Given increasing obesity rates, fingers are often pointed at “big food” and their marketing practices. Restaurant meals are indeed larger than home-cooked meals, and portion sizes have increased. We consider constrained “socially optimal”—rather than decentralized profit-maximizing—portions to see whether welfare maximizing strategies may also be waistline-increasing. We demonstrate that socially optimal restaurant meals are larger than average home-cooked meals, yet the choice to “super-size” alleviates the size discrepancy. Moreover, portion sizes at home and in restaurants increase with relative reductions in the marginal costs and/or relative increases in the fixed costs of meal preparation. (JEL I10, D11)

I. INTRODUCTION

“Do you want fries with that?” is the mantra of the fast food burger joint. It is also the direct descendant of the “Anything else?” at the baker’s, the “May I interest you in these lovely pork chops, madam?” at the butcher’s, or “Wouldn’t you like a nice bunch of grapes?” at the green grocer’s. Although those were looked on as polite questions made to elicit preferences or to bring the order to a close only when the customer was ready, the question of fries has been imbued with evil intent. Big food, not unlike big tobacco, has conspired to make us eat more by offering us fries or the option to super-size our orders (May 2003). And we don’t have to look any farther than the bulging waistlines of the adult American population to establish their success. Or do we?

Open any newspaper or magazine or turn on the television or radio and you are immediately confronted with articles and op-ed pieces on the increasing trend in childhood and adult obesity and the ostensible culprit—big food companies, such as McDonald’s and Burger King, have been sued. Although the Pezman v. McDonald’s case was thrown out of court, the judge, Robert Sweet, suggested a way to pursue the claim that would be more likely to advance through the court system. John F. Banzhaf III, professor at George Washington University Law School has refocused his energies away from big tobacco, where he was one of the most successful antitobacco litigants, and onto big food. His Web page (http://banzhaf.net/obesitylinks) is dedicated to this campaign. Marion Nestle, professor of nutrition at NYU, argues in her much-quoted book, Food Politics (2002), that advertising by big food is both to promote their products and to induce consumers to eat more. Clearly, if implicitly, the firms that make up “big food,” not we, are to blame. This being the case, fat taxes have been suggested both in jest, that is, taxing people based on their weight (Rauch 2002), and as a serious proposal to alter an individual’s eating habits via the price mechanism, for example, by taxing fatty foods at a higher rate (Nestle 2002; BBC 2000; Jones 2003). Also, states and school districts are restricting the sales of sodas (Los Angeles Times 2003), offering instead milk, juice, or water; and recently California has further banned the sale of so-called junk food in schools (Griffith 2005).

Though the idea that no publicity is bad publicity may be apt in some circumstances, big food has taken notice of the onslaught
and has responded. Kraft Foods is reducing the serving size of its prepackaged one-serving meals and snacks; Hershey’s is offering sugar-free chocolates; McDonald’s, Wendy’s, and their ilk are offering salads and other lower fat meals in addition to their usual fare, and/or opening more health-conscious fast food restaurant alternatives. Similarly, a recent KFC advertising campaign sings the praises of how few carbohydrates and how much protein their fried chicken contains, in a nod to the Atkins (2002) diet, and McDonald’s has stopped offering super-sized meals (Carpenter 2004). These responses to the market struck some as panic (Ayers 2002), suggesting guilt rather than hard-nosed competitive responses. But market research has found that when consumers are offered lower calorie options and reduced portion meals, they do opt for them, and then replace the saved calories in appetizers or desserts (Fonda 2003; May 2003).

II. THE ECONOMICS PROFESSION WEIGHS IN

The positive trend in weight began in the mid-1800s and is not, as usually depicted, an entirely recent phenomenon (Cole 2003; Costa 1993). What is incontrovertible, however, is that since the late 1970s portion sizes have increased. Thus, on average, the portion size and energy intake has increased by 93 kcal for salty snacks, by 49 kcal for soft drinks, by 68 kcal for French fries, and by 97 kcal for hamburgers (Nielsen and Popkin 2003). This can ostensibly be the result of a reduction in the price of food, but because price elasticities of demand are inadequate to account for the increases in weight, alternative and additional reasons have been suggested. Ladkawalla and Philipson (2002) point to more sedentary jobs and Martinez-Gonzalez et al. (1999) to more sedentary lifestyles, both leading to less energy usage. Bednarek et al. (2006) find that increases in income and leisure time lead to individuals eating more and spending less time in active pursuits. Cutler et al. (2003), find that lack of self-control leads individuals to give into temptation today while putting off the diet until a tomorrow that fails to arrive. Mancino and Kinsey (2004) demonstrate how work habits and eating patterns adversely affect diets of even those who have considerable knowledge of healthful diets.

More to the point of the debate concerning a connection between the prevalence of weight gain and big food, Cutler et al. (2003) note the increased time cost of home preparation of food—largely as a result of women’s increased labor force participation—causing a substitution into the relatively cheaper market prepared food. Emphasizing this point, Chou et al. (2002) find that when the density of fast food outlets rises in an area, the incidence of obesity rises as well. These rationales, however, should not necessarily lead to weight gain because nothing necessitates overeating more when one eats out rather than in. However, and seemingly in line with these observations, although we overeat (eat more than we once did) at home, we overeat more at fast food restaurants, which provide the largest servings (Nielsen and Popkin 2003). Although these data paint a consistent picture, they do not provide an explanation of why it is that the food industry provides a service that appears inconsistent with revealed preference when we provide the service for ourselves.

To provide additional insight into this question—be it as an alternative to or in addition and complementary to those provided by the popular press—we consider the question of optimal portion size in a choice theoretical framework. We examine an individual’s demand for food at an instant in time, for example, at lunch. A consumer faces a varying degree of hunger, and so chooses the consumption bundle, that is, the meal, that best satisfies his or her appetite. We consider two basic methods for the provision of meals. We suppose that consumers are free to choose any size of consumption bundle, as is the case in the home production of meals. We contrast this with the problem of providing an optimal standardized meal size that maximizes the welfare of the typical consumer. Unlike a profit-maximizing firm (e.g., a restaurant), the solution to this problem accounts only for consumers’ utilities at a point in time, which allows us to abstract from motives aimed more at the bottom line (such as psychological manipulation of preferences) than the waistline. Thus, we take as given the distribution of hunger in the population and the cost of providing meals and then determine the size of the meal, measured, for example, in calories, that maximizes the utility of the

1. Somewhat at odds with this finding is that although caloric intake per meal has not changed, the number of meals consumed has (Cutler et al. 2003).
representative agent. The thus constrained “socially optimal” meal is larger than the average sized one resulting from individual choices. Should it be feasible to choose two rather than a single meal size (which could be characterized as a standard and a supersized meal), then all agents’ ex ante utility is increased. In our model, choice makes everyone better off, but the technological constraints on choice and the need to best serve the typical (representative) customer make people fatter. Thus, competition and falling food prices, rather than evil intent, are the culprits.

III. THE MODEL

Ex ante identical agents are endowed with \( y \) units of income. Their preferences are defined over a composite good, \( m \), and food consumption, \( c \). Utility derived from food consumption obviously stems from many factors—not just the amount of food but also its quality, preparation, presentation, as well as variation. However, holding these factors constant across venues (home cooking, or eating out), we make the simplifying assumption that food consumption is measured by the one-dimensional variable \( c \).

Agents’ utilities are quasi-linear and concave in food consumption. Nevertheless, one’s utility from food consumption depends on how hungry the agent is. Specifically, an agent experiences utility from food consumption that is captured by the function \( \pi U(c) \), where \( U(.) \) is a standard von Neumann–Morgenstern utility function with \( U' > 0, U'' < 0 \), and \( \pi \in (0,1] \) measures how hungry an agent is. The bigger the \( \pi \), the greater is one’s hunger, and food gives more pleasure the hungrier one is. We assume that \( \pi \) is distributed i.i.d. across the population and across time according to the distribution function \( F \) and at the beginning of the period agents realize their state of hunger.

Once \( \pi \) is realized the agent chooses food consumption, \( c \), and the amount of the composite good, \( m \), to maximize

\[
\begin{align*}
(1) & \quad \pi U(c) + m, \\
\text{subject to} & \quad y = m + e(c),
\end{align*}
\]

where \( e(c) \) measures the expenditures made to acquire a portion of size \( c \).

If the (per unit) price of food is fixed and given by \( p \), then the expenditure function simply reduces to the more familiar form \( e(c) = pc \). However, we use the expenditure function to capture the possibility of volume discounts—often encountered when increasing the order size of the purchase. Thus we make the natural assumption that expenditures are increasing in the amount purchased, \( e'(c) > 0 \), but unit prices, \( p = e(c)/c \) are (weakly) decreasing in quantity, \( e'(c)c - e(c) \leq 0 \).

The two properties attached to the expenditure function mirror actual pricing policies in restaurants. More important for our purposes, though, they reflect typical cost structures of production: a fixed cost of providing (any sized) portion and relatively constant marginal costs of increasing the portion size. Thus, pricing at a given mark-up above the cost of a portion yields an expenditure function with these properties. Indeed, to the degree that the food industry is (either perfectly or monopolistically) competitive, one expects to find pricing policies that underlie such expenditure functions.

IV. THE DETERMINATION OF OPTIMAL PORTION SIZES

We consider three scenarios in determining the optimal portion size of meals: home cooking, eating out, and eating out with an option to super-size.

First, we suppose that consumers can choose any desired portion size. This serves as our benchmark. Second, we consider the case in which a single fixed serving size is provided. We determine the socially optimal size, given the underlying cost structure, and compare it to average consumption under the benchmark case. Third, we allow for distinct (albeit limited) portion sizes, that is, the option to super-size a meal, and see how consumption under this option differs from the other two scenarios.

Given these three scenarios, we then examine how they are affected by changes in the
pricing rules, that is, changes in the expenditure function, given the assumption that the pricing function is a reflection of production costs.

**Case 1: Continuous Choice; Home Provision of Meals**

Home cooks when preparing meals need only prepare according to their current state of hunger and can vary portion size to perfectly satisfy that hunger. This option is sometimes found in buffet-style cafeterias and restaurants, where one loads up a plate that is weighed at the register and pays a price per ounce. However, because this method is largely impractical for most restaurant meals, it is not often observed, and we consider this benchmark case to be one of food preparation at home.

Substituting Constraint (2) into Equation (1) and choosing $c$ to maximize

$$\pi U(c) + y - e(c),$$

the first-order condition of the agent’s problem is

$$\pi U'(c) - e'(c) = 0.$$  

(3)

The second-order condition of the agent’s problem is

$$\pi U''(c) - e''(c) < 0.$$  

(4)

If the second-order condition is satisfied, Equation (3) is solved for the optimal level of food consumption as a function of one’s state of hunger, $c^*(\pi)$. A sufficient condition for the second-order condition to be satisfied is that the expenditure function reflects (constant) mark-ups above average costs and the marginal cost of food preparation is nondecreasing—a requirement that is sure to hold in all relevant instances.

**Case 2: The Optimal Portion Size for a Single Portion**

Suppose that the provision of any given meal size is costly (in terms of size-specific equipment and auxiliary items as well as specialized labor) so that one cannot provide each agent with a continuous choice of meal size and thus cannot provide each consumer with his or her desired consumption portion. Then, like the restaurateur or the purveyor of TV dinners but unlike the home cook, it may be necessary to choose a single portion size. Facing this constraint, expected social welfare is optimized by the choice of a portion size $b$ that maximizes

$$\int_0^1 [\pi U(b) + y - e(b)]dF(\pi).$$

Rewriting, $b$ should maximize

$$\hat{\pi} U(b) + y - e(b),$$

where $\hat{\pi}$ is the expected value of $\pi$. The first-order condition of the problem is

$$\hat{\pi} U'(b) - e'(b) = 0,$$

which is solved for $b^*$.

**Proposition 1.** The socially optimal portion size is larger than the average portion size of the consumer with continuous choice. That is,

$$E(c^*(\pi)) < b^*.$$  

**Proof.** Equation (3) implicitly defines $c^*$ as a function of $\pi$, say $G(c,\pi) = \pi U'(c) - e'(c) = 0$. By the implicit function theorem,

$$c'' = (d^2/d\pi^2)c^* = -(d/d\pi)(G_{\pi}/G_c)$$

$$= -(G_{\pi\pi}G_c - G_{\pi}G_{\pi})/(G_c^2)$$

$$= U''U'/G_c^2 < 0,$$

so, $c(\pi)$ is concave. Hence, $E[c^*(\pi)] < c^*(E\pi)$. But $c^*(E\pi) = b^*$.

Thus, the optimally chosen single portion size is larger than the average portion chosen by the population at large. This is because the utility loss of having too little food is much higher at the margin than the utility loss (in terms of forgone consumption of $m$) of having too much. Hence, one will be more willing to err on the side of abundance rather than paucity, and profligacy rather than abstemiousness is the path to higher expected utility. Once food is prepared and purchased, the consumer has the option of not eating any excess beyond the decentralized full information (“first best”) optimum (i.e., the home production choice of $c^*(\pi)$), that is, there is free disposal.
However, because the marginal utility of greater consumption is necessarily positive at the first-best level of consumption and sunk costs are sunk, the agent will eat in excess of the first-best level.

Consequently, the average amount of food intake may very well increase as an individual shifts consumption habits from home food production to restaurant meals (or TV dinners). However, far from being a reflection of a conspiracy of big food against consumers, it may merely reflect the optimal provision of standardized portions.

Case 3: Super-Sizing

We now consider the case of two meal sizes over which the consumer can choose—a “standard” portion size, \( a_1 \), and a super-sized option, \( a_2 \). We proceed in two steps. First, we analyze a consumer’s choice, given two meal sizes, and then we discuss the best meal sizes from the vantage point of the social optimum.

Define \( W_i \) as the utility an agent receives given meal \( a_i \), that is

\[
W_i = \pi U(a_i) + y - e(a_i), \quad i = 1, 2,
\]

so

\[
(d/da_i)W_i > (<)0 \text{ as } a_i < (>)c^*.
\]

The agent chooses between \( a_1 \) and \( a_2 \) to solve \( \max[W_1, W_2] \).

For any feasible pair of \( a’s \), there will be a type of agent, \( \pi^c \), such that the agent is indifferent between the two meals, given the portion sizes and the associated expenditures. For that type of agent \( W_1 = W_2 \), which implies that

\[
\pi^c = [e(a_2) - e(a_1)]/[U(a_2) - U(a_1)] > 0,
\]

for an interior solution.

Consider now the optimal meal sizes. Given the agent’s expected utility for a given value of \( \pi \), the agent’s ex ante expected utility is given by

\[
EW(a_1, a_2) = \int_0^{\pi^c} [\pi U(a_1) + y - e(a_1)]dF(\pi) + \int_{\pi^c}^{1} [\pi U(a_2) + y - e(a_2)]dF(\pi).
\]

Assuming, for the sake of closed-form solutions, a uniform distribution of \( \pi \) across the population,\(^3\) the problem is to choose \( a_1 \) and \( a_2 \) to maximize

\[
EW(a_1, a_2, \pi^c(a_1, a_2))
\]

\[
= \{0.5\pi^c U(a_1) - e(a_1)\} \pi^c
\]

\[
+ \{0.5(1 + \pi^c)U(a_2) - e(a_2)\}
\]

\[
\times (1 - \pi^c) + y.
\]

Letting a subscript denote the partial derivative, the first-order (sufficient) conditions with respect to \( a_1 \) and \( a_2 \), respectively, are

\[
\{0.5\pi^c U'(a_1) - e'(a_1)\} \pi^c
\]

\[
+ 0.5\pi^c U(a_1)\pi^c + \{0.5\pi^c U(a_1) - e(a_1)\} \pi^c
\]

\[
+ 0.5\pi^c U(a_2)(1 - \pi^c) - \{0.5(1 + \pi^c)U(a_2)
\]

\[
- e(a_2)\} \pi^c_1 = 0;
\]

\[
\{0.5\pi^c U(a_1) - e(a_1)\} \pi^c_2
\]

\[
+ 0.5\pi^c U(a_1)\pi^c + \{0.5(1 + \pi^c)U'(a_2)
\]

\[
- e(a_2)\} (1 - \pi^c) + 0.5\pi^c U(a_2)(1 - \pi^c)
\]

\[
- \{0.5(1 - \pi^c)U(a_2) - e(a_2)\} \pi^c_2 = 0.
\]

Recalling the implicit definition of \( \pi^c \),

\[
\pi^c U(a_1) - e(a_1) = \pi^c U(a_2) - e(a_2),
\]

these reduce to

\[
0.5\pi^c U'(a_1) = e'(a_1)
\]

\[
0.5(1 + \pi^c)U'(a_2) = e'(a_2).
\]

The first-order conditions immediately yield the following two results.

First, compared to the case of a single (standardized) meal, welfare is strictly increased with the choice between two meals, that is,

\[
W(a_1^*, a_2^*) > W(b, b), \quad \text{for all } b,
\]

because the first-order conditions cannot be satisfied for any pair \( a_1 = a_2 = b \), so the maximum under two distinct portions must be strictly greater than for the single portion.

3. The assumption of a uniform distribution makes the calculation particularly convenient, especially because we are dealing with implicit functions. However, the following results likely follow with any unimodal distribution.
Second, a comparison of the reduced first-order conditions with the agent’s first-order conditions given in Equation (3) shows that the two distinct meal sizes chosen are optimal conditioned on the segment of the population that chooses a particular meal, that is,

\[ a_1 = c^*(E\pi|\pi < \pi^c) \quad \text{and} \quad a_2 = c^*(E\pi|\pi > \pi^c), \]

because \( E(\pi|\pi < \pi^c) = 0.5\pi^c \) and \( E(\pi|\pi > \pi^c) = 0.5(1 + \pi^c). \)

Thus, increasing the number of portion sizes improves welfare and maximizes average utility of consumers given their choice of serving size. But how does increasing the number of portion sizes available affect how much is consumed? As a first step note that the two optimal meals, \( a_1^* \) and \( a_2^* \), straddle \( b^* \), that is,

\[ a_2^* > b^* > a_1^*. \]

This is so because \( b^* = c^*(0.5) \) (see the proof of Proposition 1), and \( a_1 = c^*(0.5\pi^c) \) and \( a_2 = c^*(0.5(1 + \pi^c)) \). Because \( c^* \) is increasing, the result follows as \( \pi^c \in (0, 1) \).

In other words, as more portion sizes are offered, larger portion sizes become available. So the larger portion size is indeed super-sized. However, this does not inform us concerning how average consumption is affected by offering a variety of portion sizes. For this we consider average portion sizes consumed under the three regimes, the home cooked benchmark, the single portion size, and the supersize scenarios. For the latter comparison, let \( E\pi^* \) denote the average consumption when two different portion sizes are offered.

**PROPOSITION 2.** Average consumption given a choice in portion size is above the average portion size of the consumer with continuous choice, yet it is smaller than when only one meal is offered. That is,

\[ E\pi^* < E\pi^c < b^*. \]

**Proof.** Notice that

\[ E\pi^* = \pi^c a_1^* + (1 - \pi^c) a_2^* = \pi^c c^*(0.5\pi^c) + (1 - \pi^c) c^*(0.5(1 + \pi^c)). \]

For the first inequality, applying Proposition 1 to each segment of the population in turn yields

\[ \pi^c c^*(0.5\pi^c) + (1 - \pi^c) c^*(0.5(1 + \pi^c)) > \pi^c E(c^*|\pi < \pi^c) + (1 - \pi^c) E(c^*|\pi > \pi^c) = E\pi^c. \]

For the latter inequality in the proposition, let \( \pi^a \) denote any threshold, not necessarily the optimally induced one of \( \pi^c \). Note that

\[ (d^2 / d\pi^a)^2 (E\pi^a) = c^* \left( 0.5\pi^a \right) + 0.25\pi^a c^* \left( 0.5\pi^a \right) - c^* \left( 0.5(1 + \pi^a) \right) + 0.25(1 - \pi^a) c^* \left( 0.5(1 + \pi^a) \right) = c^* \left( 0.5\pi^a \right) - c^* \left( 0.5(1 + \pi^a) \right) + 0.25 c^* \left( 0.5(1 + \pi^a) \right) - c^* \left( 0.5(1 + \pi^a) \right). \]

Furthering the derivation in the proof to Proposition 1,

\[ c^* = (d^2 / d\pi) c^* = -2G_c G_{\pi^c} U'' U' / G_c^4 = -2[\pi U'' - e'' |\pi U'' U'/G_c^4 < 0, \]

so in addition to being decreasing, \( c^* \) is concave. Therefore the final term in Equation (7) is positive. Moreover, for any \( \Delta \neq 0, c^*(x + \Delta) + \Delta c^* \left( x + \Delta \right) > 0 \), so the sum of the first three terms in (7) are also positive. Consequently \( E\pi^* \) is convex. Now notice that if \( \pi^a \) equals 0 or 1, then \( E\pi^* = b^* \), because, as noted in the proof of Proposition 1, \( b^* = c^*(E\pi) \) and for the uniform distribution \( E\pi = 0.5 \). Hence, \( E\pi^* < b^* \) for all \( \pi^a \in (0, 1) \).

When super-sizing becomes an option, one observes larger portions being offered and consumed. However, average consumption actually decreases relative to the single portion case. Nevertheless, average consumption remains higher than in the continuous choice setting.

The model demonstrates that far from there necessarily being a conspiracy of big food or something else sinister that leads to larger portions in restaurants when compared to the average home-cooked meal, larger portions may merely be a reflection of standardized portions. Indeed, the often maligned option of super-sizing alleviates this problem that may be associated with discrepancies between home-cooked meals and restaurant meals.
V. CHANGES IN COSTS AND CHANGES IN CONSUMPTION

Another arrow in the quiver of critics of big food is that portion sizes have increased over the past few years. This is indeed the case. Our analysis, however, suggests this may be because the relative cost of food (marginal cost) has dropped dramatically (Finkelstein et al. 2005).

For the case of the expenditure function reflecting unit costs, the following proposition concerning home food preparation is obtained:

**PROPOSITION 3.** If there is a drop in marginal costs but not in fixed costs; for example, food becomes less expensive, and the time costs of preparing meals remain constant or increase, portion sizes at home increase.

*Proof.* A decrease in marginal costs as well as an increase in the fixed costs of preparing food implies that volume discounts become more generous. Then \( e'(c) \) decreases for all \( c \), and the first order condition, Equation (3), is satisfied at a higher level of \( c^* \).

Thus, as time costs of home food preparation increase, for example, due to the increase in women’s participation in the labor force, and as technological advances in agriculture, fisheries, and raising livestock reduce the cost of producing foods, it is natural to see increased portions for meals that are prepared at home. Although no one has (yet) charged home cooks and grocery stores with a conspiracy to increase the size of the meals we consume, this charge is often implicitly leveled at big food. However, because portion sizes of home-cooked meals have risen (Nielsen and Popkin 2003), the idea that larger portion sizes must be something other than a response to a change in the cost of food production could turn out to be a red herring.

Indeed, there is an immediate corollary to Proposition 3 concerning portion sizes at restaurants. Thus,

**COROLLARY 1.** As volume discounts become more generous (marginal costs fall), the socially optimal portion size of restaurant meals increases.

*Proof.* This follows now from Equation (5).

If, as suggested by Cutler et al. (2003), the time cost of home preparation has indeed increased, thereby making market produced meals relatively cheaper, then individuals will choose to eat out more. And when presented with the larger portions, they will eat more—by choice.

**PROPOSITION 4.** The proportion of consumers who “super-size,” \( 1 - \pi^c \), is increasing in the quantity discount.

*Proof.* Note that the smaller the difference in expenditures between the large and small portion, \( e(a_2) - e(a_1) \), ceteris paribus, the bigger the quantity discount. Totally differentiating \( \pi^c \) yields

\[
\frac{d}{da} \left( \frac{e(a_2) - e(a_1)}{TC} \right) = \frac{1}{U(a_2) - U(a_1)} > 0.
\]

Thus, as the expenditure difference falls, \( \pi^c \) falls, and \( 1 - \pi^c \) rises.

When an agent is choosing between the small and the large meal, the cheaper the large relative to the small, the more inclined the agent is to choose the large meal even at low hunger intensity.

If volume discounts in the food industry have become larger in the recent past not as a result of reductions in the fixed costs, the costs of labor and overhead, per serving, but rather as a result of a reduction in the marginal costs of the food inputs (i.e., a relative decrease in food costs; Finkelstein et al. 2005), and if restaurants in general and fast food in particular are subject to competitive pressures so that these reductions in cost are passed along to consumers, then consumers will respond with a greater proportion ordering the larger sized meal. Consequently, \( \pi^c \) falls and more consumers are super-sizing, that is, saying yes to that offer of fries. Indeed, Nielsen and Popkin (2003) find that portion sizes have increased most dramatically at fast food establishments and at home with the smallest increases found at sit-down restaurants. This suggests a final interesting corollary to our analysis: Restaurants who are not subject to immediate competitive pressures and retain some market power need not pass on volume discounts as underlying cost structures change. Thus, it is not surprising that smaller up-market specialty and niche restaurants may have increased the sizes of their serving plates but have decidedly not increased portion sizes.
VI. BEWARE WHAT YOU WISH FOR

Given cost structures that are common in the food industry and assuming that restaurants are restricted to offering only one portion size for meals, we derive the socially optimal portion size for a population that differs in individuals’ degrees of hunger. Without appealing to lower time costs of food preparation in the market as opposed to at home, we demonstrate that socially optimal portions exceed the average home-cooked meals in size. When providing more portion options, supersizing is one of them—and this actually reduces the size discrepancy between average home-cooked meals and restaurant meals.

Moreover, if technological advances in food production allow for lower marginal costs relative to the fixed costs of food preparation (which is what we have experienced over the past few decades), the resulting discounts are passed along to consumers in two ways: bigger portions, and more consumers demanding the biggest portion.

Despite the fact that we characterize expected welfare maximizing portion sizes, rather than those derived at by a profit-maximizing Ronald McDonald, our findings are consistent with recent trends and observations in the food industry. To the degree that prices in a (monopolistically or perfectly) competitive industry reflect underlying costs and our cost assumptions are in line with those observed in the food industry, the findings of the model suggest that recent trends in American restaurants are consistent with welfare-enhancing competitive pressures—despite also being waistline enhancing!

The problem here is thus not necessarily manipulative marketing practices by big food or lack of self control, time, or self-awareness, although these can exacerbate the problem (Mancino and Kinsey, 2004), neither is it that food is not freely disposable. Instead, the problem of increased food consumption may well be that if an individual has not reached satiation, utility is increased by consuming more. And once the sunk costs are sunk, that is exactly what most people do—thus, consuming at levels in excess of the first best that they would obtain at home.

The policy response is not clear. Should firms be restricted from responding to consumer tastes and forced to give them what is “good” for them rather than what they want?

Clearly, if consumer tastes were to shift toward smaller portions and low-energy foods and away from the satisfyingly large portions of calorie-dense foods (Prentice and Jebb 2003), restaurants would respond or would be forced out of business. Perhaps the recent reduction in average body mass index (although not obesity) in the United States (Economist 2003) heralds the onset of such a shift in tastes. On the other hand, recently Ruby Tuesday, a large restaurant chain, had to abandon an attempt to offer smaller, healthier portions because this move had angered customers and led to a 5% drop in sales (Nation’s Restaurant News 2005). Thus, for now, public policy may be hamstrung.

REFERENCES

BBC. “Fat Tax ‘Could Save Lives.’” January 28, 2000, 8:16 GMT.
Lakdawalla, D., and T. Philipson. “The Growth of Obesity and Technological Change: A Theoretical and


