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# Cornhusker Economics

## Market and Welfare Impacts of a “Portion Size Reduction” Policy

The portion size of common food items consumed at home, restaurants and fast-food establishments in the United States (US) has increased since the 1970s, with the portion size of meals and beverages in several restaurants exceeding the US Department of Agriculture (USDA) and Food and Drug Administration recommendations. Portion size has continued to grow in parallel with increasing body weights and food waste. According to USDA, 35% of the US population suffers from obesity while 40 million people are food insecure. At the same time, about 1/3 of the US food supply goes unconsumed, with 2/3 of food waste occurring within the household and the remaining 1/3 occurring in retail stores and food services. The restaurant service sector wastes up to 10% of purchased food before it reaches the final consumer and 21% of the food served in restaurants is not being eaten. Food is the single largest component ending up in landfills accounting for 22% of municipal solid waste, which is an important source of greenhouse gases emissions that cause climate change.

Previous studies have shown that increased portion sizes lead to both increased food intake – which contributes to overweight/obesity – and increased food waste. Additionally, increased portion sizes can distort consumer perceptions about “appropriate” food portions. This ‘portion size effect’ is sustained when people are exposed to larger portions for several days or weeks and has prompted calls for portion size reductions.

Despite its effectiveness in reducing both food intake and food waste, a systematic analysis of the market and welfare impacts of implementing a policy of “Portion Size Reduction” has not been considered in the literature.

A study completed in the Department of Agricultural Economics at UNL and published in *PLoS ONE* addresses this issue and determines the system-wide market and welfare effects of reducing portion sizes in the US food-service industry. In particular, the study examines the impacts of portion size reduction (PSR) on the prices and market shares of food away from home (FAFH) and food at home (FAH), as well as the impact of smaller portions on the welfare of the interest groups involved (i.e., consumers and food suppliers).

To analyze the system-wide economic impacts of PSR, the study develops product differentiation models that explicitly account for differences in consumer preferences for the different dining options and imperfect competition in the food industry. Different scenarios on the nature of differentiation between food at home and food away from home, the information available to consumers and their response to links between portion size and obesity, food waste, and climate change are considered within this framework. The analysis considers the impacts of a reduction in portion size on both the demand and the supply sides of the market; i.e., the impact of PSR on the consumer valuation of FAFH (the products whose portion size is being reduced) (*utility effect*)

and the costs faced by food service suppliers (*cost effect*).

The analysis shows that, while the reduced FAFH consumer valuation and supplier costs cause the prices of FAFH and FAH to always decrease after the introduction of PSR, the impact of the policy on the quantities/market shares of the FAFH and the FAH, consumer welfare and supplier profits is case-specific and dependent on the relative magnitude of the cost and utility effects of PSR, the strength of the consumer preference for dining out, and the food suppliers' initial costs and degree of market power in the FAH and the FAFH markets. The greater (smaller) the cost effect and/or the smaller (greater) the utility effects of PSR, the greater the likelihood that the policy introduction will increase (decrease) the equilibrium quantity/market share of FAFH and will decrease (increase) the equilibrium quantity/market share of FAH.

Accounting for consumer heterogeneity in the study is essential for understanding the asymmetric welfare effects of PSR across consumers. The research indicates that PSR creates winners and losers among customers. Generally, the lower the utility effect and/or the higher the cost effect of PSR, the higher the share of consumers who gain from the policy and the higher the consumer welfare gains. FAFH suppliers are shown to benefit from the policy when the impact of the reduced demand for FAFH is outweighed by the cost reduction faced by these suppliers. The lower (greater) the utility effect and/or the greater (lower) the cost effect, the higher is the gain for FAFH (FAH) suppliers.

The consumer welfare gains from PSR in the absence of information provision are the minimum gains from PSR as the extra benefits of the policy (i.e., benefits for consumers' health and the environment) might not be internalized by consumers. To capture the health and environmental benefits of PSR, the last part of the study assumes that, while facing the reduced portion size of FAFH, consumers are provided with information that links portion size with obesity, food waste, and climate change. In essence, this part of the study assumes that information will make consumers endogenize at least some of PSR's extra benefits, which will increase consumer valuation of reduced portion sizes of food prepared away from home. The analysis shows that the results depend on the consumer responsiveness and reaction to this information.

In particular, if the consumer valuation of FAFH is greater than the consumer valuation in the absence of information but lower than the valuation prior to the policy, the results are qualitatively similar to those in the absence of information, with an increased likelihood for the emergence of a scenario characterized by a relatively weak utility effect/dominant cost effect. On the other hand, if the feeling of supporting a good cause and one's health increases consumer valuation of the resized FAFH relative to the benchmark case, the results change. In this case, the quantity/market share of FAFH always increases, and the quantity/market share of FAH always decreases under PSR. The prices of FAFH and FAH increase when the increase in consumer valuation outweighs the decrease in costs and, in this case, only consumers with relatively strong preference for food prepared away from home realize welfare gains. On the other hand, when the prices decrease, all consumers realize welfare gains. Suppliers of FAFH are shown to always gain in this case, while the impact of the policy on FAH suppliers profits depends mainly on the relative magnitude of the cost and utility effects of PSR.

The results of the study were shown to be robust to the nature of the differentiation between the different dining options, while the market and welfare effects of the policy were quantified using a simulation analysis for all cases considered in the study.

In addition to providing insights on the market and welfare effects of PSR, this study provides policy makers with a systematic analysis that accounts for the key impacts of introducing PSR, such as changes in consumer valuation and costs, the value of information provision, and all possible scenarios and related outcomes that can emerge. With the results being dependent on the consumer reaction to PSR and the cost effects of the policy, the study can also provide a valuable theoretical grounding for empirical studies of certain portion size reductions in different economic environments. Finally, the study can provide the basis for the analysis of the economic causes and market and welfare consequences of portion size reduction when the latter is not mandated by a government policy but is, instead, a strategic choice of firms/food suppliers of food away from home.

## Reference

Hosni H., K. Giannakas. "An Economic Analysis of a 'Reduced Portion Size' Policy." *PLoS ONE* 17, 12(2022): e0279165 (Available at <https://doi.org/10.1371/journal.pone.0279165> ).

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