THE REVENUE AND WELFARE EFFECTS OF FISCAL HARMONIZATION FOR THE UK

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Abstract

This paper describes the distributional, efficiency and revenue consequences of changes to the structure of indirect taxation in the UK implied by proposals for tax harmonization across the EEC. The results were generated by a microcomputer simulation program that allows the user to change the structure of indirect taxes in any desired way. The program features estimates of a system of demand equations obtained using 100,000 observations from the Family Expenditure Surveys to predict behavioural reactions to tax changes and their consequences for revenue and welfare.

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1. INTRODUCTION

The European Community is currently considering proposals for harmonizing the structure of indirect taxes across the community. The proposals are part of a programme of action designed to facilitate a unified internal market within the Community (see Commission of the European Communities (1987)). The Commission has proposed that Value Added Tax should lie within two bands: 14 – 20% for the majority of goods and services, and 4 – 9% for a limited range of essentials such as most foods, domestic energy, books and newspapers, and public transport. In the case of excise duties the Commission suggests that the rates be set for each country at the average across all member states. The implications for the UK are that zero rated goods such as most food and domestic energy will be taxed, at say 4%, while those goods already subject to VAT and, in addition, children's clothing will be taxed at, say the existing VAT rate of 15%. Goods currently subject to excise duties – petrol, alcohol and tobacco – would attract new rates of duty. Excise Duties on spirits, wines and beer would fall dramatically, and there would be a small increase for that on petrol and a relatively small decrease for that on tobacco. The Commission argued that these proposals are the minimum required to facilitate the abolition of frontier controls within the Community as a step towards the creation of a single internal market. However, it has been argued in Lee, Pearson and Smith (1988) (hereafter LPS) that these proposals exceed the minimum changes required for the purpose. Moreover, LPS argue that in some respects the proposals represent a retrograde step in establishing an ideal tax system.

The purpose of this paper is to investigate the impact of the proposals for indirect tax harmonization on UK government revenue and its sources and on the living standards of UK households. Our results are derived from a set of estimated consumer expenditure equations due to Blundell, Pashardes and Weber (1988) (hereafter BPW) using a microcomputer program called SPIT (Simulation Program for Indirect Taxation) by Symons and Walker (1988). The program, which uses data from a large sample survey, allows the user to simulate the effects of indirect tax changes on the pattern of household expenditure, on government revenue and its sources, and on household living standards. In section II

below we give brief details of the estimates and the simulation program and in section III we present our results. The results demonstrates the importance of allowing for behavioural responses in the calculation of government revenue changes arising from tax changes. In this particular application behavioural responses are particularly important because of the large price elasticity associated with alcohol and the large alcohol price change induced by the changes in excise duties. This finding is reflected in LPS who use alternative estimates to obtain revenue predictions. Once we correct for the deficiencies of the FES data we find that harmonisation would lead to a 2.3% increase in indirect tax revenue. In contrast when we compute revenue under the assumption that the patterns of expenditure are fixed we find that revenue would fall by 2.6%. Here we extend the analysis of LPS to consider the effect of the proposed changes on household living standards and how these are distributed across the population. The temptation to concentrate on the effects of the VAT changes would, we find, be misleading. While it is certainly true that the extension of the VAT base to include food, fuel and childrens clothing would be a regressive change to the tax system, our findings indicate that the changes to custom duties, especially the reduction in tobacco taxation, benefit poor households sufficiently more than it does rich households that the overall distributional effect of harmonization is less clear cut. Moreover we find that allowing for the possibility that households can substitute in response to relative price changes is important. From these welfare and revenue effects we then estimate the effect of the changes on the deadweight loss of the UK indirect tax system. We find that the proposals would *reduce* the deadweight loss of the tax system by an amount equivalent to around 1.5% of revenue.

II ELASTICITY ESTIMATES AND SIMULATION METHODOLOGY

The model of household expenditure behaviour used here is due to BPW who estimated an Almost Ideal Demand System[1] whose budget shares are given by

1 See Deaton and Muellbauer (1980) for background to the AIDS model.

$$w_i = \alpha_i + \sum_{j=1}^{n} \gamma_{ij} \log p_j + \beta_i \log(y/P), \qquad i = 1, \ldots, n \tag{1}$$

where w_i is the budget share of good i, p is a n vector of prices, y is total expenditure on the n goods, and P is a Stone price index that can be approximated by

$$\log P = \sum_{j=1}^{n} w_j \log p_j .$$

The estimates of BPW cover seven commodity groups: Food, Clothing, Alcohol, Fuel, Transport, Services and Other Goods and were obtained by applying an Instrumental Variable estimation technique due to Keene (1986) to correct for zero expenditures in the data arising from infrequency of purchase. The data used was the UK Family Expenditure Surveys from 1970 to 1984 – approximately 100,000 observations. Estimation was conducted one equation at a time and the cross equation restrictions implied by symmetry, etc. were imposed using a minimum χ^2 technique at a final stage. A broad idea for the sizes of elasticities is given in table 1 which were calculated from the estimates in BPW and evaluated at the means of the relevant explanatory variables in the 1984 FES data. More detail of the estimation procedure and how the elasticities are distributed across households can be found in BPW, and in Blundell (1988).

In simulation we use the most recent sample, the 1984 FES, which contains 7080 households. For simulation purposes the estimates are deficient in a number of respects. First, the seven commodity groups cover only 73% of total expenditure, according to the 1984 FES data, since durables, tobacco and housing expenditure are excluded from consideration. We incorporate these important commodity groups in simulation by assuming that the quantities of these goods are rationed at the levels implied by their observed 1984 expenditures and the 1984 price indices, and that they are separable from the commodity groups that are covered by the estimates. Thus, changes in the tax treatment of durables, tobacco or housing are treated as changes in total expenditure on the other seven commodities via

the household budget constraint. That is, y is treated as the income remaining after the rationed levels of housing, tobacco and durables have been purchased, so that y will change as the tax treatment of the rationed goods change.

Table 1 Estimated Elasticities

Pensioners

PRICE	Food	Alcl	Fuel	Cloth	Trans	Servs	Other	INCOME
Food	−.58	.05	−.01	.03	−.05	.01	−.05	0.60
Alcohol	−.13	−1.94	.82	−.16	.49	−.19	−.69	1.80
Fuel	.04	.63	−.87	.05	−.38	−.08	.20	0.41
Clothing	−.17	−.09	−.04	−.86	−.13	−.22	.10	1.40
Transport	−.29	.22	−.29	−.04	−.76	.03	−.06	1.18
Services	−.31	−.08	−.19	−.16	−.03	−.96	.13	1.59
Other	−.27	−.37	.13	.12	−.06	.24	−.74	0.95

Non − pensioners with children

PRICE	Food	Alcl	Fuel	Cloth	Trans	Servs	Other	INCOME
Food	−.61	.04	−.01	.03	−.05	.00	−.05	0.65
Alcohol	−.19	−2.09	.97	−.20	.58	−.20	−.81	1.93
Fuel	.07	.72	−.86	.07	−.44	−.11	.22	0.33
Clothing	−.15	−.07	−.03	−.89	−.10	−.17	.09	1.33
Transport	−.32	.24	−.32	−.05	−.73	.04	−.06	1.20
Services	−.39	−.09	−.21	−.21	−.02	−.94	.16	1.70
Other	−.29	−.39	.14	.13	−.06	.25	−.73	0.95

Non − pensioners without children

PRICE	Food	Alcl	Fuel	Cloth	Trans	Servs	Other	INCOME
Food	−.57	.06	−.02	.03	−.05	.01	−.06	0.59
Alcohol	−.10	−1.81	.71	−.14	.41	−.16	−.59	1.68
Fuel	.04	.79	−.85	.07	−.46	−.10	.24	0.28
Clothing	−.15	−.09	−.03	−.87	−.12	−.20	.10	1.37
Transport	−.27	.20	−.27	−.04	−.78	.03	−.05	1.17
Services	−.30	−.09	−.17	−.17	−.04	−.96	.13	1.59
Other	−.28	−.38	.14	.13	−.06	.25	−.73	0.95

Secondly, the estimates may imply a predicted budget share outside the 0, 1 interval. While this does not occur using the prices reigning during 1984 it can occur at different prices implied by some tax change. In simulation we treat zero and unit budget shares as binding constraints and a prediction outside the unit interval would result in the prediction being set at the relevant bound and the additional implied disposable income (which would be negative if the prediction were greater than a unit budget share and positive if the prediction were for negative expenditure on a commodity group) reallocated to other goods in proportions given by their marginal budget shares. Finally, the estimated equations only allow the prediction of the behavioural responses of commodity groups such as clothing and not specific items, such as children's clothing. Since the latter are outside the VAT base while the former are within it we cannot appeal to the composite commodity theorem. Thus, the simulation routine assumes that the proportions of such group expenditure accounted for by each item within the group are constant. Thus, taxing children's clothing reduces the quantity of clothing purchased but leaves the share of total clothing expenditure spent on children's clothing unchanged. Clearly, one could develop the accuracy and sophistication of the simulation procedure by disaggregating further until the point is reached where commodities correspond to items that are subject to specific tax treatment. Thus, for example, alcohol could be disaggregated into, say, beer, wine and spirits. Two stage budgeting implied by separability would be a useful assumption to appeal to in this context since it could allow the estimation of subsystems of equations for each commodity group.

In simulation, the estimated equations are used to reflate the 1984 data to June 1987 using the relevant components of the Retail Price Index. The tax changes on individual items are converted to commodity group price changes using weights derived from the 1984 FES data. Thus, an increase in petrol duty has no impact on the behaviour and welfare of households who do not own a car. Similarly, taxing children's clothing mainly affects households with children.[2]

2 Households without children do, on average, record a small amount of expenditure on children's clothing; presumably as gifts.

Two, possibly related, problems remain which pertain to the reliability and accuracy of the FES data. First, the surveys are known to suffer from non-response bias. A number of groups are under-represented in FES relative to their frequency in the population as a whole. The extent of the problem is difficult to gauge with certainty because of the possibility that other data sources may also be unreliable. Thus, while we can be confident about the degree to which FES under-represents childless and pensioner households since we can compare FES with the Census, we can be less certain about the degree of non-response for, say rich households, since other data sets that tell us about incomes may also be less than entirely reliable. Thus, the simulation routine can provide "weighted" results where households are weighted according to a comparison of 1984 FES with the 1981 Census to correct for the FES deficiencies in the number of pensioner households and households with different numbers of children[3]. The second major deficiency of FES data is the extent to which alcohol and tobacco expenditures are under-recorded relative to National Accounts figures. The problem is a very significant one - in 1984 alcohol expenditure in FES was only 50% of National Accounts and for tobacco it was 67%. The problem is thought[4] to arise from non-response in that heavy drinkers (and smokers, because of their strong correlation) are less likely to respond to FES (or be in the sampling frame at all). Moreover, it appears that the consumption of alcohol is highly skewed with a large proportion of expenditure due to a small proportion of the population. In the absence of an alternative source of information that tells us about the joint distribution of heavy smoking with observable variables in FES there is little that can be done beyond simply scaling up the FES alcohol and tobacco data to match National Accounts. This is a satisfactory procedure (if the extent of under-recording is independent of prices) for accurately predicting government revenue but does not permit a full distributional analysis since non-respondents are likely to be very atypical in their expenditure patterns[5].

3 Our procedure is a simple application of the Atkinson, Gomulka and Sutherland (1988) general approach to "grossing up" to correct for non-response bias.

4 See Kemsley, Redpath and Holmes (1980).

5 Further details of the simulation methodology and of the hardware required to run the program can be found in Symons and Walker (1988).

III FISCAL HARMONIZATION

The proposals for indirect taxation from the European Community imply quite radical changes in the structure of indirect taxation for the UK. Table 2 below shows the existing 1987 indirect taxes together with a likely structure implied by the harmonization proposals.

Table 2 Indirect Taxes and Harmonization

Commodity	Goods included	1987 Taxes	Proposed
Food	Other food	0%	4%
	Ice cream, sweets, etc	15%	15%
	Hot takeaways, meals out	15%	15%
Energy	Fuel, light and power	0%	4%
Alcohol	Beer	15% + 18.6p/pt	15% + 7p/pt
	Wine	15% + 68.6p/bt	15% + 8.35p/bt
	Spirits	15% + 473.1p/bt	15% + 267.1p/bt
Other Goods	Spectacles	E	E
	Medicines, Drugs	0%	4%
	Books, newspapers, etc.	0%	4%
	Jewellry, photographic	15%	15%
	All other	15%	15%
Tobacco	All tobacco products	15% + 61.2p + 21%	15% + 29p + 39%
Clothing	Adult clothing	15%	15%
	Childrens clothing	0%	15%
Durables	Furniture, other elec.	15%	15%
	Kitchen electrical	15%	15%
	Major appliances	15%	15%
	China and glass	15%	15%
Housing	House purchase	0%	0%
	Repairs/adds/decs	15%	15%
Services	Entertainment	15%	15%
	Post, Interest, TU subs,		
	Medical fees	E	E
	Personal services	15%	15%
	Charitable gifts	0%	0%
	Holidays	15%	15%
Transport	New cars	15% + 10%	15% + 10%
	Secondhand cars	0%	0%
	Repairs/accessories	15%	15%
	AA subscriptions, etc.	15%	15%
	Petrol, diesel and oil	15% + 88.1p/4*	15% + 107p/4*
	VED and car insurance	£100, E	£100, E
	Taxis and car hire	15%	15%
	Rail/ bus/water trans	0%	4%

Note: E = exempt from VAT

Zero rated goods such as most food, domestic energy, etc. will be taxed at a new lower VAT rate for essential goods at say 4%, children's clothing seems likely to be subject to the standard rate of VAT which we assume will remain unchanged at 15%[6]. Excise duties on alcohol, tobacco and petrol will also be changed. Duty on beer, wines and spirits will fall considerably, and duty on petrol will rise slightly while that on tobacco will fall. In our analysis we assume that these tax changes are *incident* on consumers.

First we consider the implications of these changes on household expenditure decisions. In table 3 we present the levels and percentage changes in expenditures obtained from SPIT by averaging across all households. The final columns shows the percentage change in expenditure that would arise if households did not change the quantities of the commodities that they consume. While this is the kind of analysis that might be conducted to obtain the very short run impact, the final figure in this column indicates that such expenditure changes would violate the household budget constraint in that total expenditure would rise by 0.6%. Notice that fuel expenditure falls by nearly 16% despite the 4% tax rate imposed on it, while alcohol expenditure rises by 22% despite the 20% reduction in price. This combination of behavioural responses is driven by the large own price elasticity for alcohol and the large cross price elasticity for fuel with respect to the alcohol price. Since tobacco is treated as a rationed commodity the 5% reduction in expenditure mirrors exactly the 5% reduction in price implied by harmonization. Finally, in table 3, expenditures on durables and housing are unchanged whether we allow for behavioural responses or not. This occurs because these commodities are both rationed and have their prices unaffected by harmonization[7].

Clearly behavioural changes of the order of magnitude suggested in table 3 will have a pronounced effect on the calculation of government revenues. Table 4 gives a breakdown of the sources of

6 It is not clear what the proposals imply for goods currently "exempt" from VAT. Exemption implies that VAT paid on inputs cannot be reclaimed, and in simulation we assume that this implies that these goods carry 25% of the standard VAT rate. We assume the status of charitable contributions remains unchanged.

7 We ignore the fact that the harmonization proposals suggest that new house building becomes subject to VAT.

government revenue in £ per household per week. Fuel and alcohol revenue figures differ considerably from the naive no-response figure because of the large behavioural changes shown in table 3. Thus overall, the increase in government revenue from indirect taxation is 5.38% of original revenue rather than 3.73%. When "grossed up" to the population this under-estimation of government revenue amounts to more than £0.33 billion per year.

Table 3 Behavioural Responses to Harmonization

Commodity Group	1987 Expenditure	Post Harmonisation Expenditure	% change in expenditure	% change in expenditure (quantity fixed)
Food	37.41	37.48	0.19	2.87
Fuel	11.11	9.35	-15.84	4.00
Clothing	13.78	13.90	0.87	2.69
Transport	26.51	25.57	-3.55	3.34
Services	18.39	18.42	0.16	0.00
Other	14.23	15.09	6.04	1.05
Alcohol	8.37	10.24	22.34	-19.47
Tobacco	5.11	4.86	-4.89	-4.89
Durables	12.75	12.75	0.00	0.00
Housing	27.74	27.74	0.00	0.00
Total	175.40	175.40	0.00	0.60

Note: £ per household per week.

Table 4 Sources of Tax Revenue

Commodity Group	Pre Harmonization Revenue	Post Harmonization (fixed share)	Post Harmonization (with responses)
Food	1.38	2.41	2.41
Fuel	0.00	0.43	0.36
Clothing	1.67	1.80	1.81
Transport	5.55	5.99	5.79
Services	1.70	1.71	1.71
Other	1.35	1.49	1.58
Alcohol	3.62	2.44	2.96
Tobacco	3.72	3.47	3.47
Durables	1.66	1.66	1.66
Housing	0.58	0.58	0.58
Total	21.19	21.98	22.33

Note: £ per household per week.

Tables 3 and 4 are potentially vulnerable to the greatest deficiency of FES data for our present purposes – the extent to which specific items of expenditure are badly recorded relative to National Accounts. The ratios of National Accounts to FES expenditures are .88 for food, 2.00 for alcohol, 1.49 for tobacco, 1.00 for fuel, 1.18 for clothing, 1.27 for transport, 1.44 for housing, 1.02 for durables, .99 for services, and 2.59 for other goods. Similarly we can compare Customs and Excise revenue figures with SPIT's calculations and we find that the ratio of the former to the latter is 1.69 for duty on alcohol, 1.59 for duty on tobacco, and 1.80 for total VAT yield. However our attempts at grossing up the FES households to allow for the differential response rates of pensioner households and households with different numbers of children has little impact on the size of this problem with the data. Thus in order to produce a more accurate revenue prediction we "correct" the shortfall in FES expenditure data by multiplying FES data by the ratio of National Accounts expenditure to FES expenditure for each commodity group and find that pre and post harmonization tax revenues are as given in table 5.

Table 5 Corrected Tax Revenue

Commodity Group	Pre Harmonization Revenue	Post Harmonization (fixed share)	Post Harmonization (with responses)
Food	1.21	2.12	2.12
Fuel	0.00	0.43	0.36
Clothing	1.92	2.12	2.14
Transport	7.05	7.06	7.35
Services	1.68	1.69	1.69
Other	3.50	3.86	4.09
Alcohol	7.24	4.88	5.92
Tobacco	5.54	5.17	5.17
Durables	1.69	1.69	1.69
Housing	0.84	0.84	0.84
Total	30.67	29.86	31.37

Note: £ per household per week.

Having corrected for the discrepancies between FES and National Accounts expenditures as far as possible we find that we predict that the total tax yield should be £30.7 billion[8]. Thus harmonization implies, with the corrected revenue figures, a revenue increase of £0.70 billion. In contrast the use of fixed shares would imply a reduction in corrected revenue of £0.81 billion. Thus the use of the estimated model implies a 5% higher tax yield than assuming constant shares.

The greatest virtue of working with data at the household level is that it facilitates a comprehensive distributional analysis of the effects of tax changes. For example, it is possible to breakdown the indirect tax payments made by, say smokers and drinkers, compared with non – smokers and non – drinkers, as in table 6. Clearly, the nature of the proposals favour households that spend a high proportion of their income on goods whose prices fall – especially cigarettes and alcohol. Thus, while table 6 shows that the VAT increase affects smokers and non – smokers, and drinkers and non – drinkers to approximately the same absolute extent, the excise duty changes benefit the drinkers by much more than the smokers. Overall those that smoke and drink pay £0.58 more in tax while those who neither drink nor smoke pay £1.72 more in tax.

Table 6 Changes in Indirect Taxes Paid

Smoker	Drinker	VAT	EXCISE	TOTAL
Yes	No	1.80	−0.13	1.67
Yes	Yes	2.36	−1.79	0.58
No	No	1.53	0.19	1.72
No	Yes	2.24	−0.94	1.30

Note: £ per household per week.

8 Customs and Excise (1987) reveals that the actual yield was £37.8 billion.

However, concern is usually with the impact of tax changes at different parts of the income distribution. In figure 1 households have been ranked into deciles of the normal total expenditure distribution and shows the average proportionate changes in indirect tax payments for members of each decile. The proportionate tax burden has risen most at the bottom of the income distribution. However the graph conceals the wide variation around each decile average and the fact that the richest decile is much richer than the second richest so that whether or not the proposals would represent a regressive change to the tax system is not entirely clear .

Figure 1 Changes in Indirect Tax Burden by Income Decile

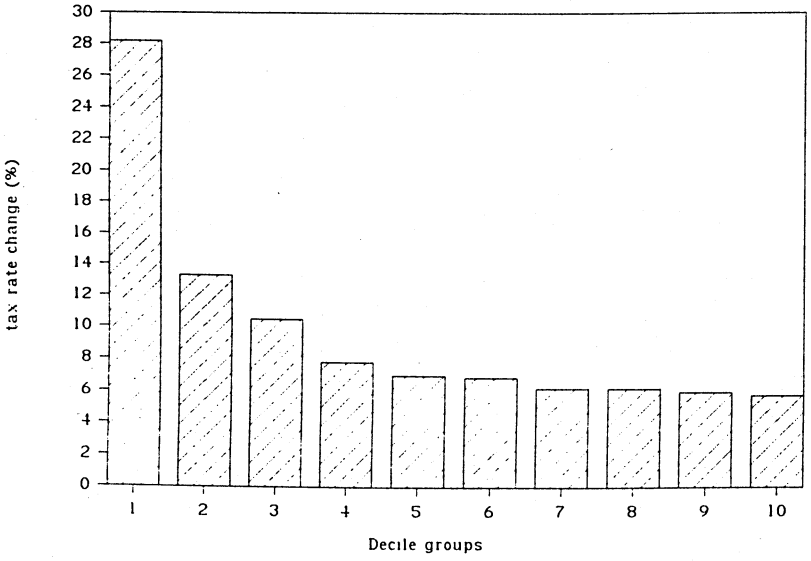

Table 6 and figure 1 do not, however, exploit the benefits of having an estimated welfare function for each household. Following King (1983) we use the equivalent income function, which can be derived from the expenditure function, to facilitate the welfare analysis. For the Almost Ideal model the household expenditure function, corresponding to the budget shares given in (1), is given by

$$\log E(p, z, U) = A(p, z) + B(p)U \tag{2}$$

where z is a vector of demographic characteristics and household variables that affect tastes. The functions $A(p, z)$ and $B(p)$ are given by

$$A(p, z) = \alpha_0(z) + \sum_i \sum_j \gamma_{ij} \log p_i \log p_j + \sum_i \alpha_i \log p_i, \tag{3}$$

$$B(p) = \prod_{i=1}^{n} p_i^{\beta_i} \tag{4}$$

Equations (2), (3) and (4) allow the measurement of household utility (up to a monotonic transformation), and the calculation of measures of welfare changes. The welfare change measures known as compensating and equivalent gain (CG and EG) due to King (1983) are particularly useful in the present context since they allow for the impact of both price and lump sum income changes arising from a tax change. Since we are treating three commodities as rationed we can regard changes in their prices as equivalent to lump sum income changes. King (1983) defines CG and EG via the equivalent income function which gives the income required to achieve the actual level of utility were the household to face the new prices. Thus, for the Almost Ideal form the equivalent income function is given by

$$\log EY = \left(\frac{B^1}{B^0}\right)(\log Y - A^0) + A^1$$

where $A^0 = A(p^0, z)$, $A^1 = A(p^1, z)$, $B^1 = B(p^1)$, and $B^0 = B(p^0)$. Then the welfare change EV is defined as the change in income required to obtain the new standard of living at the new prices as opposed to the existing prices, and King's EG is obtained from this by subtracting the additional cost of the rationed bundle.

In figure 2 we have ranked households by deciles of the original equivalent income distribution and plotted the average EG's and changes in the tax payments for each decile group. The change in welfare, as measured by EG, is greatest for those on the highest living standard which is a reflection of the fact that the top decile find it easier to substitute away from fuel and food. However figure 2 conceals both the large variances in EG's within each decile and the fact that the richest decile is more than 60% better off than the second richest decile group. Thus, a more structured and less deceptive approach to the measurement of inequality is to use the whole distribution as in inequality indices such as that based on the Atkinson Social Welfare Function (Atkinson (1973)). The Atkinson inequality index is given by

$$I = \sum_{h=1}^{H} \frac{EY_h^{1-\epsilon}}{1-\epsilon}$$

where H is the number of households, ϵ is the value of inequality aversion, and EY_h is the level of equivalent income for household h. Table 7 gives the level of inequality in the existing equivalent income distribution, that resulting from taking the change in tax liability from the original incomes, and the index for the post reform equivalent income distribution for different levels of inequality aversions. Comparing the first two rows of table 7 we can see that the proposals decrease inequality in the income distribution at all levels of inequality aversion, although the effect is rather small. Comparing the first and last rows we can see that the extent of inequality in the *equivalent income* distributions is slightly *increased* by the proposals. These comments hold for any level of inequality aversion and also if inequality is measured with the more familiar Gini coefficient.

Defining inequality with reference to the Atkinson inequality index yields a natural definition of social welfare as

$$W = \overline{EY}(1-I),$$

i.e. the average living standard scaled by the level of equality. With $\epsilon = 0$, no inequality aversion, $I = 0$ and social welfare is equal to the average welfare. In general, the change in social welfare is given by

$$\Delta W = \Delta \overline{EY}(1 - I) + \overline{EY}(1 - \Delta I)$$

so that in the special case of no inequality aversion $\Delta W = \Delta \overline{EY} = \overline{EG}$. King (1983) shows that the change in deadweight loss is $\sum_h EG$ minus the change in government revenue. In table 8 we present social welfare change for different levels of inequality aversion.

Figure 2 Equivalent Gain by Deciles of Equivalent Income

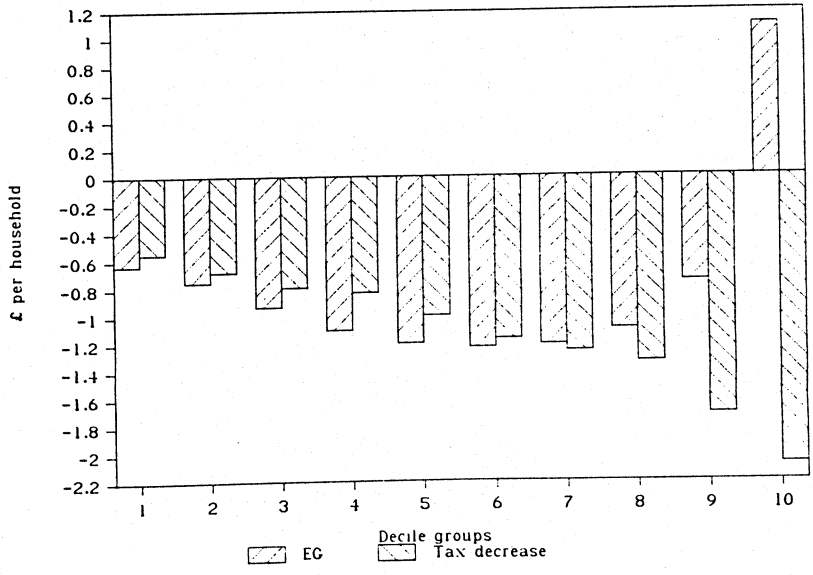

Table 7 Inequality Indices

Aversion parameter, ϵ	0.5	1.0	2.0	5.0	10.0	Gini
Pre Harmonisation EY	.109	.238	.396	.719	.862	.366
Pre EY – tax change	.107	.235	.392	.718	.856	.363
Post Harmonisation EY	.110	.240	.399	.723	.864	.367

Table 8 Social Welfare Change

Aversion parameter, ϵ	0	0.5	1.0	2.0	5.0	10.0
Change in Social Welfare	−0.80	−0.89	−0.98	−1.20	1.47	1.07
% Change in Welfare	−0.50	−0.55	−0.60	−0.99	3.00	4.40

in the equivalent income distribution. At zero inequality aversion the welfare change is £−0.80 per household per week and, given the £1.14 increase in government revenue, the decrease in deadweight loss is £0.34 per household, equivalent to 1.5% of tax revenue. However, Table 8 shows that, at higher levels of inequality aversion, the improvement in equality in the equivalent income distribution eventually outweighs the increased tax payments and social welfare rises.

III CONCLUSION

This paper has demonstrated the application of an estimated system of demand equations to the topical policy issue of harmonizing indirect taxation. With appropriate data and estimates our

simulation routine, SPIT, could be used for analysing the effects of indirect tax changes in other EEC member states[9]. Moreover, our program can be used, as it stands, to analyse any other changes to UK indirect taxes.

The estimated model predicts 5% more tax revenue from harmonisation than does the use of fixed budget shares. The analysis here also suggests that harmonization would imply a welfare loss of £0.80 per household per week, a revenue gain of £1.14 per household per week, and a small decrease in the inequality in the distribution of welfare across households. Thus the reform seems likely to increase the efficiency of the indirect tax system. Moreover at high levels of inequality aversion harmonization can increase social welfare even if the revenue gains were not redistributed to consumers. Of course, the effects identified here need to be weighed together with the possiblity of gains from reducing frontier barriers and the social costs associated with increased alcohol consumption. The results presented here should be viewed as only part of the social calculation required to assess the desirability of the harmonization proposals.

9 See Baccouche and Laisney (1988) for an evaluation of the changes to French VAT in 1972 that applies a similar methodology as that used here.

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