPC})\ \alpha\ \mathrm{EX}_{\tau}$

After having run a computer simulation for the known parameters, the results yielded suggested that for a percentage increase in the price of oil, everything else being constant, the value of imports from OPCs will increase by LM 1,011,827 whereas exports thereto will increase by $0.8984\,\theta\,\mathrm{IM}$, where θ denotes a change in value, or LM 909,009, assuming a constant MPC and a constant import component thereof. Unless we allow for trade patterns to change and demand to fall, therefore, an oil price increase is apt to be accompanied by a worsening terms-of-trade position with OPCs and an oil price decrease is likely to have the reverse result. But this is only the direct effect. Undoubtedly there will also be the indirect effects emanating from the change in the terms of trade of Malta's other trading partners with OPCs. Here, special reference is being made to the European Union, and the United States of America. Since a full-fledged analysis of the latter requires a much more elaborate dilation and thus cannot be done justice to here, I would rather leave this as an open issue for further enquiry elsewhere.

The Uncertainty Factor

Bernanke, in another research paper 34 speculated that firms will postpone investment as they attempt to find out whether the rise in the price of oil is temporary or permanent. Once again, evidence for this inference is scanty and at best very limited, the reason probably being that oftentimes no one will know whether a change in the price of oil is temporary or permanent and this, conceivably, applies to the local scenario.

Policy Response

In addition to the aforementioned tentative explanations, a plethora of literature dealing with the monetary policy response to inflation triggered by the oil price shock and the effects of the latter on inflationary expectations, which might, under certain conditions, elicit a wage-price spiral exists, but a review of them all would take us far afield and is therefore beyond the scope of this essay.

It is worthwhile pointing out, nevertheless, that because Maltese statistics are published with a considerable delay, any policy response(s) targeting the effects of a change in the price of oil will tend to be tardy and of a sub-optimal magnitude.

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[33] Fuel imports data are available for the years 1996 to 2000, whereas trade statistics are available for 2001. 2000 data for fuel imports and 2001 trade data have been used to compute the ratio in question.

[34] B.S. Bernanke "Irreversibility, Uncertainty, and Cyclical Investment." Quarterly Journal of Economics. February 1983, 98:1, pp. 85-106.

OPEC's Role

Of late, the debate concerning the effects of oil price increases on the economy has shifted and the role of OPEC in determining the price of oil has risen in importance. In this respect, evidence is emerging that OPEC decisions are far from exogenous and respond to global economic conditions. Assuming oil output is imperfectly observable, which is a reasonable assumption indeed, given that oil statistics are produced with a considerable time lag, expansions, *ceteris paribus*, strengthen oil cartels whereas recessions undermine them [35]. A further element in OPEC's pricing decision seems to be the exchange rate of the USD vis-à-vis other major currencies. Since oil prices are quoted in USD and trade therein is also conducted using USD, the exchange rate of the USD matters on two accounts: firstly, in that from OPEC's perspective, the price of goods denominated in currencies other than the USD will be inversely related to the value of the USD in relation to the other currencies [36]; secondly, in that a weaker USD will tend to make the price of oil for the rest of the world seem lower thereby giving more clout to OPEC and driving up the price of oil, albeit for Malta this has to be treated as a totally exogenous factor.

The Likely Effect Of Fickle Oil Prices In The Short- And Medium-Term On The Local Industry And The Economy In General

To sum up, in a nutshell, the preponderance of the literature reviewed seems to be supporting the view that the alleged link between oil price changes and macroeconomic performance has been overstated and that that view has only survived because it is the only *prima facie* explanation for the appearance of stagflation [37].

In the light of this study's findings, fickle oil prices foment an aura of uncertainty as risk-averse economic agents wait to see whether a change in the oil price is temporary or permanent. This potential aura of uncertainty is the result of the domestic government's decision to liberalise fuel and electricity prices and peg them to their international prices. However, it must be remembered that subsidies distort market prices thereby resulting in perverse incentives. Doling out subsidies in the face of a ballooning fiscal deficit, moreover, is impolitic, especially when the subsidised item is associated with negative externalities like pollution (e.g. SO_2, CO, CO_2, PM2.5, and PM10).

[35] J.J. Rotemberg and G. Saloner, "A Supergame-Theoretic Model of Business Cycles and Price Wars During Booms," American Economic Review, June 1986, 76:3, pp. 390-407.

[36] In other words, the weaker the USD in relation to other currencies, the higher the price of goods denominated in currencies other than the USD and the reverse.

[37] For convincing evidence to the contrary, see R.B. Barsky and L. Kilian, 2001 (op. cit.).

As per the presented findings, the worst hit industrial sectors are likely to be those for food and beverage, coke, petroleum and chemicals, plastic and rubber products, electrical machinery, other transport equipment, furniture and manufacturing not elsewhere classified, and construction.

With regards to the household sector, if fuel is locally as price-inelastic [38] as postulated in theoretical studies, then the result of a price increase will have a proclivity to be regressive and *viceversa*. For an increase in the price of oil, households will register a deterioration in purchasing power as more of their disposable income has to be relinquished in return for the same quantity of fuel, and because of Malta's volume of exports and imports, the decline will tend to affect adversely those trading partners from whom Malta does not purchase oil, as well as the local economy. Again, in the event of an oil price decrease, the converse will apply.

Fickle oil prices, what is more, might goad particular clusters of workers to ask for higher wages when negotiating wage adjustments during periods of exceptionally high oil prices, and by the same token other clusters who might happen to be negotiating their wage increases in periods of exceptionally low oil prices might end up worse-off when the price of oil rises again. In an environment where the price of oil is unpredictably volatile, labour will therefore ask for higher wages irrespectively of whether the price of oil is high or low at the period of negotiation. This will be apt to generate cost-push inflation if a pass-through of RPI inflation to core-inflation occurs and Malta's already-precarious productivity per lira vis-à-vis other countries will, in that case, exacerbate.

With volatile oil prices, the Maltese balance of payments position in relation to OPCs will become more unpredictable and volatile itself.

Following a change in the price of oil, the aftershocks on labour demand are apt to be felt most strongly for those NACE categories where competition-intensity is relatively low, and where the incidence of mark-up pricing is therefore higher. The aftershocks of RPI inflation, on the other hand, are likely to be cost-driven by the produce of those sectors that would be worst-hit by a rise in oil prices. These items, together with their HBS weighting are to be found in *Addendum* 3. Tourism could also be adversely affected if the price of air fares change as a result of changes in the price of aviation fuel. This will be more likely to happen if the situation is perceived to be temporary; however, in the latter case, air carriers might decide to absorb the difference in aviation fuel themselves.

In a world characterised by highly-volatile oil prices, hedging agreements for the supply of oil could be resorted to, but the result of such agreements is not always clear, as it may end up costing or saving Malta big money depending on whether the price of oil subsequently rises or drops.

[38] We cannot know whether this applies to Malta or not, since data is available only up till the year 2000, (see figures 3, 6 and 7) during which prices for all fuels were still being subsidized by Enemalta.

Enemalta, on account of its being a government-owned monopoly, is unlikely to invest in alternative energy sources even if these turn out to be economic, which, given the subsidies being thrown onto oil-produced energy and the advancement in alternative energy technologies, these will probably soon be. This is so because the Maltese government is currently saddled with a budget deficit that must be reined in soon if meeting all the Maastricht criteria are to be met. The better way forward, accordingly, would be to liberalise the supply of energy and to establish the economic thresholds of alternative energy technologies beyond which a technology will become economic after having taken into account the subsidies that go into oil-produced energy and the negative externalities affecting Malta that this gives rise to.

Lastly, it would be in order to exhort for more statistics to be published more timely, for without data it is impossible to accurately gauge the effects of something potentially as cataclysmic as changes in the price of oil.

Addendum 1

Middle East Political Events And Domestic Inflation

Year	Event	Lagged Inflation (Year-on-year)			
		$\pi_t - \pi_{(t-1)}$	$\pi_{(t+1)} - \pi_t$	$\pi_{(t+2)} - \pi_{(t+1)}$	$\pi_{(t+3)} - \pi_{(t+2)}$
1973	Arab-Israel War	4.44 +	-0.49 -	1.52 +	-8.24 -
1978	Iranian Revolution	-5.29 -	2.42 +	8.62 +	-4.26 -
1980	Iran-Iraq War	8.62 +	-4.26 -	-5.70 -	-6.67 -
1986	OPEC Collapse	2.24 +	-1.58 -	0.53 +	-0.09 -
1990	Persian Gulf War	2.12 +	-0.44 -	-0.9 -	2.5 +
1999	OPEC Meeting	-0.26 -	0.24 +	0.56 +	-0.74 -
2001	Afghan War	0.56 +	-0.74 -	-0.89 -	N/A
2003	Iraq War	-0.89 -	N/A	N/A	N/A

Table 1: Inflationary Patterns Following Political Events In The Middle East (π denotes inflation, whereas subscript t denotes the time period in years starting from the Middle East political event).

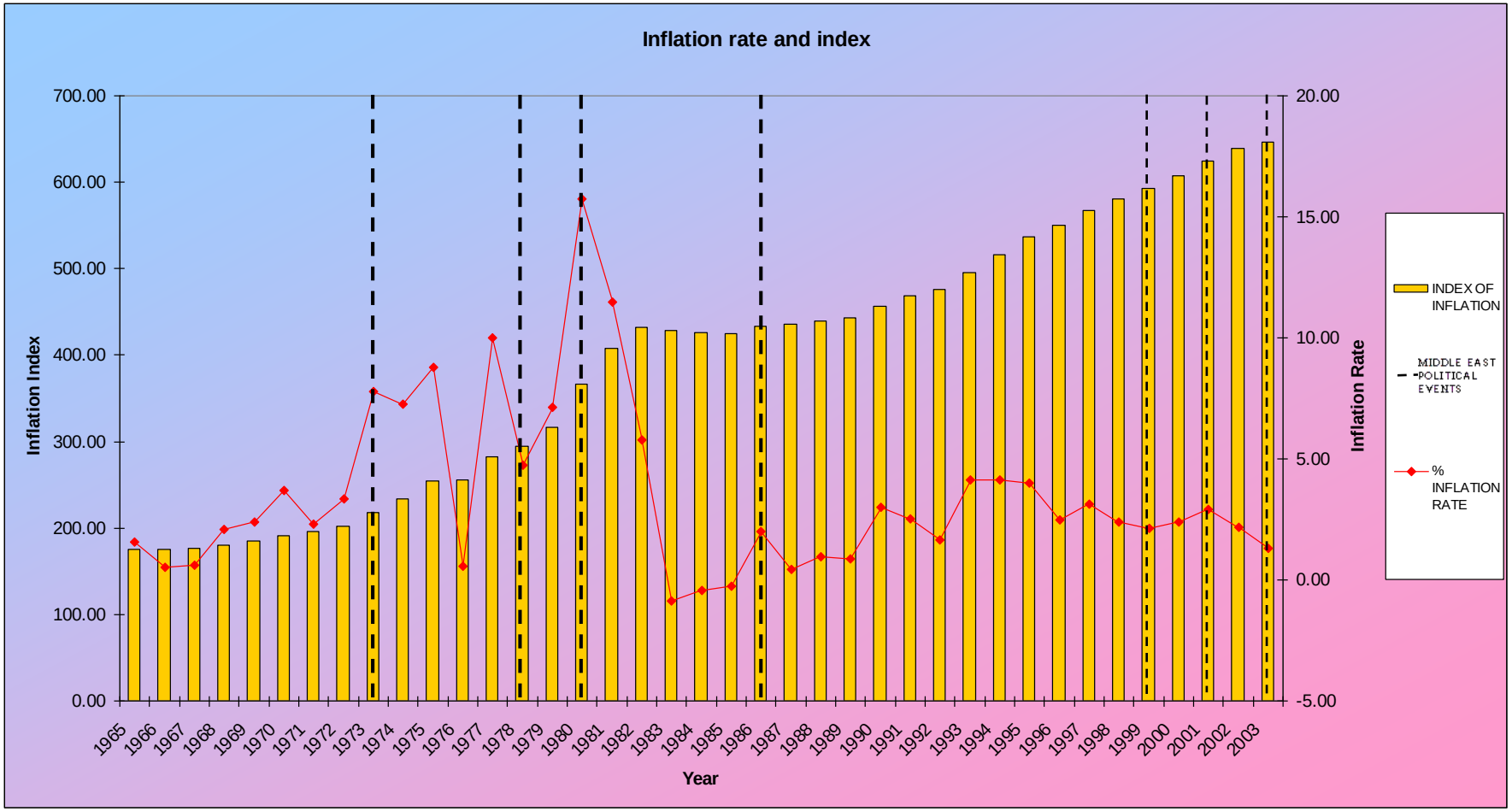

Figure 2: Inflation Rate and Inflation Index for Malta with Superimposed Middle East Political Events.

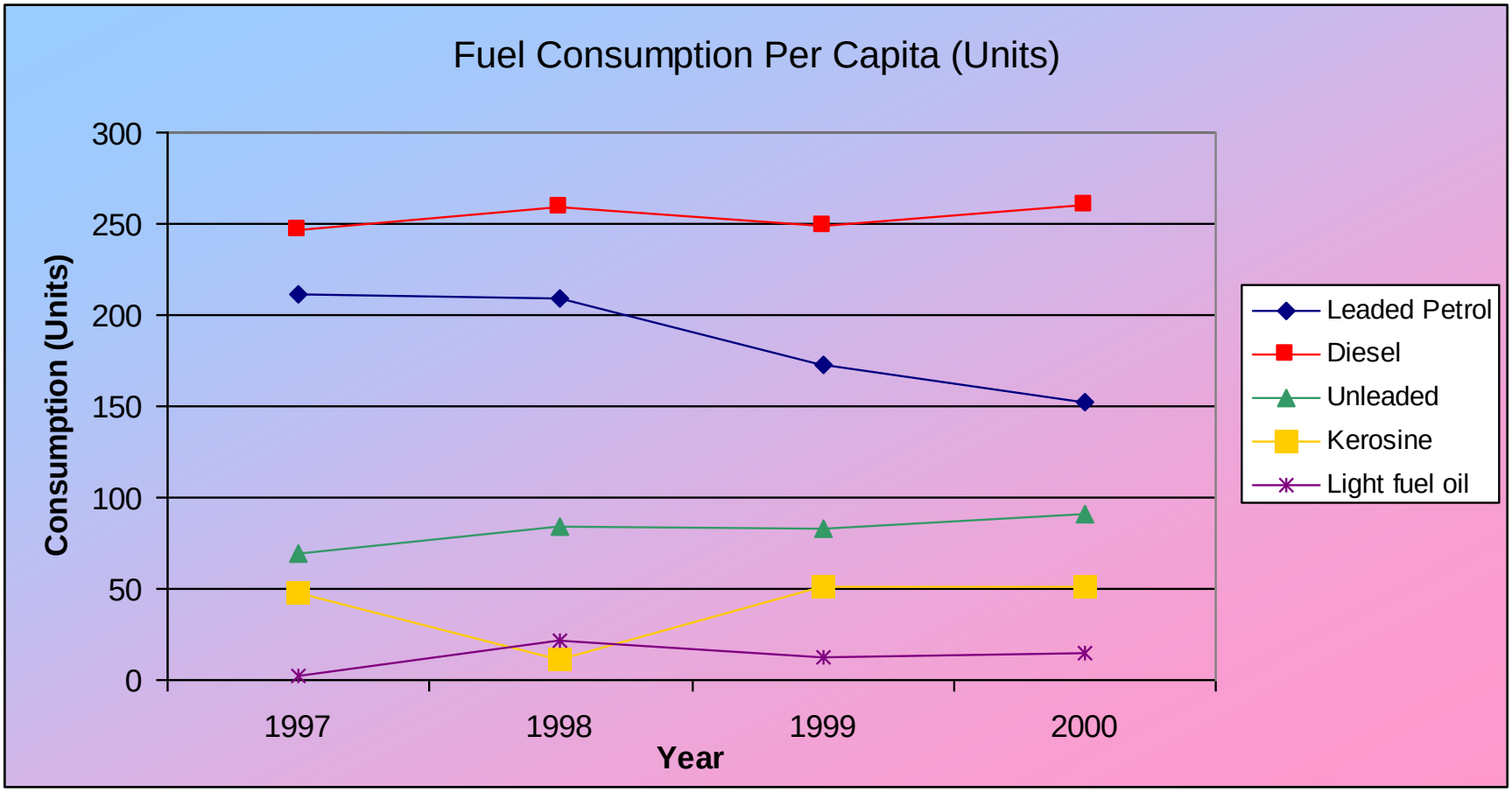

Figure 3: Fuel Consumption Per Capita; Source "Environment 2000", National Statistics Office, 2002, Table 38.

Addendum 2

Approximative Competition-Intensity Index

The approximative competition-intensity index is an index designed for benchmarking competition per NACE category against other NACE categories. Since competition per sector is being scaled against other local sectors, the values of the index were, by design, constrained between the value of 0 and 1, with the sector for which the index is 0 being the sector with the least competition intensity and that for which the value is 1 being the one with the largest competition-intensity.

The approximative competition-intensity index takes account of two factors, namely the number of firms per sector and the employment per firm per sector.

Economic theory suggests that the larger the number of firms operating in a given sector, the healthier the competition within the same sector. Ideally, here we should have taken the market share of each firm into account, but such data is not available and we will have to make do with the limitations imposed on us by the data. Moreover, employment per firm is indicative of minimum-efficient scales of production and hence of sectoral barriers to entry. On the foregoing notion, the larger the employment per firm, the less intensive the competition of that particular sector is apt to be. Thus, the number of firms per sector and the employment per firm per sector were used as a proxy for competition intensity as against other local sectors.

The index has been computed using the following formula.

Let X_{Z_i} represent the total number of employees per individual NACE category Z_i

Let Y_{z_i} represent the total number of firms per individual NACE category Z_i

Let V_{z_i} represent the employment per firm $\left(\frac{X_{Z_i}}{Y_{Z_i}}\right)$ per individual NACE category Z_i

$$\frac{\left[\frac{V_{z_i} - \text{Maximum } V_{z_i}}{\text{Minimum } V_{z_i} - \text{Maximum } V_{z_i}}\right] + \left[\frac{V_{z_i} - \text{Minimum } V_{z_i}}{\text{Maximum } V_{z_i} - \text{Minimum } V_{z_i}}\right]}{2}$$

The computations per NACE category of the index explained hitherto follows on the following pages.

NACE	Description	Competition-Intensity Index
Unknown	**Other**	0.5122
A1	Agriculture, hunting and related service activities	0.4536
B5	Fishing, operation of fish hatcheries and fish farms; service activities incidental to fishing	0.0585
CA11	Extraction of crude petroleum and natural gas; service activities incidental to oil and gas extraction, excluding surveying	0.5004
CB14	Other mining and quarrying	0.0099
DA15	Manufacture of food products and beverages	0.0691
DA16	Manufacture of tobacco products	0.4867
DB17	Manufacture of textiles	0.0089
DB18	Manufacture of wearing apparel, dressing and dyeing of fur	0.5059
DC19	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear	0.0035
DD20	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	0.0151
DE21	Manufacture of pulp, paper and paper products	0.4980
DE22	Publishing, printing and reproduction of recorded media	0.5179
DF23	Manufacture of coke, refined petroleum products and nuclear fuel	0.0004
DG24	Manufacture of chemicals and chemical products	0.5038
DH25	Manufacture of rubber and plastic products	0.0058
DI26	Manufacture of other non-metallic mineral products	0.0263
DJ27	Manufacture of basic metals	0.0027
DJ28	Manufacture of fabricated metal products, except machinery and equipment	0.0696
DK29	Manufacture of machinery and equipment n.e.c.	0.0072
DL30	Manufacture of office machinery and computers	0.0013
DL31	Manufacture of electrical machinery and apparatus n.e.c.	0.0043
DL32	Manufacture of radio, television and communication equipment and apparatus	0.4847
DL33	Manufacture of medical, precision and optical instruments, watches and clocks	0.4915
DM34	Manufacture of motor vehicles, trailers and semi-trailers	0.0019
DM35	Manufacture of other transport equipment	0.4895
DN36	Manufacture of furniture; manufacturing n.e.c.	0.1603
DN37	Recycling	0.4996
E40	Electricity, gas, steam and hot water supply	0.0000
E41	Collection, purification and distribution of water	0.3358
F45	Construction	0.7426
G50	Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel	0.2046
G51	Wholesale trade and commission trade, except of motor vehicles and motorcycles	0.7067
G52	Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods	1.0000

NACE	Description	Competition-Intensity Index
H55	Hotels and restaurants	0.6738
I60	Land transport; transport via pipelines	0.5895
I61	Water transport	0.5086
I62	Air transport	0.0027
I63	Supporting and auxiliary transport activities; activities of travel agencies	0.5581
I64	Post and telecommunications	0.4953
J65	Financial intermediation, except insurance and pension funding	0.0140
J66	Insurance and pension funding, except compulsory social security	0.5023
J67	Activities auxiliary to financial intermediation	0.0096
K70	Real estate activities	0.6215
K71	Renting of machinery and equipment without operator and of personal and household goods	0.5246
K72	Computer and related activities	0.5367
K73	Research and development	0.0017
K74	Other business activities	0.7574
L75	Public administration and defence; compulsory social security	0.0134
M80	Education	0.5747
N85	Health and social work	0.5752
O90	Sewage and refuse disposal, sanitation and similar activities	0.5055
O91	Activities of membership organizations n.e.c.	0.0526
O92	Recreational, cultural and sporting activities	0.6087
O93	Other service activities	0.2361
P95	Private households with employed persons	0.5002
Q99	Extra-territorial organizations and bodies	0.5049

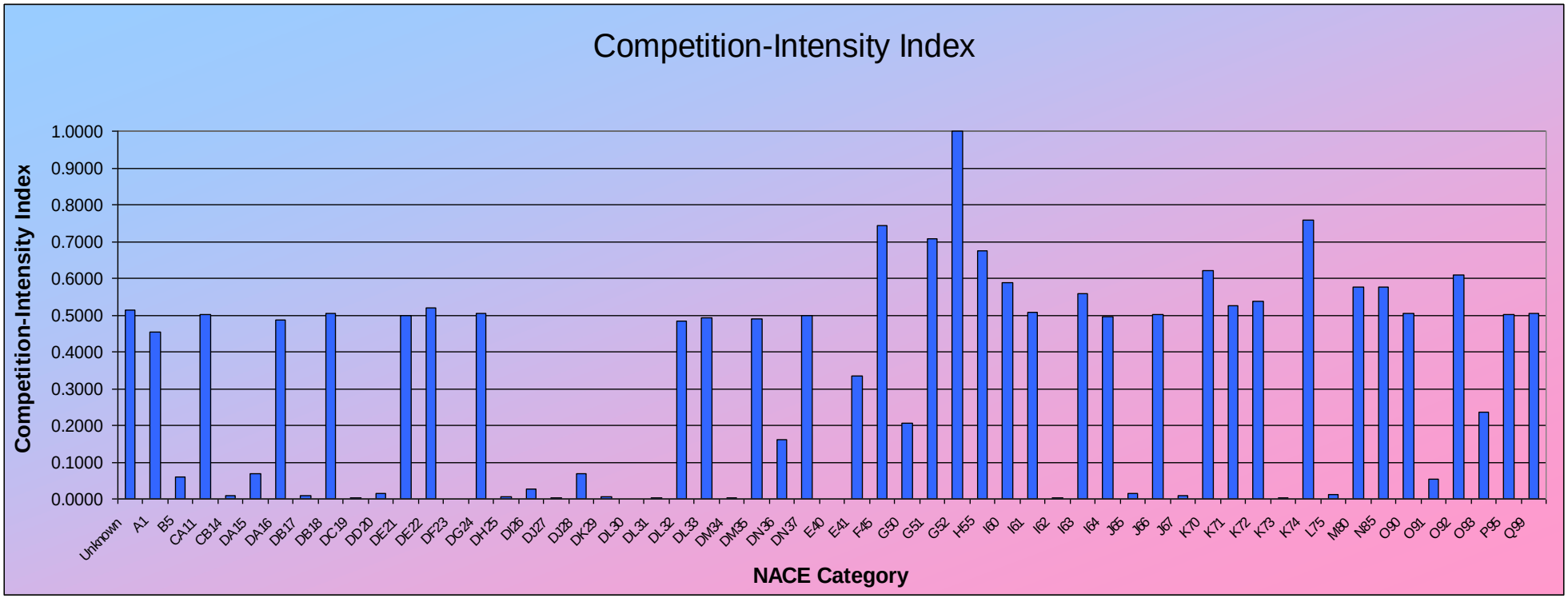

Figure 4: Source: Customised Data Request to NSO. I take the opportunity to thank Mr. Robert Mizzi (Library & Information Unit, NSO) for having guided me in requesting the data and in complying with my request timely and professionally.

Addendum 3

Potential Oil-Related Inflation

A.3.1 The NACE Categories Worst Affected By A Rise In The Price Of Oil [39]

15. Manufacture of food products and beverages
31 and 32. Manufacture of electrical machinery and apparatus not elsewhere classified (n.e.c.) and manufacture of radio, television and communication equipment and apparatus
23 and 24. Manufacture of coke, refined petroleum products, nuclear fuel, chemicals and chemical products
25. Manufacture of rubber and plastic products
45. Construction
36. Manufacture of furniture; manufacturing (n.e.c.)
35. Manufacture of other transport equipment

A.3.2 The HBS Weight Of The Worst-Affected NACE Categories [40]

Food products and beverages [41] (22%)
Electrical machinery and apparatus not elsewhere classified (n.e.c.), and radio, television and communication equipment and apparatus [42] (4.2%)
Coke, refined petroleum products, chemicals and chemical products [43] (0.3%)
Rubber and plastic products [44] (Unknown)
Construction [45] (6%)
Furniture [46] (4.2%)
Transport equipment [47] (6.4%)

[39] Refer to the bar chart on the previous page; **N.B.** Data is available only for the designated NACE categories.
[40] "Household Budgetary Survey 2000", National Statistics Office, 2003, pp. 107-116 *passim*.
[41] Includes bread and cereals, meat and meat products, fish and seafood, eggs, milk, dairy products, oils and fats, fruit, sugar, jam, honey, chocolate and confectionery, vegetables, other food products and beverages.
[42] Includes major household appliances, small electric household appliances, telephone and fax machines and audio-visual equipment.
[43] Includes gas and liquid fuels and solid fuels.
[44] Includes
[45] Includes materials for repair and maintenance of dwellings, maintenance of dwelling and repair services, other services related to dwelling.
[46] Includes furniture and furnishings, floor coverings and repairs of furniture.
[47] Includes fuels and lubricants, maintenance, repair, other services related to personal transport equipment and transport and services related thereto.

Addendum 4

International Trade

Trade datum for the countries highlighted in yellow were deducted from their respective region's total on account of their being an oil producing country. Trade values for the designated countries feature in total at the end under the heading "Oil Producing Countries".

Jan - Dec 2001 Imports & Exports		
Trading Bloc / Region	**Imports (LM)**	**Exports (LM)**
EU 15	779,079,179	421,350,467
UK	123,096,754	76,211,179
	655,982,425	**345,139,288**
European F.T.A.	18,397,106	2,309,017
Norway	1,514,100	791,559
	16,883,006	**1,517,458**
Europe Other	37,607,310	13,544,419
Albania	91,318	130
Azerbaijan		6,755
Russian Federation	10,319,578	34,184
Ukraine	1,461,473	37,373
	25,734,941	**13,465,977**
Africa	28,603,798	33,019,209
Algeria	3,983	179,161
Angola		220,815
Benin	11,097	588,645
Cameroon	14,994	7,022
Egypt	716,734	1,711,611
Gabon	75	
Guinea	5,838	
Ivory Coast	395,556	
Libya	19,718,273	21,880,469
Nigeria	5,204	274,133
Sudan	1,260	351,383
	7,730,784	**7,805,970**

Jan - Dec 2001 Imports & Exports		
Trading Bloc / Region	**Imports (LM)**	**Exports (LM)**
America & The West Indies		
North/Central America	148,567,562	1,765,776,315
West Indies	266,298	657,410
South America	8,522,616	1,052,174
	157,356,476	1,767,485,899
Canada	5,884,919	1,809,206
Guatemala	7,101	
Mexico	658,366	391,300
United States of America	141,763,827	174,365,290
Trinidad and Tobago		217,239
Colombia	255,044	28,333
Ecuador	869,831	31,901
Peru	47,652	
Suriname	7,767	
Venezuela	4,095	61,934
	7,857,874	**1,590,580,696**
Asia	197,311,322	174,197,034
Bahrain	130,092	217,843
Indonesia	1,357,842	17,255
Iran	120,405	19,860
Kuwait	40,707	399,187
Malaysia	11,661,297	199,524
Oman	53,276	691,073
Qatar		301,873
Saudi Arabia	165,864	3,565,450
Syria	1,240,053	45,957
United Arab Emirates	729,788	4,696,187
Vietnam	277,009	1,366
Yemen		491,315
	181,534,989	**163,550,144**
Oceania	**6,803,534**	**627,502**
Oil Producing Countries	**322,631,172**	**289,846,512**

Sources: http://www.aneki.com/oil_countries.html and "Trade Statistics 2001", National Statistics Office, 2003, Table 4.

Jan - Dec 2001 Imports & Exports: Summary Table				
	Imports	Exports	Imports As A % of Total	Exports As A % of Total
EU 15	655,982,425	345,139,288	53.54%	14.31%
European F.T.A.	16,883,006	1,517,458	1.38%	0.06%
Europe Other	25,734,941	13,465,977	2.10%	0.56%
Africa	7,730,784	7,805,970	0.63%	0.32%
America & The West Indies	7,857,874	1,590,580,696	0.64%	65.93%
Asia	181,534,989	163,550,144	14.82%	6.78%
Oceania	6,803,534	627,502	0.56%	0.03%
Oil Producing Countries	322,631,172	289,846,512	26.33%	12.01%
Total	**1,225,158,725**	**2,412,533,547**	**100.00%**	**100.00%**

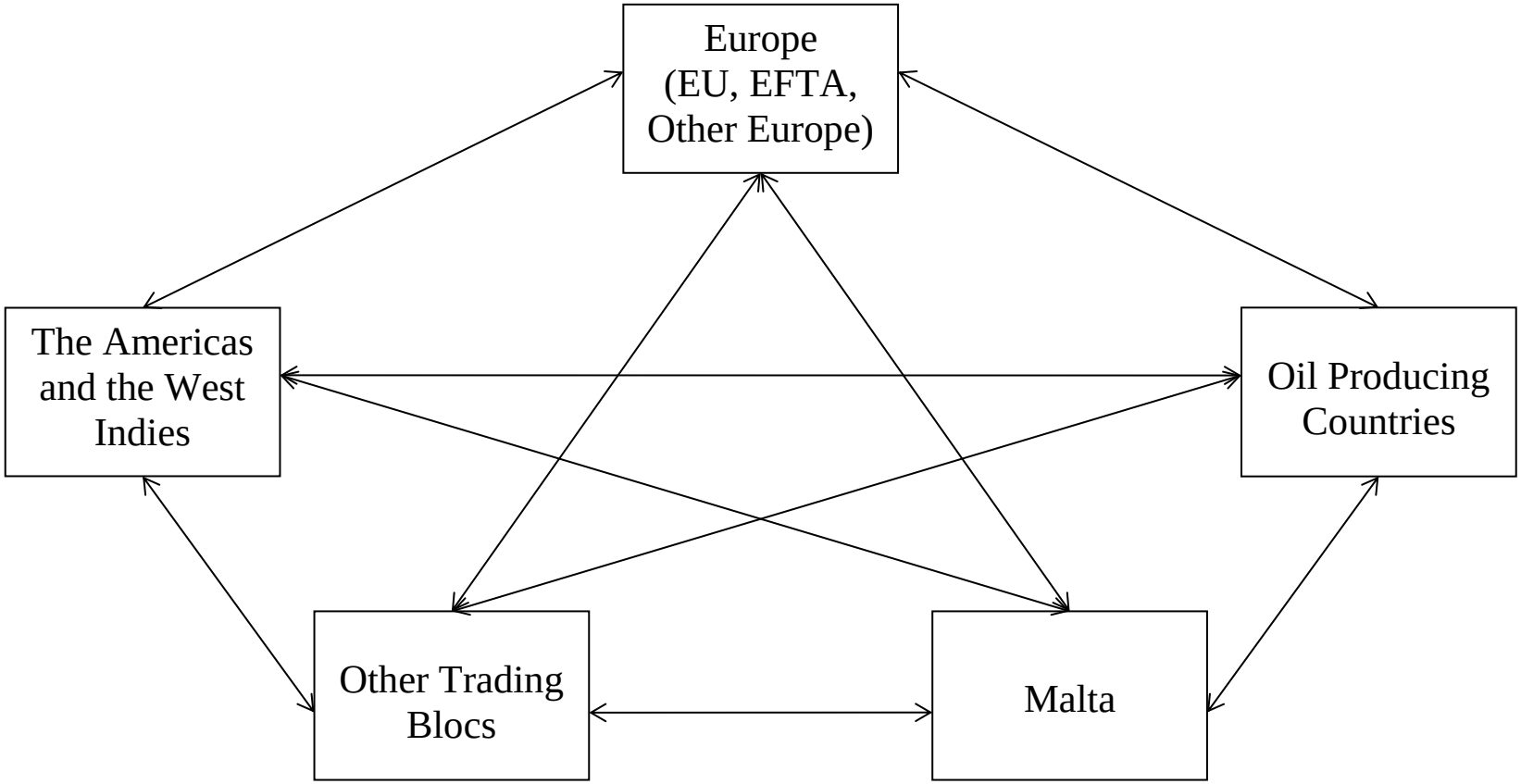

Figure 5: International Trade Schema.

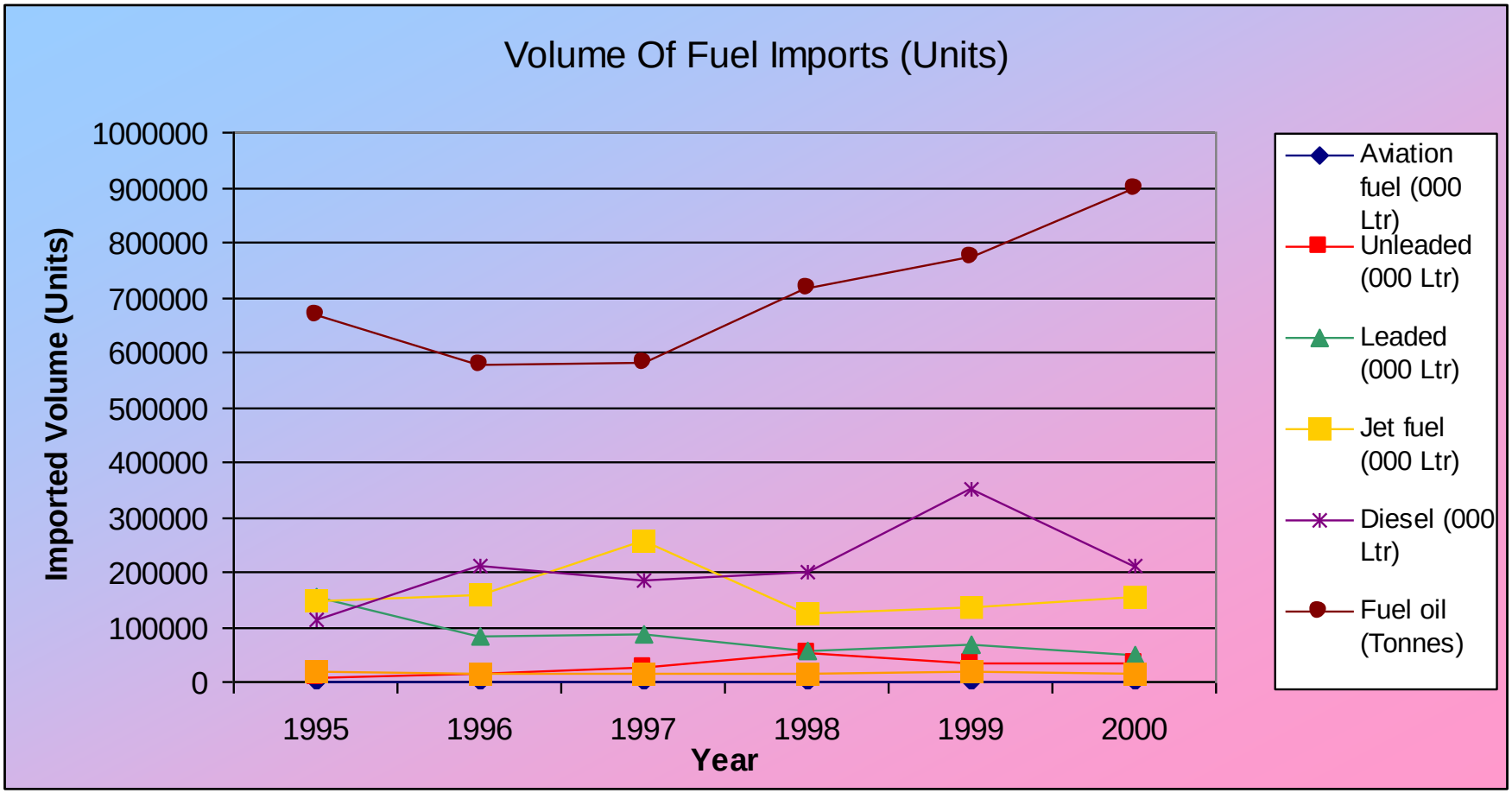

Figure 6: Volume Of Fuel Imports; Source "Environment 2000", National Statistics Office, 2002, Table 33.

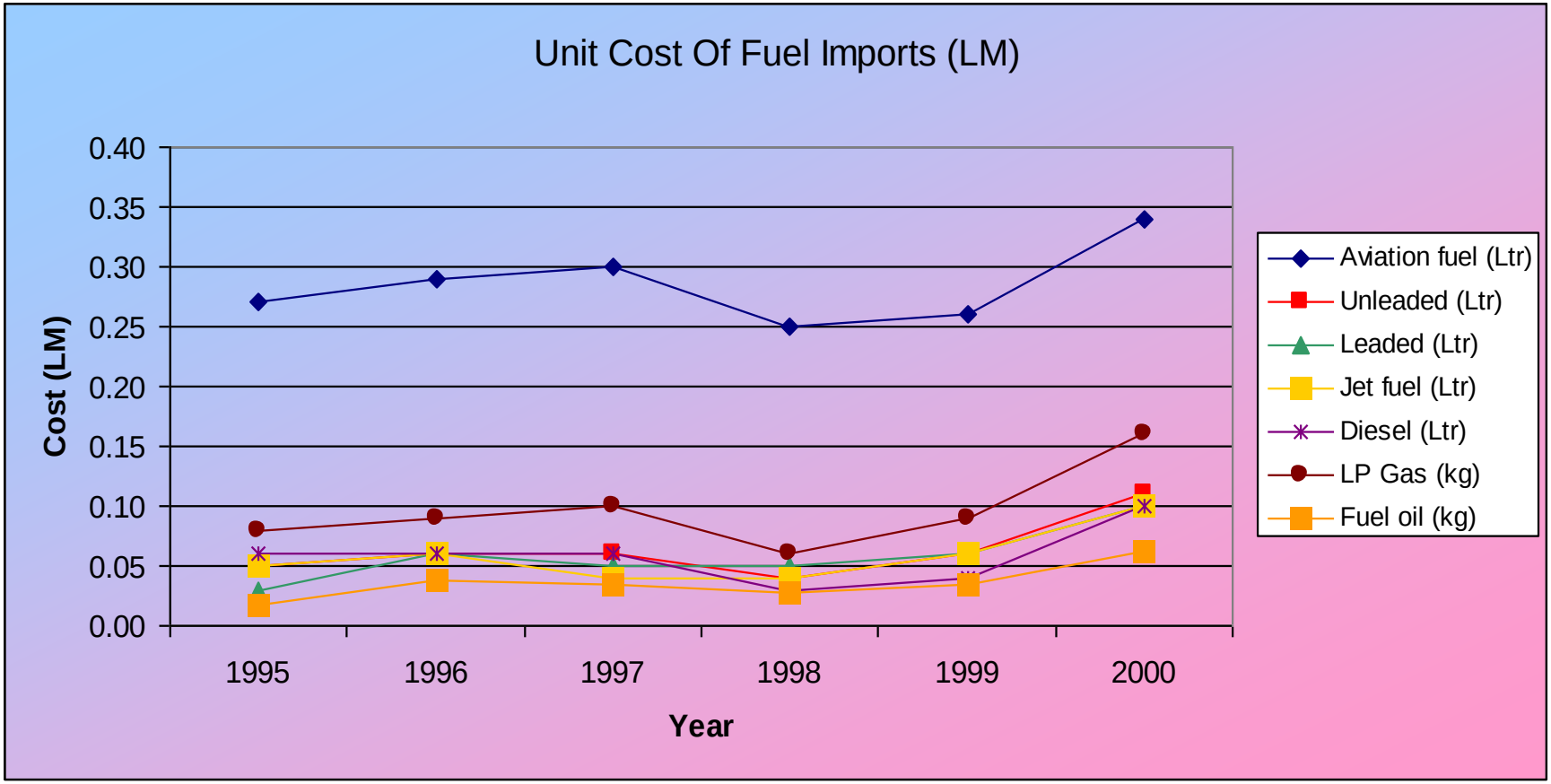

Figure 7: Unit Costs Of Fuel Imports; Source "Environment 2000", National Statistics Office, 2002, Table 37.