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Working Paper

Health interventions and risky behaviour

UCD Centre for Economic Research Working Paper Series, No. WP07/09

Provided in Cooperation with:

UCD School of Economics, University College Dublin (UCD)

Suggested Citation: Madden, David (2007) : Health interventions and risky behaviour, UCD Centre for Economic Research Working Paper Series, No. WP07/09, University College Dublin, UCD School of Economics, Dublin

This Version is available at:

<https://hdl.handle.net/10419/43331>

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UCD CENTRE FOR ECONOMIC RESEARCH

WORKING PAPER SERIES

2007

Health Interventions and Risky Behaviour

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WP07/09

August 2007

**UCD SCHOOL OF ECONOMICS
UNIVERSITY COLLEGE DUBLIN
BELFIELD DUBLIN 4**

Health Interventions and Risky Behaviour

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July 2007

Abstract: This paper reviews the extent to which policy interventions can affect risky behaviours such as smoking, drinking and diet. The justification for such intervention is typically a market failure, broadly defined. The types of market failure typically encountered are discussed. First and second best interventions are examined and there is a review of the efficacy of such interventions with respect to Ireland.

Keywords: Risky behaviour, market failure.

JEL Codes: I12, I18, D62.

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Health Interventions and Risky Behaviour¹

1. Introduction

We are all familiar with health interventions designed to combat specific diseases or conditions which may arise. Typically an individual feels unwell, or notices something is amiss with their health. For simple and familiar conditions they may self-medicate, but for more complex conditions they will typically attend a General Practitioner (GP) who will recommend an intervention or else refer them to a specialist who in turn may recommend an intervention.

The situation we have just described refers to interventions designed to deal with specific conditions with the patient deciding upon the treatment or if they feel they do not have sufficient information, referring the treatment to someone with superior information. In these situations, governments may be involved in the provision or funding of GP and/or specialist services, but it is clear that in principle such services could also be provided by the private market (though of course there may be very important issues regarding affordability and access to services).

However, there are other areas where governments intervene in health issues and one of these is the extent to which they may attempt to dissuade individuals away from what is perceived as risky behaviour. Governments engage in a variety of interventions designed to reduce or eliminate certain actions and it is the analysis of these actions which forms the subject matter of this paper. We start off by attempting to motivate these interventions from the perspective that they arise owing to government attempts to correct market failures. Taking this perspective, we try to identify what can be regarded as first best and second best responses to such failures (the precise definition of first and second best will become clearer later in the paper). We then take a more detailed look at

¹ A version of this paper was presented at a conference titled *The Provision and Use of Health Services, Health Inequalities and Health and Social Gain*. I am grateful to Brian Nolan for helpful comments but remain responsible for any errors.

interventions in three specific areas of risky behaviour, smoking, drinking and diet. In so doing we will draw upon Irish and international evidence and also evidence arising from the project *The Provision and Use of Health Services, Health Inequalities and Social Gain* . We start off however by describing first of all what exactly it is we mean by market failure in the context of risky behaviour.

2. Market Failure and Risky Behaviour

One of the most basic results in microeconomics, the First Fundamental Theorem of Welfare Economics (see Debreu, 1954), broadly states that, under certain conditions, there is no justification for government intervention in the economy and that firms and consumers, if left to their own devices, will bring about a competitive equilibrium with optimal (in a very restricted sense) properties. The specific conditions under which this result holds are mainly to do with all agents in the economy being too small to affect prices in any market (hence they are all price-takers), perfect information for all agents, and the provision of a full set of markets. The conditions under which the Theorem holds are highly unrealistic, but they serve to offer a reference point which enable us to identify situations under which government intervention can lead to an improvement in welfare. In particular, it is the failure of the latter two conditions to hold (perfect information and a full set of markets) which typically provide the justification for intervention in the area of risky behaviour.

To motivate this intervention more fully, perhaps it is worth first of all considering the case of no intervention. Economics typically stresses the concept of sovereignty of the consumer. Thus in a world of perfect information and full markets, the optimum situation is where consumers weigh up the costs and benefits of all activities (including risky ones) and then participate in these activities or consume these commodities to the point where the marginal benefit just equals the marginal cost. In this world there is no justification for any intervention by government or any other agency.

For the consumption of some goods and for some activities, the real world may provide a close enough approximation to the mythical “no intervention” world described above and in this case the optimal outcome probably is that of little or no intervention. For example, it seems unlikely that there is a justification for much government intervention in the market for many household goods. Individuals make their choices with little or no regulation by government.

For the types of goods and services associated with risky behaviour however, market failure as broadly defined above may be more likely to arise. Let us examine first of all the issue of information. For some risky behaviour, information available will not be perfect. What is perhaps more important is that the consequence of lack of perfect information for risky behaviour may be far more severe than for other goods. The cost to a person of buying the wrong shirt or pair of trainers is somewhat less than that of say, an unwanted teenage pregnancy, or the cost of smoking for a prolonged period believing that it has no adverse health consequences.

Economic theory suggests that when a market failure is observed then the optimal intervention is to deal with that failure directly at source (this is sometimes referred to as the “first-best” intervention). Thus if there is a failure of information, the optimal response is to provide better information. Hence the resources devoted to explaining the health consequences of such risky activities as smoking and drinking. Often these information campaigns are particularly directed at younger people, since younger people appear to be more prone to such risky activities (we return to the particular issues associated with younger people and risky behaviour below).

However, even when such information is made available, there may be another form of failure in that people may not be able to respond optimally to such information. This can most typically arise in the case of risky behaviour associated with addictive goods such as tobacco and alcohol. For example, there is evidence that people in general, and young people in particular, underestimate the addictive nature of tobacco and overestimate their ability to quit in the future. Gruber (2001) provides evidence from

high school students in the US. When interviewed, 56% of those who smoked said they would not be smoking in 5 years, but only 31% in fact did quit. Also among those who smoked in excess of one pack a day, the smoking rate five years later among those who stated they would be smoking (72%) was less than for those who stated they would not be smoking (74%).

The implications of this type of market failure is that when assessing the costs and benefits of an activity such as smoking (over the medium to long-term) consumers underestimate the costs (since they assume that they will quit smoking much earlier than in fact they do, if they manage to quit at all). The celebrated “rational addiction” model of Becker and Murphy (1988) assumes that consumers sit down at the beginning of their lives and rationally assess the costs and benefits of addiction. According to their model those who become addicts do so as a matter of choice and should they subsequently decide that the costs of addiction outweigh the benefits, then they will quit. The evidence cited above plus addicts’ recourse to quitting aids such as nicotine patches for smokers and support groups such as Alcoholics Anonymous for drinkers, suggest that the Becker-Murphy model fails badly in terms of trying to explain quitting or controlling addictive behaviour, whatever about the insights it may offer into other aspects of addiction.

Another way in which the provision of better information may not work optimally is that individuals may differ in their response to such information. Thus when information about the negative consequences of smoking became generally available around the mid 1960s (the landmark event here was probably the publication of the 1964 Surgeon General’s Report in the US entitled “Smoking and Health”) smoking rates did decline. However the decline was far from uniform across the population. It was observed that the bulk of the decline occurred among the better educated (see Farrell and Fuchs, 1982 and Townsend, 1987). The key point here is that even when what appears to be the optimal intervention is available, its efficacy may not be uniform across the population. In such a case it may be desirable to supplement this intervention with additional “second-best” interventions.

The other area where market failure may occur is where private costs/benefits of a good or activity may differ from the social costs/benefits. In general for most goods it is the case that private and social costs/benefits of consumption are approximately equal. For some goods however, it may be the case that the social costs/benefits of consumption differ from the private costs/benefits. An example of a good where the social benefit may exceed the private benefit is vaccination against an infectious disease. Vaccination provides a private benefit to the person receiving the vaccine as it decreases the probability they will contract the disease. However, if the disease may be passed from person to person, there is also a further benefit to society in that the probability that other people will contract the disease has also fallen.

Similarly, it can be argued that the social costs of goods such as alcohol and tobacco exceed the private costs. Another way of expressing this is that when an individual, say, smokes a cigarette they incur private or *internal* costs. However, since smoking will also confer costs on non-smokers (these are known as *external* costs) there will be a divergence between private and social costs. Essentially what is happening here is a market failure, since the market on its own does not bring about the equality between social costs and benefits at the margin. The precise nature and magnitude of these external costs for smoking and alcohol can be difficult to ascertain but the implication is that since individuals will consume up to the point where private costs and benefits are equal at the margin, then, in the absence of any intervention, the privately optimal level of consumption will exceed the socially optimal level. Some form of intervention is thus needed to bring about the equality of private and social costs.

The first best intervention to correcting the divergence between private and social costs would involve some form of side-payment between the individual engaging in the risky activity and those who are bearing the external costs. Thus in the case of smoking, the smoker makes a payment to all those who incur external costs arising from his smoking and this brings about an equality between private and social costs of smoking (this type of solution is associated with the Nobel prize winning economist Ronald Coase). While attractive in principle, and possibly workable in the case of smoking with

a small number of people where drawing up the “contract” would be feasible, it would be impossible to generalise this to cases where there would be a large number of passive smokers. In the case of other risky behaviours however, the external cost may be once-off and severe rather than incremental. Thus side-payments may be feasible when the external cost is in the form of passive smoking, but not when it is in the form of a serious road accident arising from drink-driving.

An alternative approach would be to place limitations on where people can engage in the risky activity and thus minimise the external costs. Thus in the case of smoking we see workplace bans, bans on smoking in public places etc. One of the attractive aspects of such policies is they may involve only a limited curtailment of smokers’ “rights”. Thus there is no absolute ban on smoking, but smokers are confined to smoking in places where the external costs are minimised. The effect of such bans on overall smoking is unclear. If smokers compensate for the smoking they would have carried out in a public place by increasing their smoking in private places to the same degree, then overall smoking will be unchanged. However, if private and public smoking are not perfect substitutes then overall smoking is likely to fall. Anecdotal evidence regarding the initial impact of the workplace ban on smoking in Ireland introduced in 2004 suggests that overall smoking consumption will fall as a result of the ban. Bear in mind, however, that from a strictly economic perspective the only “gain” is in the form of the reduced external costs. While the public health perspective would no doubt welcome the fall in smoking, from the economic perspective, the “optimal” level of smoking is not zero, merely that rate which equates social costs and benefits.

Some people may find this last point unconvincing on the basis that for any level of smoking (or drinking or poor diet for that matter) there will be costs in terms of treatment arising from smoking-related diseases, costs which may be borne to some extent by the taxpayer. The counter to this argument is that since smokers typically die younger, there will be offsetting gains to taxpayers in terms of public pension payments and other medical care costs arising from old age. This is a contentious area, as it seems to suggest that in drawing up a form of balance sheet for the costs and associated with smoking, the

premature deaths of smokers appear as a public “benefit”, particularly since smokers tend to less productive workers and may well die just after retirement. It seems fair to say that many people would have grave ethical reservations about such an approach. The key point here is that regardless of how medical costs and savings for smokers balance out or not over the lifetime, the principal costs arising from smoking are the years of lost life of smokers. But are these costs internal or external, particularly if smokers are possessed of full information? This clearly a thorny issue and the reader is referred to Madden (2002a) for a more detailed discussion.

An alternative approach to solving the market failure associated with external costs is to apply a tax, sometimes called the “Pigovian tax”, the size of which is determined by the gap between private and social costs. Applying this tax will bring about an equality of private and social costs and hence the socially optimal level of consumption will be achieved. Formally this is quite similar to the Coasian solution outlined above, except that instead of paying the external costs directly to those people who bear them, now these costs are paid to the government. The Pigovian approach has little to say about what happens to the tax revenue thus collected. Thus while both approaches bring about the socially optimal level of smoking in the sense that the smoker pays the external costs, the difference lies in who actually receives these costs.

It is important to bear in mind that the reason for the application of a Pigovian tax is the market failure arising from the lack of equality between private and social costs. It does not arise from the private or internal risks associated with the consumption of alcohol or tobacco. As an illustration of this, we observe Pigovian type taxes on a good such as petrol. It seems fair to say that this does not arise owing from the private risks associated with driving (there are extensive information campaigns and road safety regulations to address these issues) but rather because of the social costs associated with pollution. Similarly, a risky area such as diet does not attract a Pigovian tax, though there have been suggestions of a so-called “fat-tax”. This is because while there may be information issues regarding diet, it seems less plausible to suggest that the social costs of poor diet exceed the private costs. We discuss this in more detail below.

Before analysing the specific measures taken in Ireland to address risky behaviour, there are two other issues worthy of discussion. The first of these is the extent to which people truly take on board the internal costs of risky behaviour and secondly, whether risky behaviour amongst young people should be a cause of particular concern.

In the discussion so far it has been the maintained assumption that consumers are rational, even though they may not be fully informed. Market failures have generally focussed on information failures and divergence between private and social costs. However, while consumers' preferences may be rational at any given point in time, they may not be *consistent* over time. This can have a crucial bearing on attempts to reduce or control risky behaviour and may have radical implications for the extent to which people engaging in such behaviour take full account of the internal costs of the behaviour. In turn this has radical implications for strategies to control such behaviour.

An activity such as smoking, drinking or eating fatty food involves an immediate pleasure which may have a health consequence in the future, and thus the degree to which current pleasures and future costs are traded-off is a key element in the decision to smoke/drink etc.² When agents engage in activity which has costs and benefits spread out over time, then the rate at which costs/benefits in one period are traded off for costs/benefits in another period is crucial. The standard approach in economics has been to assume that agents are time-consistent in their preferences applying what Frederick et al (2002) call the discounted utility (DU) model. Thus utility at future periods is discounted at a constant rate i.e. if utility tomorrow is worth only 99% of utility today then utility 10 days from now will only be worth 99% of utility 9 days from now.

However, there is substantial evidence that agents apply a *higher* discount rate to events in the very near future and are thus more present-orientated than the standard DU model would predict. This will give rise to time-inconsistency of preferences. Think of

the child who in mid-August is relatively indifferent as to whether Christmas falls on December 25th or December 26th. On the night of December 24th that child is likely to be far from indifferent as to whether Christmas falls in one or two days time. There is an extra impatience attached to the immediate event. A similar argument can be applied to decisions to quit an activity such as smoking. Well-meaning decisions to quit smoking say in the New Year or Lent may be made, but when the actual quitting day comes around, it may prove much more difficult to quit and quitting may be postponed until next period, when the same arguments will apply again, implying that quitting may be postponed indefinitely. Thus my preferences are time-inconsistent in the sense that the original decision to quit is not followed through. As Gruber (2001) points out and casual evidence suggests, unrealised intentions to diet or quit smoking and drinking are a common feature of stated preferences. The use of self-control devices (such as making bets with friends or joining diet clubs etc) are also indirect evidence of time-inconsistency, since in the absence of such time inconsistency there would be no need for the self-control device. Note that in the case of smoking such self-control strategies are not to be confused with quitting aids such as nicotine patches.

So what relevance does this have for strategies to control risky behaviour? If preferences are time inconsistent, then another form of market failure has been introduced since not only do smokers impose external costs on non-smokers, they also impose *intrapersonal* externalities or “internalities” upon themselves. In other words smokers do not fully take account of the costs they are imposing upon themselves when they smoke and clearly the same could apply to heavy drinkers or eaters.

What form of control strategy should be adopted here? One possibility again is to use taxation to bring about equality between private costs and private costs taking account of these internalities. Another way of looking at this is that government tax policy is effectively acting as the self-control device which time-inconsistent agents need to help them control their habits. However, the implications for tobacco and alcohol taxation are

² The situation with regard to drinking is somewhat complicated by the fact that moderate drinking appears to have health benefits. In the discussion which follows it will be assumed that we are dealing with

potentially enormous. For example in the case of tobacco Gruber and Koszegi (2001) estimated the internal costs of smoking a packet of cigarettes to be \$30. Adjusting for exchange rates and inflation, if taxation was to correct even 10 per cent of these internal costs then current tobacco taxes in Ireland would need to be doubled. It seems likely that the magnitude of tax increase with regard to alcohol would be similar. Regarding fatty foods, there would now be a clear justification for a “fat-tax” which might be quite substantial. Such dramatic tax increases are unlikely to be practical for most countries, so what other possible control strategies are there?

One possibility is to alter the *timing* as opposed to the level of taxation following the suggestion of O’Donoghue and Rabin (2000). Thus, continuing with the example of smoking, instead of increasing the price of cigarettes by, say, 50 cents, governments could instead leave the price unchanged but insist that to buy cigarettes a person must pay an upfront fee of €500 for a form of smoking licence. Since €500 is less than 50 cents per day over three years someone who is truly committed to being a long-term smoker would prefer the upfront fee.³ However, someone who originally intends being a short-term smoker but who, via self-control problems becomes a long-run smoker, might be deterred from starting smoking. Since risky behaviour such as smoking involves short-term benefits and long-run costs, providing short-term rewards for good behaviour (or equivalently in this case a very costly short-term penalty for bad behaviour) may be effective.

Other possibilities, along similar lines, suggested by O’Donoghue and Rabin (2003) and Bhattacharya and Lakdawalla (2004), is that individuals can commit their future selves to different tax regimes. Thus someone who believes they will have a future self-control problem with cigarettes, alcohol or fatty foods can commit themselves to a high tax regime. The advent of smart cards and computer based purchasing makes such schemes more feasible but there could clearly be monitoring problems in terms of getting

excessive drinking.

³ This approach is reflected in the decision to phase out cigarette packets containing only ten cigarettes. Since many young people who may be considering starting smoking may be income constrained, being forced to buy cigarettes in packs of twenty acts as a form of upfront fee or barrier.

other people to buy on your behalf. However such problems would be arguably no worse than is the case with under-age drinking/smoking.

One feature of the above schemes is that neither of them impose any penalty upon those individuals *without* self-control problems who choose to become smokers (or burger addicts or whatever). There is no coercion involved whereby committed smokers are forced to pay more for their cigarettes. These are examples of what Thaler and Sunstein (2003) label *liberal paternalism* whereby it is recognised that in some cases “.....individuals make inferior choices, choices which they would change if they had complete information, unlimited cognitive abilities and no lack of willpower” (Thaler and Sunstein, 2003). Another way of looking at this is that in the examples above, effectively the government, via the tax/licence regime, is creating a market in self-control, a market which was previously missing.

Another possibility is to return to a Coase type solution. Recall that the problem there was the practical difficulty of organising some form of binding contract between the smoker/drinker and those bearing the external costs. In the case of “internalities” the two parties to the contract are the same person! More accurately, they are the two different sides of the same person: the health-conscious individual who would prefer not to smoke and the smoker who is constantly trying to undermine these best-laid plans. Alternatively they can be regarded as the long-run preferences of the individual and their short-run (and more impatient) preferences.

So what form of contract could be devised? In the case of smoking one possibility would be for the individual to post a bond of a reasonably substantial amount, say €1000, with another party whereby if the individual smokes over a specified period the bond is forfeited. Periodic checks on smoking status could be carried out and after the period, say five years, has elapsed, the person receives back the bond. The third party service could in principle be provided by the private market, but once again there may be incentives for the market to provide a sub-optimal amount so government could provide the service. Interest could also be made payable on the bond. One criticism which could

be made of that scheme is that those parties who would have most to gain, the young, would not have the financial resources to provide the bond. In this case there could be some argument that instead of the individual providing the bond, the government could undertake to make a payment to all individuals on their 25th birthday, providing they had not started smoking (recalling the “pledge” regarding alcohol which many Irish children make, or used make, at Confirmation!). The upper bound of the cost to the state of this scheme would be in the region of €60m per annum (based on a payment of €1000, a steady state of 60,000 births per annum and no “default”). Given the potential benefits to the scheme it does not appear to be an overly expensive investment. For other examples of the use of financial incentives in smoking cessation see Donatelle et al (2000) and Roll and Higgins (2000).

The scheme outlined above is probably more feasible in the case of smoking rather than drinking or eating fatty foods as detection of nicotine in the body may be more feasible than for other substances. There could also be suggestions that the checking for the presence of such substances would be an infringement of civil liberties. If the posting of the bond was to be purely voluntary, then there may be a danger of a reverse adverse selection problem whereby only the good risks apply (i.e. those who would not smoke anyway) and the impact upon smoking would be negligible.

Before concluding this section it is worth pointing out that the schemes outlined above may have particular relevance for younger people. In general it seems reasonable to suggest that on average younger people engage in more risky activities than do older people. Such risky activities may take the form of binge drinking, fast driving, unprotected sex, petty and/or serious crime and smoking (see Gruber, 2000). These behaviours may be accounted for by young people being in general more myopic i.e. they discount the future at a higher rate, or are more present-oriented. They are also more likely to be time-inconsistent in the sense outlined above and finally they may be less likely to be aware of these problems and hence try to avail of self-control devices. Curing these market failures once again may involve a combination of education and

advice programmes and also the type of control strategies and contracts which encourage a greater congruence between short-term desires and long-run interests.

We now turn to examining in more detail some of the specific strategies adopted in Ireland and elsewhere to control risky behaviour in the three selected areas, smoking, drinking and diet.

3. Evaluation of Control Strategies for Specific Behaviours

In this section we examine and evaluate some of the specific control strategies adopted for the selected subset of risky behaviours, smoking drinking and diet. In this analysis it is useful to think in terms of what economists often refer to as the “full price” of any activity. Thus in the case of smoking the full price would include not just the monetary cost of smoking, but also the cost in terms of future health problems. In the case of excessive drinking the full price would also take account of factors such as the probability of detection and conviction for an activity such as drunk driving and the penalties associated with such convictions. We initially discuss the case of smoking.

Smoking

As outlined in the previous section, specific interventions in the area of smoking may be directed at issues to do with information and also market failure. The situation regarding information may relate to either a lack of perfect information, or else perhaps an inability to act on such information. The first best solution is thus to provide the best possible quality information to potential smokers. Publicly provided information campaigns concerning the adverse health consequences of smoking have surely played a major role in bringing about long-term decline in smoking rates in many higher-income countries (Warner, 1977). Publicly provided research which expands knowledge concerning the effects of smoking would also be regarded as a first-best intervention. The argument for such research being publicly funded is that there are reasons to believe

that the private market would provide a sub-optimal amount of such research (because the social benefits of such research outweigh the private benefits).

Other forms of regulation and control addressing the information issue, which are not perhaps first-best, might include advertising bans. An advertising ban is arguably not a first-best solution since, rather than providing information about a product, it is preventing a supplier from providing information or awareness of their product. Only if a supplier were telling outright lies concerning their product could such an intervention be described as first-best.

As well as addressing the second form of market failure via the provision of the best quality information, tobacco cessation programmes might also be used. Since quitting smoking brings about private benefits, the private market will clearly provide this service up to a point. However, given that the social benefits of quitting outweigh the private benefits it can be argued that the private market will provide a socially sub-optimal degree of cessation and so intervention can be justified. The precise form of these programmes may vary. For example, quitting aids such as nicotine patches could be subsidised. Support services such as counselling could also be provided. In a review of smoking cessation therapies, Warner (1997) concluded that even the most expensive forms of therapy were highly cost-effective compared to the majority of medical practices which had been studied (for some recent evidence regarding the effectiveness of web-based smoking cessation therapies in Ireland see Strecher et al, 2005).

In terms of perhaps the principal market failure associated with smoking, the divergence between private and social cost, assuming that the Coase solution is not practical, then the principal strategy to be adopted is taxation. As a method of tobacco control, taxation may be regarded as a “second-best” solution. In some cases it may be a rather blunt instrument e.g. it does not distinguish between different types of smokers even though the degree of market failure may differ. However, even while economic theory recommends first-best solutions where possible, it is very often the case that second-best solutions have to be adopted. In this regard taxation may perform an

effective, though blunt, role in addressing the market failures we have outlined. For example, adolescents who may not fully take on board the health and/or addiction risks associated with smoking may be very susceptible to a high rate of tax (though this greater sensitivity of young people to tobacco taxes has been questioned by De Cicca et al., 2002).

In general, higher taxes appear to be an effective strategy to reduce tobacco consumption. There is a substantial body of literature to testify that the demand for cigarettes clearly responds to changes in prices (see the comprehensive review by Chaloupka and Warner, 2000) with most estimates of the magnitude of this response being around about -0.4 . Thus a ten per cent increase in price gives rise to approximately a four per cent decrease in consumption, although depending upon the nature of the data available it is not always clear whether this decline represents fewer people smoking, or lower rates of smoking amongst smoking. To make this distinction it is necessary to have individual level (as opposed to aggregate level) data on smoking and unfortunately such data is sometimes hard to find, especially for Ireland.

Evidence for Ireland is broadly in line with these findings. A variety of models of tobacco consumption have been estimated mostly using aggregate time-series data dating from O'Riordan (1969) to Madden (1993). These studies have produced broadly comparable results with a median estimate for the price elasticity of tobacco in the region of -0.5 . However, the use of aggregate time-series data precludes distinguishing between the effect of price on the probability of smoking and on the demand for cigarettes conditional on smoking. Conniffe (1995) remedied this to some extent by combining analysis of aggregate time-series data with data on the proportion of the total population who are smokers. He found that the proportion of the population smoking is unaffected by price (or income) but exhibits a downward trend related to health concerns. Consumption by smokers does not exhibit such a downward trend but appears to have a significant price elasticity of around -0.3 .

More recently, in a study associated with the project *The Provision and Use of Health Services, Health Inequalities and Social Gain*, Madden (2007) constructed a longitudinal data set based upon responses regarding starting and quitting dates for smoking for a sample of Irish women. He then matched these responses with tax data for the years in question and used duration analysis to examine the extent to which higher taxes delayed the transition to starting smoking and/or hastened the transition to quitting smoking. Probably the major innovation in the paper was that rather than using aggregate time series data which is unable to distinguish between the number of people who smoke and the number of cigarettes smoked conditional upon smoking, this study used individual level data. The results show a limited response to tax increases and also show some heterogeneity across the response by educational background.

One criticism which has been put forward regarding high rates of taxation on cigarettes is their regressivity. Analysis of household budget data indicates that consumption of cigarettes is concentrated mainly amongst lower-income groups and these is frequently put forward as an argument against high taxation of tobacco since it is argued that high taxes on cigarettes impose an unfair burden on the less well-off.

However, it can be argued that cigarette taxation is not necessarily as regressive as might be thought at first glance. Becker and Murphy (1988) make the distinction noted above between the money and health price of smoking (together these constitute the full price). Their model predicts that individuals who are very present oriented are more likely to be sensitive to the money price while people who are more future oriented will be relatively more sensitive to the health price. It is typically believed that the degree of future orientation is positively correlated with education levels, suggesting that lower-income groups, with less education, will be more sensitive to the money price (i.e. tax on cigarettes). In that case, higher taxes are less likely to impact upon these groups since they will cut back on their smoking. The bulk of the burden will be borne by higher income groups. Evidence for the US indicates that demand elasticities for lower income groups may be up to four times greater than for high income groups (see Evans et al., 1999) while Townsend et al (1994), using UK data, found that men and women in lower

socio-economic groups are more responsive than are those in higher socio-economic groups to changes in the price of cigarettes and less to publicity concerning the adverse health effects of smoking. Borren and Sutton (1992) find evidence of an “inverse-U” relationship in terms of price responsiveness, with a higher elasticity for middle-income men compared to lower and higher-income men. Their evidence for women, while less clearcut, appears to indicate that elasticity declines as income increases.

The evidence for Ireland on this issue is not entirely clearcut. In the study referred to above Madden (2007) found some evidence of an “inverse-U” effect of taxation on the probability of starting smoking. The strongest effect of taxation was observed on those with intermediate levels of education with weaker effects for those with the most and the least education. The evidence showed no clear relationship in terms of quitting smoking.

Drinking

In examining specific interventions concerning the adverse effects of drinking, we once again review the choice between different second-best options. The costs of excessive alcohol consumption include health consequences such as cirrhosis of the liver and damage to other organs (though there is evidence that moderate alcohol consumption may have a protective effect for certain conditions). There are also costs relating to road accidents, industrial and personal accidents (e.g. drownings), violence and public order. There may also be losses associated with productivity (although the evidence is not entirely clearcut here, see Mullahy and Sindelar, 1996). As with smoking, the distinction between internal and external costs is important, and from a public policy point of view, it is arguably external costs which are of most relevance.

In terms of interventions which can be used to address these costs it may be useful to distinguish between direct and indirect interventions. Taking drink driving as an example, we can think of policies which directly influence the cost (price) of drink-driving and so can be expected to reduce the demand for drink-driving. These policies would address the probability of detection, the probability of conviction given detection

and then the expected penalty, given conviction. In effect by increasing the full price of drink driving, the demand for drink-driving is reduced.

An alternative approach to reduce the demand for drink-driving is to reduce the demand for goods which are complementary to drink-driving (in this instance the good in question is alcohol itself, since clearly there must be a demand for alcohol in order for there to be a demand for drink-driving). This principally involves alcohol control policies such as changes in the minimum age of drinking or increases in the price of alcohol. These policies do not directly affect the demand for drink-driving since not all young drinkers (those affected by the minimum age laws) will drink and drive, while not all drinkers (those affected by increased price of alcohol) will drink and drive.

Both approaches have benefits and costs. The benefits are clearly the reduced deaths and injuries arising from road accidents involving alcohol. The costs of the direct approach involve the resources required to detect, convict and then punish drink-drivers. The costs of the indirect approach is the deadweight loss associated with the higher price (tax) on alcohol above what standard tax considerations would warrant.

One problem with the use of taxation in this regard is that conventional alcohol taxes such as excise taxes do not discriminate with respect to “harmful” and “non-harmful” drinking. As Cook and Moore (2000) point out, a 21 year old man who drinks seven beers and then drives home pays the same tax as a 40 year old woman who drinks one beer with her dinner each night. Applying high tax rates to harmful drinking only would imply discrimination in tax rates according to the age of the consumer, where the product is consumed, the amount consumed per unit of time and other circumstances. Price discrimination is present for some goods (witness the different costs of insurance by age and gender). While it may be possible to conceive of some types of tax discrimination (in the same way that individuals could choose their own tax regime to impose a form of self-control), it is likely to be very difficult to apply such tax discrimination in practice.

There is some evidence on the relative costs of the direct and indirect approach for the US. Kenkel (1993) concludes that the direct approach may be slightly more cost-effective to achieve a given reduction in alcohol related road fatalities, but he acknowledges that given the degree of uncertainty surrounding the figures, this conclusion is tentative rather than definitive. It is also worth bearing in mind that the indirect approach of general alcohol control would also reduce other external costs arising from alcohol, such as public order offences.

Carpenter et al (2007) also compare the effectiveness of policies using the Monitoring the Future dataset. They conclude that direct effects such as increases in the minimum drinking age and “zero-tolerance” approaches are effective in terms of reducing youth drink-driving. The effect of increases in alcohol price is more difficult to evaluate, mainly owing to the lack of sufficient variation in alcohol prices. Results tend to be sensitive to choice of time period and omitted state-level heterogeneity (i.e. those states which impose high alcohol taxes tend to be those which are “drinker-unfriendly” in unobservable ways and it is not possible to distinguish the effect of alcohol prices from these unobserved effects).

Is there any evidence regarding the effect of interventions for Ireland? The literature concerning the effectiveness of alcohol control policies on alcohol related problems in Ireland is relatively scarce. Honourable exceptions include Walsh (1987, 1989) and McCoy (1992) and Conniffe and McCoy (1993). Perhaps the most relevant for this review is the paper by Walsh (1987) which examines the extent to which higher excise taxes (on alcohol) can save lives through reducing deaths from alcohol related causes. The conclusion is that a relatively small number of alcohol related deaths would be averted via higher excise taxes.

Other studies which have some relevance to this issue are those of Madden (1992, 1993), Thom (1984) and Eakins and Gallagher (2003) who study the impact of price on alcohol consumption in Ireland. Madden (1992) calculates a range of demand elasticities for alcohol from systems of demand equations (i.e. elasticities are calculated

simultaneously for a range of goods taking account of cross dependencies of demand). The calculated elasticities show quite a wide range with median values of around -0.7 , indicating that alcohol consumption is sensitive to change in price. Thom (1984) presents disaggregated demand elasticities for various categories of alcohol and reports a range of elasticities from -0.6 for beer to -1.3 for spirits and -1.6 for wine. More recently Eakins and Gallagher (2005) also report disaggregated elasticities for alcohol and distinguish between short and long-run response to price changes. Their results are very similar to Thom and Madden with long-run elasticities of -0.7 for beer and spirits and -1.6 for wine. Consistent with the Becker-Murphy model they find long-run elasticities to exceed short run elasticities. Finally, Madden (1993) attempts to calculate the external costs implicit in the indirect tax system for three goods, tobacco, alcohol and petrol i.e. given the relatively high tax rates on these goods, what degree of external costs would render the existing tax system optimal. The study finds that such external costs do appear to be embodied in the Irish tax system but the imprecision of the estimates makes it very difficult to infer the exact level of these costs.

One feature of the above studies is that they all employ aggregate time-series data and so are unable to take account of the heterogeneity of factors affecting individual level consumption of alcohol. Madden (2002b) examined the factors affecting smoking and drinking for a sample of Irish women. Unfortunately, there was no price variation in the data so it was not possible to estimate demand elasticities using individual level data. The results did seem to suggest however that a qualitative distinction could be drawn between moderate and heavy drinkers in a way which cannot be done for smokers. Overall, evidence on demand response by level of drinking is mixed. Manning et al (1995) found that moderate drinkers showed the greatest price response compared to “light” and “heavy” drinkers who showed elasticities closer to zero. This contrasts however with the evidence from Kenkel (1993) and Saffer (1991) who appear to show higher price elasticities amongst heavier drinkers. The evidence for a greater response by heavy drinkers appears to be more conclusive in the case of young drinkers on the basis of the review by Grossman et al (1994). It is also noteworthy that the harmful consequences associated with heavy drinking such as cirrhosis of the liver and drink

driving and crime do appear to be sensitive to changes in the full price of alcohol (Pacula and Chaloupka, 2001).

Overall, the evidence for alcohol is similar enough to that for tobacco. Despite the addictive nature of both goods and the consequent possibility that they would be unresponsive to changes in price (whether monetary or full) there is ample evidence of significant demand responses.

Diet

The final aspect of behaviour which we examine with regard to health interventions is diet. In this regard we are primarily concerned with obesity and the possibility that economic interventions might be used to influence the level and composition of food intake. Ireland has shared in the growing international concern over obesity levels (for a European perspective see Lang and Rayner, 2005, while for a US perspective see Cutler et al., 2003). Given the well-documented socio-economic gradient observed in obesity (see for example Drewnowski and Darmon, 2005), it seems likely that economics may be able to make useful contributions in this area.

Before examining possible economic interventions in this area, it is worth pointing out also that economics has much to contribute to the measurement of obesity. Since the measure of obesity concerns both the identification of those who are obese (typically via having a body mass index in excess of a given threshold) and the aggregation of this information into a meaningful index, it shares much in common with the measurement of poverty. This is discussed in greater detail in Jolliffe (2004) and, in work directly associated with this project, Madden (2006a).

Turning now to possible economic interventions to influence diet, once again we concentrate on “second-best” interventions, bearing in mind that arguments concerning first best interventions such as the provision of optimal information apply with the same force in this case as with tobacco and alcohol. It is arguable that the justification for

intervention in the instance of diet is less compelling than in the case of tobacco or alcohol. This is because its external effects such as passive smoking or drink driving are less easy to identify in the case of diet. However, if it is believed that issues of “internalities” and self-control apply in the case of diet, then a case for intervention can be made.

Probably the most celebrated intervention which has been suggested in the case of diet is the use of taxation to change the relative price of different foods, thus altering the composition of diets. Such a policy has often been described as a “fat-tax” which is somewhat misleading as formally the same effects could be obtained by subsidising goods which are low in fat as could be obtained by taxing goods high in fat. A case for such a fat-tax in the UK was put forward by Marshall (2000) who more accurately described it as a fiscal food policy. He identified those goods in the UK diet which most contributed to saturated fat and then examined the effect of imposing VAT at the full rate on these goods. On the basis of estimated elasticities and risk factors (associated with ischaemic heart disease) he then calculated the number of life years saved by the imposition of such a fat tax. His figures suggest that in the UK between 1500 to 1800 lives per year could be saved. Marshall’s analysis has been questioned on the basis of the food elasticities employed and on the relationship assumed between fat consumption and heart disease (see Kennedy and Offut, 2000).

A more comprehensive analysis of a fat tax was provided by Leicester and Windmeijer (2004). They point out that a pure fat tax in the sense of taxing the fat content of foods could prove highly regressive, since such fat constitutes a greater proportion of the budget of poor families. They also point out some of the practical difficulties involved in implementing a fat tax, not least the degree of lobbying which might arise as different food interests campaign to have their food product excluded. They conclude that there may be scope for limited tax increases on certain goods which are considered unhealthy (e.g. snack foods or fizzy drinks) but that their acceptance might be conditional upon the revenue so raised being spent on other programmes to combat obesity.

The issue of the potential regressivity of a fat tax was taken up by Madden (2006b) in work associated with the project *The Provision and Use of Health Services, Health Inequalities and Social Gain*. He examined the effect upon conventionally measured poverty measures of a tax package consisting of a 10% tax increase on certain “unhealthy” goods such as full-fat milk, take-away foods etc combined with a subsidy of fresh fruit and vegetables. Preliminary analysis suggested that such a measure would increase poverty, but the income effects of such a measure could be offset to some degree by lump-sum transfers to the poor.

4. Conclusion

This paper has provided an overview of the scope for economic interventions to affect health behaviour, particularly in areas which might be regarded as “risky”. It has suggested that the principal rationale behind such interventions is what can broadly be regarded as “market failure”. Given the instance of such market failure, when first best policies are not available or cannot be implemented effectively, then classic second best policies such as taxes and subsidies may be used. The paper has reviewed the efficacy of such policies and concluded that even with regard to potentially addictive behaviours such as smoking and drinking, such policies may be effective. The paper has also discussed other policies which can affect the “full price” of risky behaviours as well as examining the role of time consistency of preferences. Overall, the evidence presented here for Ireland and elsewhere has suggested that economic policies can play an extremely useful role in correcting the effects of market failure and in bringing about a greater congruence between social costs and benefits.

References

Battacharya, J and D. Lakdawalla (2004): "Time Inconsistency and Welfare", NBER Working Paper, No. 10345.

Becker, G., and K. Murphy (1988): "A Theory of Rational Addiction", *Journal of Political Economy*, Vol. 96, pp. 675-700.

Borren, P., and M. Sutton (1992): "Are Increases in Cigarette Taxation Regressive?", *Health Economics*, Vol. 1, No. 4, pp. 245-254.

Carpenter, C., D. Kloska, P. O'Malley and L. Johnston (2007): "Alcohol Control Policies and Youth Alcohol Consumption: Evidence from 28 Years of Monitoring the Future", *Berkeley Electronic Journal of Economic Analysis and Policy* (January 2007 draft accepted subject to minor revisions).

Chaloupka, F.,m and K. Warner (2000): "Tobacco" in *Handbook of Health Economics*, Vol. 1, ed. A. Culyer and J.P. Newhouse. Elsevier Science.

Conniffe, D., (1995): "Models of Irish Tobacco Consumption", *Economic and Social Review*, Vol. 26, pp. 331-347.

----- **and D. McCoy (1993):** *Alcohol Use in Ireland: Some Economic and Social Implications*. Economic and Social Research Institute. Dublin.

Cook, P. J., and M. Moore (2000): "Alcohol" in *Handbook of Health Economics*, Vol. 1, ed. A. Culyer and J.P. Newhouse. Elsevier Science.

Cutler, D, E. Glaeser and J. Shapiro (2003): "Why have Americans Become More Obese?", *Journal of Economic Perspectives*, Vol. 17, pp. 93-118.

Debreu, G., (1954): "Valuation Equilibrium and Pareto Optimum", *Proceedings of the National Academy of Sciences of the USA*, Vol. 40, pp. 588-592.

DeCicca, P., D. Kenkel and A. Mathios (2002): "Putting Out the Fires: Will Higher Taxes Reduce the Onset of Youth Smoking?", *Journal of Political Economy*, Vol. 110, pp. 144-169.

Donatelle, R., S. Prows, D. Champeau and D. Hudson (2000): "Randomised Controlled Trial Using Social Support and Financial Incentives for High-Risk Pregnant

Smokers: Significant Other Supporter (SOS) Program”, *Tobacco Control*, Vol. 9 (suppl III):iii67-iii69.

Drewnowski, A., , and N. Darmon (2005): “The Economics of Obesity: Dietary Energy Density and Energy Cost”, *American Journal of Clinical Nutrition*, Vol. 82 (suppl), pp. 265S-273S.

Eakins, J., and L. Gallagher (2005): “Dynamic Almost Ideal Demand Systems: An Empirical Analysis of Alcohol Expenditure in Ireland”, *Applied Economics*, Vol. 35, pp. 1025-1036.

Farrell, P., and V. Fuchs (1982): “Schooling and Health: The Cigarette Connection”, *Journal of Health Economics*, Vol. 1, pp. 217-230.

Frederick, S., G. Lowenstein and T. O’Donoghue (2002): “Time Discounting and Time Preference: A Critical Review”, *Journal of Economic Literature*, Vol. 40, pp. 351-401.

Evans, W.N., J. Ringel and D. Stech (1999): “Tobacco Taxes and Public Policy to Discourage Smoking”, in *Tax Policy and the Economy* (ed. J. Poterba). NBER. MIT Press.

Grossman M., F. Chaloupka, H. Saffer and A. Laixuthai (1994): “Alcohol Price Policy and Youths: A Review of the Evidence” in *Journal of Research into Adolescence*, Vol. 4, pp. 347-364.

Gruber, J., (2000): “Risky Behaviour Among Youths: An Economic Analysis”, NBER Working Paper, No. 7781.

----- (2001): “Tobacco at the Crossroads: the Past and Future of Smoking Regulation in the United States”, *Journal of Economic Perspectives*, Vol. 15, No. 2, pp. 193-212.

----- and B. Köszegi (2001): “Is Addiction ‘Rational’? Theory and Evidence”, *Quarterly Journal of Economics*, Vol. 116, pp. 1261-1303.

Jolliffe, D. (2004): “Continuous and Robust Measures of the Overweight Epidemic: 1971-2000”, *Demography*, Vol. 41, pp. 303-314.

Kenkel, D., (1993): “Drinking, Driving and Deterrence: The Effectiveness and Social Cost of Alternative Policies”, *Journal of Law and Economics*, Vol. 36, pp. 877-913.

Kennedy, E., and S. Offut (2000): “Commentary: Alternative Nutrition Outcomes Using a Fiscal Food Policy”, *British Medical Journal*, Vol. 320, pp. 304-305.

Lang, T., and G. Rayner (2005): “Obesity: a Growing Issue for European Policy?”, *Journal of European Social Policy*, Vol. 15, pp. 301-327.

Leicester, A., and F. Windmeijer (2004): *The ‘Fat Tax’: Economic Incentives to Reduce Obesity*. Institute for Fiscal Studies. Briefing Note No. 49. IFS. London.

McCoy, D., (1992): “Issues for Irish Alcohol Policy: A Historical Perspective with Some Lessons for the Future”, *Journal of the Statistical and Social Inquiry Society of Ireland*, Vol. 26, pp. 1-43.

Madden, D., (1992): “Can We Infer External Effects from a Study of the Irish Indirect Tax System”, *Economic and Social Review*, Vol. 24, pp. 63-74.

-----, (1993): “A New Set of Consumer Demand Estimates for Ireland”, *Economic and Social Review*, Vol. 24, pp. 101-123.

-----, (2002a): “Setting the Appropriate Tax on Cigarettes in Ireland”, in *Budget Perspectives 2003* (eds. T. Callan, D. Madden and D. McCoy). Economic and Social Research Institute, Dublin, 2002.

-----, (2002b): “Smoke and Strong Whiskey: Factors Affecting Female Smoking and Drinking in Ireland”, UCD Centre for Economic Research, Working Paper WP02/05.

-----, (2006a): “Body Mass Index and the Measurement of Obesity”, UCD Centre for Economic Research Working Paper, WP06/27.

-----, (2006b): “The Poverty Effects of a Fat-Tax”, *mimeo*.

-----, (2007): “Tobacco Taxes and Starting and Quitting Smoking: Does the Effect Differ by Education?”, *Applied Economics*, Vol. 39, pp. 613-627.

Manning, W. G., L. Blumberg and L. H. Moulton (1995): “The Demand for Alcohol: The Differential Response to Price”, *Journal of Health Economics*, Vol. 14, pp. 123-148.

Marshall, T., (2000): “Exploring a Fiscal Food Policy: the Case of Diet and Ischaemic Heart Disease”, *British Medical Journal*, Vol. 320, pp. 301-304.

Mullahy, J., and J. Sindelar (1996): “Employment, Unemployment and Problem Drinking”, *Journal of Health Economics*, Vol. 15, pp. 409-434.

O’Donoghue, T., and M. Rabin (2000): “Risky Behaviour Among Youths: Some Issues from Behavioural Economics”, *mimeo*, Cornell University.

-----and----- (2003): “Studying Optimal Paternalism, Illustrated by a Model of Sin Taxes”, *American Economic Review*, Vol. 93, pp. 186-191.

O’Riordan, W., (1969): “Price Elasticity of Demand for Tobacco in Ireland”, *Economic and Social Review*, Vol. 1, pp. 109-115.

Pacula R., and F. Chaloupka (2001): “The Effect of Macro-Level Interventions on Addictive Behaviour”, *Substance Use and Misuse*, Vol. 36, pp. 1901-1922.

Roll, J., and S. Higgins (2000): “A Within-Subject Comparison of Three Different Schedules of Reinforcement of Drug Abstinence Using Cigarette Smoking as an Exemplar”, *Drug and Alcohol Dependence*, Vol. 58, pp. 103-109.

Saffer, H., (1991): “Alcohol Advertising Bans and Alcohol Abuse: An International Perspective”, *Journal of Health Economics*, Vol. 10, pp. 65-80.

Strecher, V., S. Shiffman and R. West (2005): “Randomised Controlled Trial of a Web-Based Computer-Tailored Smoking Cessation Programme as a Supplement of Nicotine Patch Therapy”, *Addiction*, Vol. 100, pp. 682-688.

Thaler, R., and C. Sunstein (2003): “Libertarian Paternalism”, *American Economic Review*, Vol. 93, pp. 175-179.

Thom, DR, (1984): “The Demand for Alcohol in Ireland”, *economic and Social Review*, Vol. 15, pp. 325-336.

Townsend, J., (1987): “Cigarette Tax, Economic Welfare and Social Class patterns of Smoking”, *Applied Economics*, Vol. 19, pp. 355-365.

-----, **P. Roderick and J. Cooper (1994):** “Cigarette Smoking by Socioeconomic Group, Sex and Age: Effects of Price, Income and Health Publicity”, *British Medical Journal*, Vol. 309, pp. 923-927.

Walsh, B., (1987): “Do Excise Taxes Save Lives? The Irish Experience with Alcohol Taxation”, *Accident Analysis and Prevention*, Vol. 19, pp. 433-448.

-----, **(1989):** “Alcoholic Beverages in Ireland: Market Forces and Government Policy”, *Addiction*, Vol. 84, pp. 1163-1171.

Warner, K., (1977): “The Effects of the Anti-Smoking Campaign on Cigarette Consumption”, *American Journal of Public Health*, Vol. 67, pp. 645-650.

-----, **(1997):** “Cost Effectiveness of Smoking-Cessation Therapies”, *Pharmacoeconomics*, Vol. 11, pp. 538-549.

