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OIL PRICES AND ECONOMIC STABILITY

The Macroeconomic Impact of Oil Price Shocks on the Swedish Economy

by

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The Macroeconomic Impact of Oil Price Shocks on the Swedish Economy

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ABSTRACT

In these simulation experiments for the Swedish economy, the impact of a future oil price shock was measured in terms of the stabilization policies required, and the possibility was evaluated of insuring against such price shocks by way of a gradually increasing oil tax.

KEYWORDS

Oil dependence; oil price shocks; energy taxation; macroeconomic simulation models; policy analysis.

INTRODUCTION

The small, open Swedish economy depends on imported oil for roughly 2/3 of its use of primary energy. It is, thus, particularly vulnerable to sharp increases in the price of oil. A major concern in current Swedish energy policy is the adjustment and stabilization problems that a future oil price hike would create. This paper reports on a simulation study of these problems and of the possibility of easing them by the use of domestic oil taxes. The emphasis, here, has been laid on presenting the methodological approach that is exemplified by some numerical results.[1]

THE PROBLEMS POSED

In a policy-oriented study, the choice of a suitable measure of the macroeconomic impact of a large future oil price hike will depend on what you regard as the focal problem or dominant threat posed by the increased oil price.

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[1] The study has been conducted by the author and T. Nordström. Some further results are presented in Ysander (1981b). The study forms part of a larger project - KRAN - dealing with various aspects of energy crises and economic adjustment. A preliminary report on this whole project is given in Ysander (1981a).

If the main worry is concerned with the unavoidable long-term welfare losses resulting from the unfavorable terms-of-trade development, you may want to measure these losses - e.g., in terms of equivalent variations around a reference consumption path - assuming that the Swedish adjustment policies are efficiently planned and executed.

It may be, however, that the major perceived threat is not so much the high new level of oil price as the abrupt and unexpected way it jumps up. The general experience of the two price hikes in the 70's seems to point that way.[2] In particular much of Sweden's present difficulties - manifested by a mounting deficit both in public budgets and in external exchange and by a shrinking and underutilized export industry - can be viewed as arising out of a failure to cope with the stabilization problems caused by the oil price hikes (cf. Eliasson and Ysander,1981). If the paramount concern is to reduce the risk of again losing control of the stabilization problems and having the economy degenerate into stagflation, then the relevant impact measure should, instead, use as a benchmark the policy adjustments required to restore balance in the economy. We have chosen, here, to gauge the impact, primarily in terms of the adjustments in wages and in private and public consumption, required to restore balance both in external exchange and in the labor market within three years. We, thus, concentrate on measuring the political costs and/or risks involved in adjusting the economy. This criterion is then applied to the following three types of question.

How big can the impact - or the policy adjustments required - be and how does it vary with the kind of policies actually pursued in Sweden and abroad? How much of the impact on the Swedish economy can be directly attributed to the increased oil bill and how much is caused indirectly by repercussions on other world markets? To what extent do various possible restrictions on domestic policies - i.e., limited flexibility in fiscal and budgetary policy - affect and inflate the problems? One might think of the alternatives as a kind of ladder of political feasibility. On top is the first-best solution, where all countries, including Sweden, adjust smoothly and swiftly, leaving the world markets largely unperturbed. At the bottom of the ladder is a situation where the Swedish government is not only faced with world market repercussions, but also has its hands tied by political commitments to various groups of consumers and wage earners.

The second type of questions is concerned with the costs and benefits of an oil tax buffer - i.e., of "anticipating" an eventual future oil price hike by a gradually increasing oil tax.

The third round of questions, finally, deals with the effects of possible oil price increases - and the policies of adjustment or insurance they call forth - on the use of oil and other kinds of primary energy.

THE EXPERIMENTAL SET-UP

The model we have used in the simulations is a 23 sector growth model for the Swedish economy, designed for medium- and long term policy analyses. Besides import and export functions, it incorporates various mechanisms for dynamic adjustment, such as a vintage approach to capital formation in industry, a Phillips curve-like determination of wages, domestic price setting depending both on cost and on world market prices, and a sub-model for local government taxing and spending be-

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[2] Comparisons made between the effects of gradual versus abrupt oil price increases - e.g.Jacobson-Thurman (1981) - also lend support to this interpretation.

havior. The model was particularly tailored to allow for both long-run and short-run energy substitution.[3]

Our choice of policy means for controlling the model economy has been guided by priorities and practice in current Swedish policy. We employ three main policy instruments: wage policy, income tax and public consumption. "Wage policy" means controlling the long-term growth trend of nominal wages. The income tax can be looked upon as a representative of the wide variety of tax and transfer measures. Finally, we assume full control both of central government and local government expenditures. We have not included an active exchange policy among our policy instruments since it appears in the model to be a substitute for rather than a complement to wage policy.

The eight main simulations are listed in Table 1. Around these eight simulations various kinds of sensitivity analyses have been carried out.

As a measuring rod for our simulations we have used a reference case, i.e. a standard scenario for the development of the Swedish economy in the 80's and 90's. A detailed discussion of this case and of alternative conditions and strategies for Sweden is given in Nordström-Ysander (1980). In the reference case the present imbalances in the Swedish economy have been eliminated by 1990, in accordance with current official policy objectives. The price of oil is assumed to increase annually by 1.5 per cent relative to the price of finished goods in international

TABLE 1 Eight Simulations 1980-2000

		No oil tax	Oil tax
No oil price hike		REF - The reference case	TREF - Oil tax without oil price hike
Oil price hike		OI - Oil price hike without world market repercussion	
Oil price hike	Increasing economic and political adjustment costs	OS - Oil price hike with world market repercussions but without restrictions on policy	TOS - Oil tax with oil price hike
Oil price hike	Increasing economic and political adjustment costs	MW - Minus wage policy	
Oil price hike	Increasing economic and political adjustment costs	MP - Minus also public consumption policy	
Oil price hike	Increasing economic and political adjustment costs	MR - Minus also the possibility of lowering real wages	

[3] A detailed description of the structure of this "ISAC" model is given in Jansson, Nordström, and Ysander (1981). An application of the vintage approach is exemplified in Jansson (1981), while the local government sub-model and its possible policy uses are demonstrated in Nordström and Ysander (1981).

trade. The coal price is, throughout the simulations, assumed to adjust proportionately, although with a certain lag, to changes in the oil price.

Below the reference case in the left-hand column of Table 1, different variations of the oil crisis scenario are listed in order of increasing adjustment problems. The "oil crisis" itself is throughout modeled as a 60 per cent rise in the relative oil price, occurring early in 1991. In the first scenario, (OI), this oil price hike occurs without, in any way, interrupting world trade. In the second, (OS), various cyclical repercussions on other world markets are taken into account. Based on the experience of the 70's, and on some experiments carried out for this purpose on the LINK model,[4] the resulting world trade cycle is modeled as a three-year pattern led by a short-lived speculative boom in raw material an investment goods - of dominant importance still for Swedish exports - followed by a general trade slump. Over the first four years of the 90's, the annual increase in the volume and price of world trade (excepting services) will be, on the average, multiplied by a factor of 0.6 and 1.2, respectively, compared to the reference development. To ease comparison we let, in both cases, public consumption develop as in the reference case, registering the shrinking room for increased consumption in terms of private consumption.

The three following variations - MW, MP, and MR in the table - simulate the effect of successively taking into account restrictions on the use of economic policy instruments which, judging from the experience of the 70's, may well be perceived as binding by Swedish decision-makers. In MW, we take away the wage policy instrument, making it impossible to influence the long-term trends in nominal wage increase. This must then be compensated by a more active use of the control of public consumption. In MP also this policy instrument is blocked, public consumption again being prescribed to follow the reference pattern. Finally, in MR, the need for trade union support is supposed to force the government to guarantee no decline in real wages, thus increasing the unemployment needed to ensure external balance.

The two cases, where an oil tax is used as a buffer against the possibility of an oil price hike, are listed in the right-hand column of Table 1. The oil tax we study has a very simple construction. It is successively stepped up during the 80's, annually adding an extra oil price increase of around 5 per cent, so that by the beginning of 1991 it has raised the domestic oil price at least as much as the assumed size of an eventual oil price hike.

If the oil crisis materializes - the TOS-case - the tax is used as a buffer, the lifting off of tax neutralizing the raised import price. We then measure the "benefits" by comparing the resulting development during the 90's with the "uninsured" case, OS, assuming the same access to policy instruments. If the oil crisis does not come - the TREF-case - the oil tax however remains, causing some retardation in growth, etc. during the following decade. The cost of the tax "insurance" is evaluated by comparing with the outcome in the reference case, which, apart from the tax, rests on identical assumptions.

THE IMPACT OF AN OIL PRICE SHOCK

The policy adjustments required to restore balance in three years after an oil price shock turn out to be quite drastic. This is true even when no account is

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[4] Cf. Sarma (1981), whose interpretation and measurement of the impact on the Swedish economy, however, differ from ours.

taken of possible world market repercussions - the OI-case. The oil price must be compensated by holding back private consumption - budget policy will have to be so hard-fisted, that the level of 1990 is regained only in 1994. The parsimonious regime will be reflected in a temporary increase in unemployment. The rate of nominal wage increase drops from almost 10 per cent in 1990 to about 3 per cent in 1991 while the rate of inflation goes up from 6 to 9 per cent - implying an almost 6 per cent cut in real wages instead of 3-4 per cent increase of the preceding years. Balance in the external payments is reached in 1993 but continued concern for the external payment situation will make it impossible to recover more than a small part of the relative losses in consumption before the turn of the century.

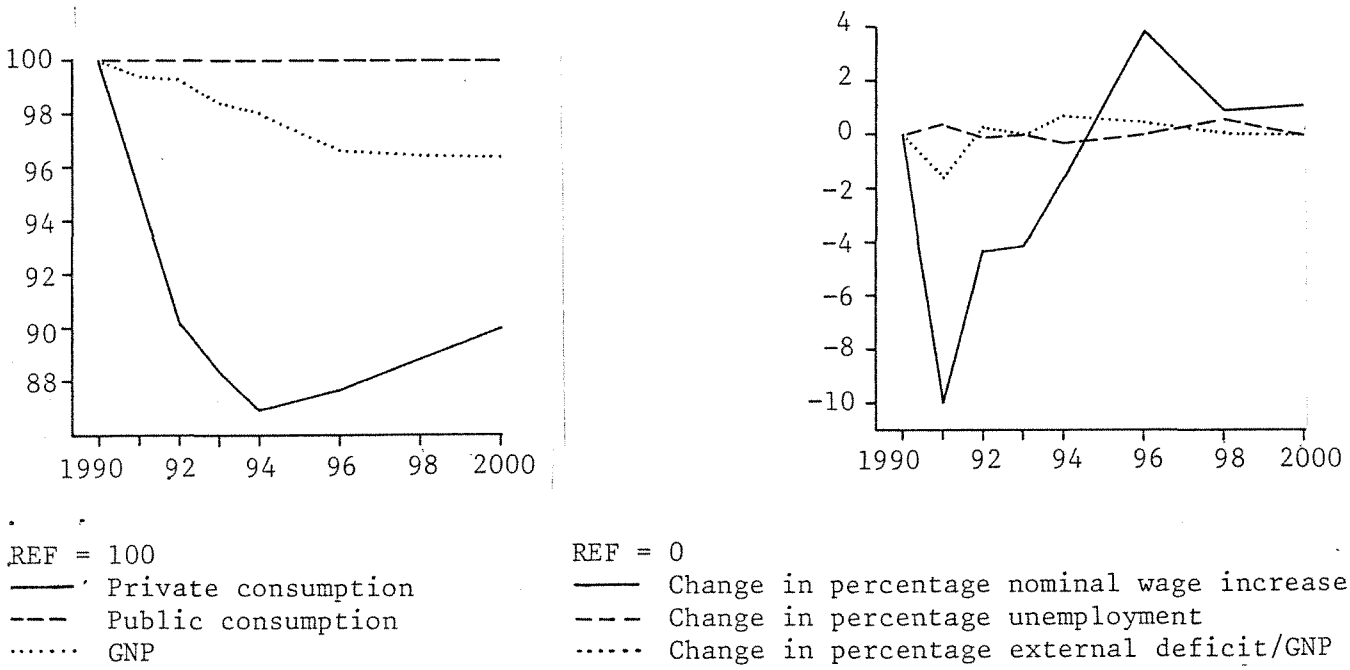

Fig. 1. Oil price hike with world market repercussion (OS)

Figure 1 shows how the stabilization problems are further blown up in the more realistic case - OS - where world market repercussions are also taken into account. To regain balance in external accounts in spite of stagnating tendencies in world trade will require even more herculean efforts in stabilization policy. There will have to be a wage freeze in 1991, and wage earners must accept an 8 per cent cut in real wages that year and expect another one per cent cut in the following year. The relative reduction in private consumption and GNP levels over the decade will be more gradual but altogether about one-third larger than before. The "direct" effects of the primary oil price shock still dominate the picture but the simulation results show that the various problems and "policy strains" during the adjustment period have all grown by something like one-third through the "indirect" effects coming via the world market.

Our situation after an oil price hike becomes even worse if we climb further down the "feasibility ladder", introducing, successively, various restrictions limiting the policy space.

Without access to wage policy - i.e., without being able to influence long-term trends in nominal wages - the government will have to use public expenditures as a substitute instrument. If we cannot rapidly improve our competitive position,

the only way to eliminate the external deficit within a few years is to save imports by substituting public for private consumption on a large scale. We can see what this means by comparing this restricted case (MW) with the case (OS), where no limits were placed on the policy instruments. Instead of just freezing the private consumption level for a couple of years, taxation must now force it down almost 10 per cent below the 1990 level, while at the same time encouraging an extremely rapid increase of public consumption at the rate of around 7 per cent annually. This policy moreover, would have to be completely reversed from 1994 onwards, if we want to let private consumption regain its previous share of total consumption. A concomitant effect would be a very high rate of wage inflation in the first years after the price shock.

If public consumption cannot be treated in this cavalier fashion, but must be left to develop according to its preset pattern in the reference case, we are left with taxation as our only available stabilization tool - the MP-case. External balance in 1993 can, then, only be reached at the price of an almost doubled unemployment rate in 1992-93. The further decline of private consumption in the MW-case can now be avoided, which also means, that despite the increased unemployment, GNP-development will be slightly more favorable.

If, on top of all this, we add the restriction that real wages should not be allowed to fall, we will end up with unemployment rates for 1991-93 that are as much as three times as high as those "normal" values, that could be retained when there were no policy restrictions. The fluctuations in wage increase and in inflation will at the same time be much larger. What these simulations illustrate is, thus, simply the fact that political limits on "feasible policies" or flexibility can make the already difficult stabilization problem unmanageable or impossible.

THE USE OF AN OIL TAX AS INSURANCE

The effects of introducing a gradually increased oil tax during the 80's without any oil crisis occurring, are shown in Fig. 2. The increased energy costs add up to the industrial problems at the start, increasing unemployment and shrinking

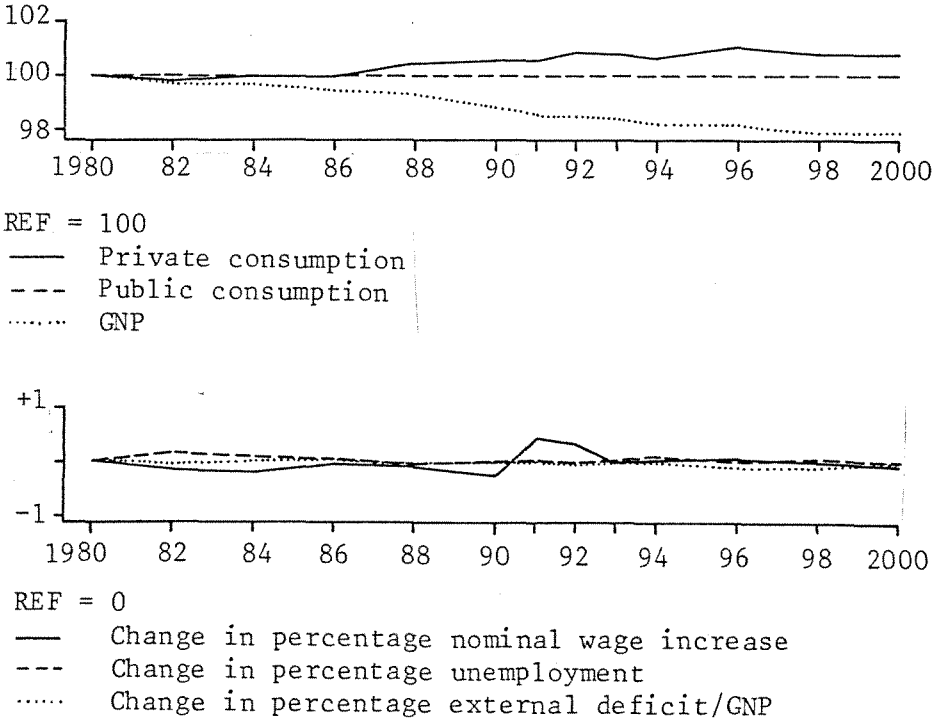

Fig. 2. Oil tax without oil price hike (TREF)

the available room for private consumption increases compared to the reference case. Due to the low estimated price elasticities in Swedish foreign trade, however, oil substitution turns out to make it easier to handle our balance of payment problem, even enabling us to raise our private standards temporarily in the 90's a bit further than what would otherwise have been possible. We will however pay a price in the form of reduced growth in GNP and in investments, leaving the century with a somewhat smaller and less modern industrial capacity.

If the insurance costs do not seem very impressive, the benefits, when an oil crisis occurs, in terms of reduced stabilization problems may be quite dramatic, as shown by Fig. 3. Instead of asking wage earners to accept an 8 per cent cut in real wages in 1991 with more sacrifices to follow, it is now enough to have them accept a very slow increase over two years. Domestic inflation rates are reduced in '91 by as much as a third and GNP, employment and private consumption develop slightly more favorably. All this is due to the forced oil saving and to the slower increase of our dependence on world markets, achieved by the oil tax in the 80's.

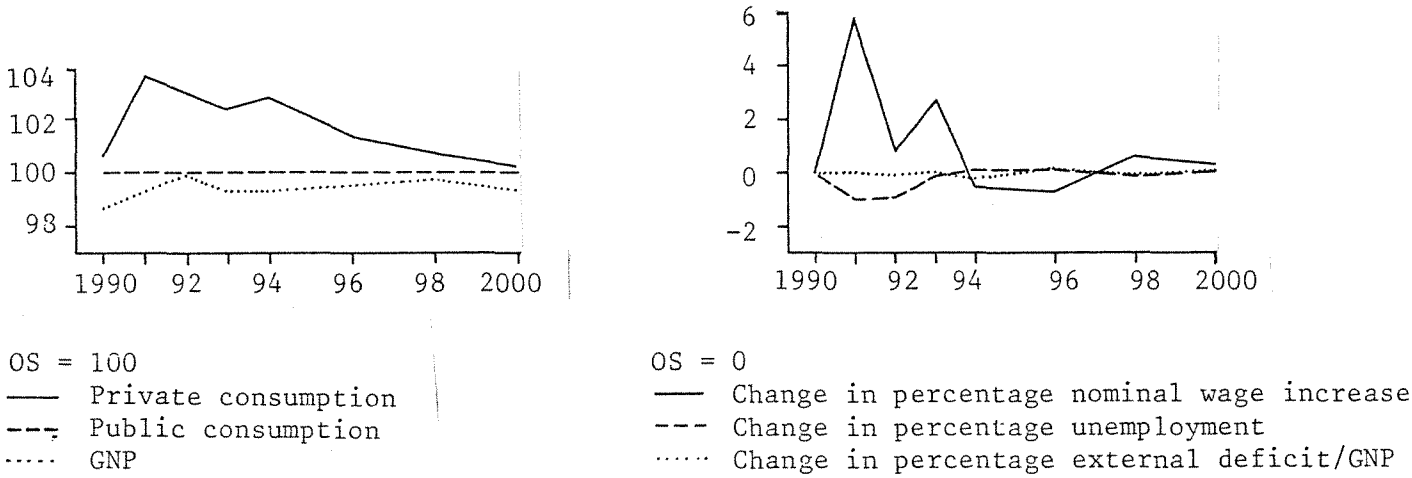

Fig. 3. Oil tax with oil price hike (TOS)

THE IMPACT ON ENERGY USE

The development of the use of oil and other forms of primary energy, implied by four different simulations - REF, TREF, OI and OS - is illustrated in Fig. 4.

We see that the stagnation of primary energy demand is expected to continue over the 80's, due to gains of conservation, low economic growth and an ongoing shift towards less energy-intensive industrial branches. An oil tax would call forth further savings in the 80's, while an unbuffered oil price shock would keep energy demand stagnant during the 90's.

For the use of oil, shown by the lower curve, a substantial reduction is foreseen for the 80's. Naturally changes in the oil price will have even more dramatic effects here. The expected reduction in oil use is only marginally due to slow economic growth. Besides energy conservation and structural change, substitution by coal, nuclear power and indigenous fuels like peat and wood is a major contributing factor behind the reduction, particularly in the projections with sharply rising oil prices.

A more detailed account of the projected composition and development of the use of various forms of primary energy in terms of TWh is given in Table 2.

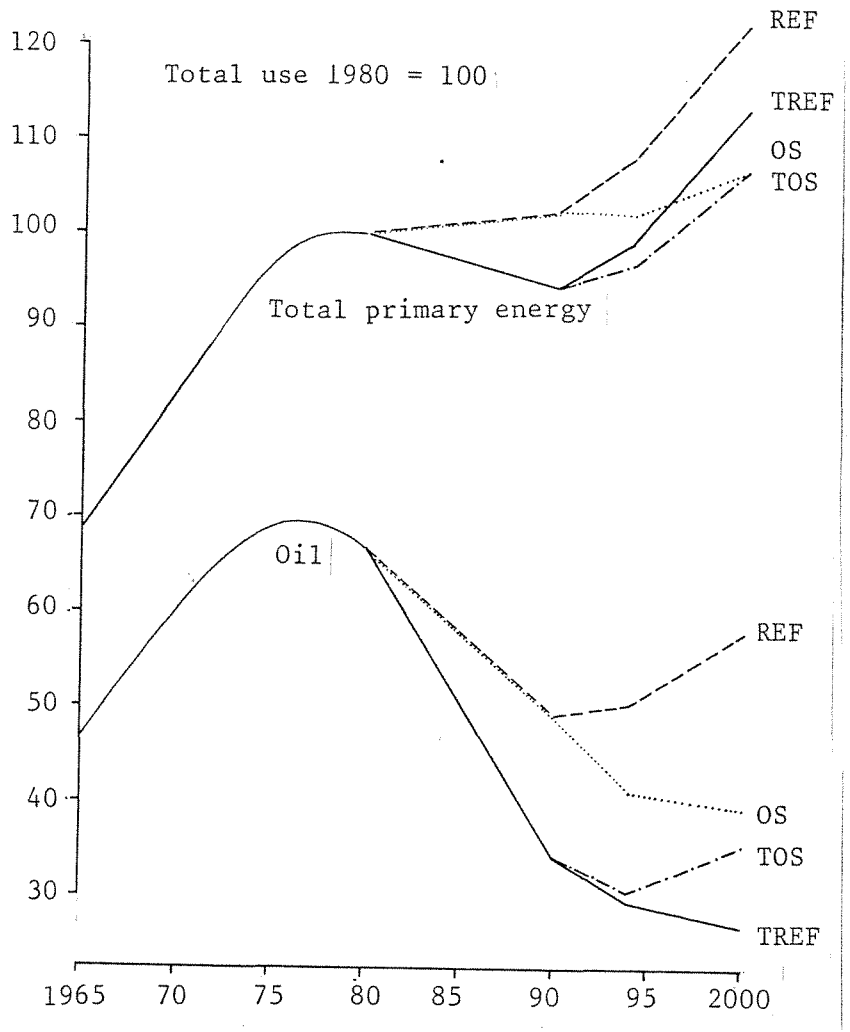

Fig. 3. The use of oil and other primary energy.

TABLE 2 The Use of Primary Energy 1980-2000

		GNP Billions of Sw.cr. 1975 prices	TWh				TWh/GNP	
			Oil	Coal	Indigenous Fuel	Total	Total	Oil
1980		322.0	297	18	40	445	1.38	0.92
1990	REF	396.8	219	43	68	456	1.15	0.55
2000		496.5	258	70	112	545	1.10	0.52
1990	TREF	392.0	152	62	78	419	1.07	0.39
2000		486.0	120	136	145	505	1.04	0.25
1990	OS	396.8	219	43	68	456	1.15	0.55
2000		481.0	175	75	122	476	0.99	0.36
1990	TOS	392.0	152	62	78	419	1.07	0.39
2000		479.0	157	85	129	475	0.99	0.33

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