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Framing Obesity in Economic Theory and Policy

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Contributed Paper prepared for the presentation at the International Association of
Agricultural Economists Conference, Gold Coast, Australia, August 12-18, 2006

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Abstract

While obesity is a growing problem that entails considerable costs, its causes for individuals are not yet well understood in economic terms. Three explanatory approaches are explored: obesity as a rational decision pursued by the individual, obesity as a problem of too little information and obesity as the result of a weak will. While the recent rise in obesity can be explained rationally by a changed environment, information deficiencies and akrasia contribute to explaining its frequency. If the state intervenes, a fat tax carries much higher allocative losses than taxing overweight directly.

Key Words: Welfare economics, second-order preferences, health economics

1. Introduction

It is often mentioned what huge costs the worldwide rise in obesity implies, both for individuals and for society (Wolf and Colditz, 1998; Bergmann and Mensink, 1999). However, economists who occupy themselves with the phenomenon should not primarily be concerned with producing cost estimates. They should, as Roux and Donaldsson (2004) put it, contribute to suggestions how to tackle the problem best, given that health care resources are scarce.

In order to solve a problem, one has to know its underlying causes. Many social scientists argue that environmental changes have supported rising obesity rates (Peters, 2003; Jeffery and Utter, 2003). They are certainly right. But the toolbox of economists is designed rather for analysing individual behaviour, which together with external influences is an important complement for explaining obesity: why would individuals decide – or happen – to become fat? Again, while sociological studies have shown that variables like race and gender play a large role (Paeratakul et al., 2002; Lin et al., 2004), the economic point of view is to analyse how, under the given constraints, obesity fits into the system of individual preference orders.

One should not underestimate the challenge of that attempt. Usually, economists assume a positive correlation between the bundle of goods consumed and a person's utility. Intuition tells us that in the case of obesity it is in fact vice versa: a person's utility may well decrease with additional consumption. For similar phenomena connected with addictive goods like cigarettes, Becker et al. (1991; 1994) have constructed a plausible explanation why people would still be consuming under these circumstances. However, it is rather implausible to apply the economics of addiction to excessive food intake. Rogers and Smit (2000) show that the vast majority of self-reported food craving and food "addiction" should not be viewed as addictive behaviour.

This paper will offer three different explanations for individuals becoming obese: it will portray obesity as the result of a rational decision (Section 2), as a consequence of information deficiencies (Section 3) and eventually as the result of akrasia, the weakness of human will (Section 4). The plausibility of these approaches will be discussed in Section 5. Section 6 focuses on the choice of appropriate policy instruments and Section 7 concludes.

2. Obesity as a rational decision

Traditional economic science prefers to depict developments as the outcome of rational decision-making by individuals. The rationality of humans is defined by the attempt to maximize their utility, a proxy for well-being. Applying this procedure to the case of obesity, one has to analyse the relationship between the uptake of excess calories e and an individual's utility U . Excess calories are all the calories that are consumed, but are not needed for human energy production. They are a function of food intake on the one hand and physical exercise on the other. As soon as utility is maximised with $e > 0$, obesity occurs. The uptake of excess calories will have three major impacts that can be summarised by the formula

$$(1) \quad U(e, v) = v + j(e) - c(e) - o(e) * d(S, a), \text{ with } j(e), c(e), o(e), \frac{\partial j}{\partial e}, \frac{\partial c}{\partial e}, \frac{\partial o}{\partial e} > 0; 0 < d(S, a) < 1.$$

While v is a constant, j describes the joy of eating. Most of us would agree that, while often being positive, the marginal joy of eating with additional excess calorie uptake will decrease so that

$$\frac{\partial^2 j}{\partial e^2} < 0.$$

$c(e)$ describes the costs of excess calories. These costs have a monetary component in terms of food prices, but they also strongly refer to time resources that are needed to prepare meals and to do the washing up. The marginal level of these costs can be assumed to be independent from the level of calorie uptake, so that

$$\frac{\partial \partial c}{\partial \partial e} = 0.$$

$o(e)$ describes both the economic and non-economic costs of overweight and obesity, for which I am going to use just the term obesity from here on. While the economic costs include all the health costs induced by obesity, non-health costs contain the emotional damage resulting from stigmatisation of obese people (Friedman et al., 2005), wage discrimination (Baum and Ford, 2004) decreased mobility, worse chances on the mating market and similar sufferings. Any advantages of the obese, like a reduced fracture risk (van Staa et al., 2001), would have to be deducted from $o(e)$. It should also be noted that the reaction of the body towards excessive calorie intake is very dependent on genetic and environmental factors, so that $o(e)$ differs considerably between individuals. In general, both economic and non-economic marginal costs of obesity can be assumed to grow with increasing uptake of excess calories, so that

$$\frac{\partial \partial o}{\partial \partial e} > 0.$$

The costs of obesity are, at least partly, long-term costs. Therefore, one has to employ a discount factor in order to obtain the present value of future utility. The level of this discount factor d can be deviated from two variables. Firstly, the level of time preference σ describes how much we prefer immediate pleasure over deferred pleasure. Secondly, future life expectancy a , as the period of sufferings from obesity will last

until death (this simplified model does not account for the possibility of diets; there are indications referred to in Section 4 that the costs of reducing obesity are usually prohibitively high). The lower my time preference, and the longer I expect to live, the lower the discount rate, i.e.

$$\frac{\partial S}{\partial d} > 0; \frac{\partial a}{\partial d} < 0.$$

Within this framework, it is easy to see that non-zero solutions for maximizing $U(e)$ are indeed possible. Starting from a balanced food intake, there is no reason why some individuals should not be able to increase their utility by eating a little more, because the joy of doing so outweighs both the costs of the food and the long-term costs of obesity, up to the point where

$$(2) \quad \frac{\partial u}{\partial e} = \frac{\partial j}{\partial e} - \frac{\partial c}{\partial e} - \frac{\partial o}{\partial e} * d(S, a) = 0$$

Offner (2001; 84), for example, is convinced that this rationality approach best reflects reality: “For weights to rise, it was necessary for people to prefer the immediate gratifications of eating, to the delayed ones of normative appearance.”

There are studies by economists that deliver empirical support for this description of rational behaviour. The causal relation between sinking food prices and the rise of obesity has been shown by Philipson and Posner (1999), Philipson (2001), Lakdawalla and Philipson (2002), Cutler et al. (2003) and Chou et al. (2004). It is not only the monetary costs of food which have declined relative to consumer budgets for decades. It can be shown that the time resources necessary for preparing a meal have become much shorter. Microwaves and progress in the food industry have contributed considerably to the decrease in $c(e)$ over time.

Komlos et al. (2004) found another angle to show the rationality of obesity. By comparing saving rates and obesity development, they show that the shrinking rate of time preference plays its part in explaining the rise in obesity.

A third pillar of empirical evidence is the age distribution of obesity. Various studies from different countries (Al-Nuaim et al., 1996; National Audit Office, 2001; Kiefer and Kunze, 2005) report rising obesity rates with rising age, up to the age where the appetite (described as $j(e)$ in (1)) decreases naturally. Figure 1 shows the United States as an example. There may be physiological reasons for rising obesity rates with age, but we should bear in mind that we consider equation (1) as always being in the free will of man. Therefore, rising obesity rates throughout life reflect rational behaviour, because there are fewer reasons to restrict eating when future life expectancy is short, anyway. Another argument would be the marginal disutility of effort like exercising with rising age.

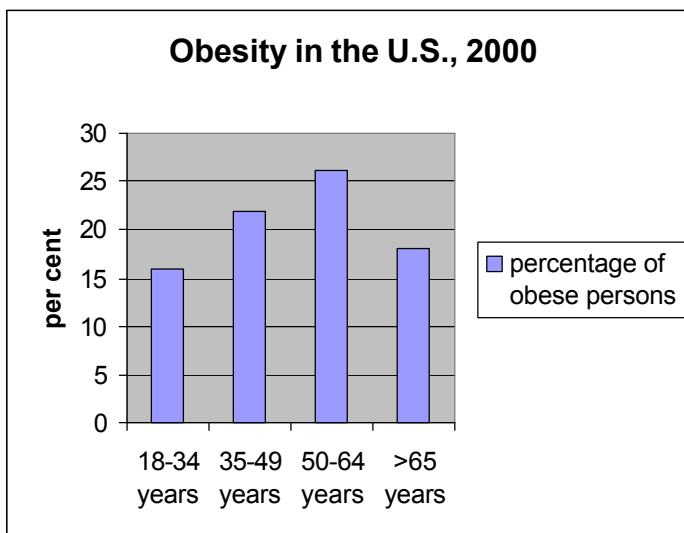


Fig. 1: Obesity rates per age group in the United States, 2000 (von Wietersheim, 2004)

Under complete market conditions, obesity does not cause externalities. There is, therefore, no reason for the government to intervene if obesity has been chosen as the utility-maximizing option for any individual.

In fact, it would cause welfare losses if the state were, for example, to tax weight and would therefore distort the optimal allocative choices of individuals.

However, although health is not a public good in terms of non-excludability and non-rivalry, health costs have been made social by most societies. Many costs of diseases are not borne by individuals, but by society in one form or another. For the United States, for example, Finkelstein et al. (2003) estimate that half of all health-related obesity costs are borne by society. That has the consequence that externalities of obesity exist and are quite comparable to those of smoking. The methodology for calculating optimal taxes to internalize the costs of obesity can largely be copied from those for smoking (Lightwood et al., 2000; Warner, 2000; Madden, 2002). Like them, the “positive” social effects of obesity, such as an earlier death and therefore a shorter dependency on health services, have to be included in the calculus. And as the authors cited do for smoking, one might come to the conclusion that the social costs of obesity are not as high as one might think.

3. Obesity as an information deficiency problem

For a long time, assuming complete information for everybody was a basic prerequisite for all economic thinking. It was only with game theory (Harsanyi, 1967) and particularly the rise of New Institutional Economics (for an overview see Kasper and Streit, 1999) that economists started to admit how much influence the lack of information could have on economic life. That might also apply to the issue of obesity. Do we simply underestimate the risk of getting fat? Coestier et al. (2005;3) make that point, and it is worthwhile to briefly consider their proposed direct utility function

$$(3) \quad "U(Q,v) = u(Q) - (1-\mu)[D(Q) - F(Q)] + v$$

where v is the numeraire and $u(Q)$ is the immediate satisfaction from consuming an amount Q of the good. The perceived disutility associated with the consumption of the risky product is noted as $(1-\mu)[D(Q)-F(Q)]$, where consumer misperception of risks is captured by the parameter $\mu \in [0,1]$. Both the expected damage, $D(Q)$, and the expected compensation, $F(Q)$, in case of obesity under liability are misperceived, meaning that the consumer has correct expectations about the level of compensation (related to the value of the damage), but underestimates the probability that obesity (and subsequent compensation) occurs.”

Even if Coestier et al. (2005) may be asked why the probability of becoming obese is necessarily under- and not possibly overestimated, model (3) cannot be brought into accordance with (1). For all $\mu > 0$, obesity is not a utility-maximizing decision any more, but a result of individual miscalculations. Coming back to the framework introduced in Section 2 which leaves liability considerations aside, now people behave in such a way that it is not the real, but the expected utility u_e that is maximised.

$$(4) \quad \frac{\partial u_e}{\partial e} = \frac{\partial j}{\partial e} - \frac{\partial c}{\partial e} - (1-m) \frac{\partial o}{\partial e} * d(S, a) = 0,$$

although (2) would still be optimal. The higher μ , the more people will cause welfare losses for themselves, because they did not know the consequences of their consumption. One could even go further by assuming a second source of uninformedness. In addition to underestimating the costs of obesity, I could well overestimate the necessary calorie intake, which would automatically lead to an underestimation of e . I would then make my judgement on the basis of perceived excess calorie intake e_p , so that

$$(5) \quad \frac{\partial u_e}{\partial e} = \frac{\partial j}{\partial e_p} - \frac{\partial c}{\partial e_p} - (1-m) \frac{\partial o}{\partial e_p} * d(S, a) = 0, \text{ with } e_p < e$$

Is there any empirical evidence for this presumption? If there is some truth in this approach, additional information should lead to lower obesity rates. Actually, this is exactly what several studies report.

Monteiro et al. (2001) report for Brazil that better educated persons are less likely to become obese. Brazil is still at a stage where the rich would typically become obese, not the poor – which makes it all the more remarkable that Monteiro et al. (2001) managed to separate the strongly positively correlated education effect from income.

Surveys focusing more specifically on health knowledge obtain similar results. Nayga (2000; 815) finds that “knowledge is inversely related to the probability that an individual is obese.” And Wang et al. (2003) even claim that the health costs saved by a school-based information program on obesity exceeded the cost of the program itself. Again, since most information campaigns against smoking have had some effect as has been shown by various studies (for a review see Chaloupka and Warner, 2001), it would be surprising if parallel campaigns against obesity were simply to fail.

All that seems to indicate that information on food consumption and health is a merit good, i.e. that consumers demand food-relevant information on the market to a lower degree than would maximize their welfare. Thus, the state would increase aggregated welfare by providing information about healthy eating, up to the point where the marginal cost of information equals the marginal benefit of prevented obesity. Practical considerations would make it probable that a lot of this information would already be provided during pre-school and school years, when many obesity ‘careers’ start.

4. Obesity as the result of akrasia

What if we believe that the disadvantages of obesity more than outweigh the pleasures of unlimited eating, and if we are, in addition, well informed about the connection between calorie uptake and weight? Is there

no possibility of becoming obese? There is, if we allow for the weakness of will. It might just be that I behave irrationally by eating although I know I am behaving in discordance with my own principles.

From Aristoteles (1991) to Elster (1984), the phenomenon of *akrasia*, or weakness of will, is well known and has been explored in depth in philosophy. Economists, however, are accustomed to working with the assumption of rationality. For that reason, the economics profession has always been reluctant to concern itself with the mechanics of *akrasia* as a straight contradiction to rationality. Still, three different options for dealing with *akrasia* in a formalised way which would in some way be compatible with economic thinking have been suggested. The oldest, as put forward by Strotz (1956), is to allow for time inconsistencies, i.e. that my foresight at time X of what I would prefer at time Y is simply wrong. Brennan and Lomasky (1983) have introduced the concept of parted preferences leading to individualist merit goods: if my market preferences and my reflective preferences are inconsistent with each other, I may want my political preferences to solve this contradiction by intervening in the market until the two preferences match.

Perhaps the most suitable framework for our purposes is also the most recent one: the introduction of second-order preferences into economics by George (2001). George claims that we do not only have the preferences on which we act (first-order preferences), but also preferences that make some internal judgement about these first-order preferences. We can prefer certain preference orders over others, which we call second-order preferences. To apply that to the choice between eating e and fasting f : for the moment, I may prefer eating over fasting ($e > f$), but I would be happier if I were to prefer fasting over eating [$(f > e) > (e > f)$]. Therefore, I have a second-order preference to restrict my eating, to which I do not obey.

Is there any empirical evidence that these kinds of second-order preferences are prevalent in most obese individuals? Every diet which is started is an indicator for that. It is unlikely that, up to the start of the diet,

obesity was the preferred choice, whereas from the beginning of the diet, losing weight is preferred. It is more plausible that by dieting we want to enforce second-order preferences over first-order preferences. An even stronger indicator is the fact that, generally, between 90 and 95 per cent of all diets fail in the long run (Polivy and Herman, 2002; Haug, 2002; Hark, 2004), which can partly, but not exclusively be seen as an information problem. The systematic failure of dieting also means that we usually fail in realising second-order preferences against the resistance of first-order preferences. The fact that obese persons suffer from depression more frequently than others, particularly if they hold anti-fat beliefs (Friedman et al., 2005), is also an indicator for the notion that rationality is often not congruent with existing obesity.

But even if we conclude that obesity is more often than not a result of akrasia, it is far from clear what the policy implications are. No-one has ever attempted to estimate a willingness to pay for asserting second-order preferences over first-order preferences and it is likely that marginal thinking, as preferred by economists, is misplaced in this field.

There are empirical examples where citizens have politically chosen for the state to subsidise “merit goods” which they consider superior, but would not buy them on the marketplace (Mann, 2003). Vice versa, it is thinkable that a majority of citizens demands that the state intervene to restrict people’s eating behaviour. What Meriwether (2003) calls ‘moral sanctions’ can perfectly well be based on self-interest. But this is only a possible pattern, not a necessary one. Likewise, there could be an aversion in the population to the state acting like a ‘nanny’ (McCuen, 2000) which could far outweigh their perceived second-order preferences. First studies of public support for government intervention (McMahan et al., 2003) show an undecided picture. Given that obesity is an issue which has gained broad public attention only recently, due to its unexpected rise, a public discourse about the role of the state still has to develop.

5. Plausibility

So far, the three explanatory approaches for obesity which have been presented are alternatives to one another. If we choose obesity as a utility-maximizing option, we cannot be ill-informed, nor are we likely to have a weak will. Do we therefore have to choose one of the three approaches as the true one, or do they all combine in some way?

Philipson (2001) rejects the suggestion that lack of information might be a problem. He argues, given the greater level of information about obesity in most societies, that obesity levels should have been fallen, not risen. A similar point could be made with respect to akrasia. There is no evidence that our will has become weaker over the last few decades. Therefore, akrasia is not well suited to explain the rapid rise in obesity we are facing.

Indeed, the supporters of the rationality explanation have done a good job in providing explanatory factors for the rise in obesity, as summarised in Section 2, particularly by pointing to the increased availability of convenience food. Going back to the formalised way of the argument, there is some evidence that for many individuals, some decades ago, it was

$$(6) \quad \frac{\partial j}{\partial e} < \frac{\partial c}{\partial e} \text{ for all } e > 0,$$

so that excess calories were not purchased, independent from the (non-negative) costs of obesity. For poor people in many parts of the world, eq. (6) still holds true today, if opportunity costs for forgoing consumption of housing or education are part of $c(e)$.

However, as soon as the marginal costs of excess calories slipped below the marginal joy of consuming them for large parts of society, there is too much empirical evidence for the influence of information

deficiency and akrasia to ignore. The clearly considerable willingness to pay, both for information about how to lose weight (Roux et al., 2004) as well as for supplementary measures for losing weight including behaviour therapy (Melcher and Bostwick, 1998; Benecke, 2002), shows that individual rationality is not the full answer. A combination of all three explanatory approaches will be more plausible.

To make things a bit more complicated it should be mentioned that, in real life, akrasia will in particular be fairly interwoven with the other two factors. Consider the link between information deficiencies and akrasia: obviously, every public library offers sufficient information about nutrition and obesity to equip people to live a healthy life. From that perspective, no information deficiency needs to exist. However, the initiative to visit the library, to search for the right books and to read them will not be as deliberately chosen as the reception of ready-made information delivered in an easily comprehensible form. That may have something to do with the different levels of transaction costs, but also with weakness of will.

Similarly, choosing obesity rationally will typically not be an act of decision at a certain point in time. The most “rational” thing what will happen is that people realise they are becoming overweight and decide that they are not going to do anything about it. Empirical research has it that “male individuals start to heed the health risks only when they are extremely overweight” (Kan and Tsai, 2004; 932). Thus, the typical decision is not to become obese but rather not to fight obesity. The less consciously individuals make this kind of decision and the more they simply ignore their changing shape, the more akrasia is arguably playing a role.

6. Policy Instruments

It has become clear that, apart from delivering information on nutrition, it may be efficient for the state to intervene against obesity in order to internalise externalities that arise once obesity costs are borne by the

public health system and/or as an educational measure for people to fight their weakness of will, deliberately chosen by the public. It has, however, not been discussed what scope such a measure would need to have in order to maximise efficiency.

The most prominently discussed policy instrument is a fat tax as proposed by Marshall (2000) and Wadden et al. (2002). It is drafted as an extra VAT on all food that is perceived as unhealthy. Different variants of the tax have been put forward, either taxing unhealthy components of food such as fat, taxing only unhealthy food or taxing the energy intake by food (Strnad, 2004). The concept of the tax is similar to the tobacco tax imposed in most countries to internalise the negative externalities of smoking. However, the important difference lies in the nature, or more specifically in the marginal damage curve of the two problems. While the marginal damage of tobacco consumption is almost constant, the marginal damage of food and even of fat is certainly not. On the contrary, a lot, probably the majority of all food and perhaps even of all fat which is consumed does not cause any damage at all but rather provides important constituents for living, whereas the proposed taxes are uniformly applied to every energy or weight unit. However, any fiscal discrimination against the part of consumed food and fats which is not only harmless, but essential, would cause massive allocative losses. Even Coke with French fries can, if moderately consumed, be an integral part of a perfectly healthy diet. This point should also lead to a rejection of more radical suggestions like banning fast food in all schools (Oliver and Lee, 2002). In addition, it has been shown that taxing snack foods would not even be an efficient tool to fight obesity (Kuchler et al., 2005).

Apart from privatising the health system, which would already internalise most or all the externalities connected with obesity, the most efficient mode of intervention would be to tax people according to their weight or, even more to their point, according to their Body Mass Index. While smokers cannot be taxed on the amount they smoke (only on the amount of cigarettes they buy) due to measurement problems, people's weight and size can easily be collected, at least in principle. The most efficient solution in terms of targeting would therefore be something like a tax for every point above Body Mass Index 25.

This solution has obvious shortcomings in terms of privacy. It may be considered as too embarrassing for everybody to have to register their weight, even although height registration (e.g. for identity cards) is already a civic duty in many countries. The trade-off between economic efficiency and cultural reluctance cannot be solved within the economic discipline, but requires a broader discussion process.

7. Conclusions

It is obvious that it was changes in our environment which caused the worldwide increase in obesity. It is less obvious, however, how individuals decide to become obese or simply do become obese. Reality is too complex to offer an integrated explanation. However, it can be shown that different factors influence individual development, including individual cost-benefit considerations, the amount of information one has about the causes and effects of obesity and the strength of a person's own will.

As long as health is considered a private good, there is no a priori reason for the state to become entangled in individual obesity. As soon as health care is provided by the state, however, obesity causes externalities that ought to be internalised by the state. In addition, as obesity becomes an epidemic, people may choose for the state to intervene more decisively than only by internalizing public costs, making it more difficult for consumers to give way to their weakness of will.

A 'fat tax', however, is a relatively inefficient tool for fighting obesity and will cause a lot of allocative losses for consumers. Taxing weight or the Body Mass Index would, at least in principle, be much more to the point as a policy instrument. Future research may reveal institutional options for such a pathway.

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