The Economics Of Obesity
An Application of the Law of Demand to Obesity Prevalence within the United States
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Abstract
We estimate the demand function for obesity using a panel model across fifty-one U.S. states over the years 2000 to 2010. We study the impact of educational attainment, average commute time to work, relative price, per capita income, and the state unemployment rate on obesity levels, controlling for differences in regional culture. We find that since 2001, obesity is a function of the relative prices of healthy and non-health foods across regions, as well as per capita income and educational attainment. From 2005 to 2010, we find that average commute time to work is a significant factor in the state obesity rate as well. Our results indicate that obesity is an inferior good due to its negative relationship with per capita income. In addition, we find obesity to be very inelastic to changes in the relative price of healthy and non-healthy food over both time periods. For every one percentage increase in the relative price of healthy food, the obesity rate increased by only 0.062 percent. Our findings suggest that in order to most effectively reduce the state obesity rate, public policies should focus on increasing educational attainment rather than lowering the relative price of healthy food. We find regional culture to be the largest indicator of state obesity rate. This suggests that, regardless of the price of food, some people will choose to adopt an unhealthy lifestyle as a result of cultural influence.

Empirical Results

<table>
<thead>
<tr>
<th>Variables</th>
<th>Regression 1</th>
<th>Regression 2</th>
<th>Regression 3</th>
<th>Regression 4</th>
<th>Regression 5</th>
<th>Regression 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Educational Attainment</td>
<td>-0.283566</td>
<td>0.284456</td>
<td>-0.283718</td>
<td>-0.366735</td>
<td>-0.32851</td>
<td>-0.293717</td>
</tr>
<tr>
<td>Relative Price</td>
<td>0.027266</td>
<td>0.02766</td>
<td>0.027487</td>
<td>0.027609</td>
<td>0.027658</td>
<td>0.027687</td>
</tr>
<tr>
<td>Per Capita Income</td>
<td>-1.03690</td>
<td>-1.03650</td>
<td>-1.03619</td>
<td>-1.03626</td>
<td>-1.03635</td>
<td>-1.03645</td>
</tr>
<tr>
<td>Average Commute</td>
<td>-0.00318</td>
<td>0.00018</td>
<td>0.00043</td>
<td>0.00060</td>
<td>0.00071</td>
<td>0.00062</td>
</tr>
<tr>
<td>Unemployment Rate</td>
<td>-0.00276</td>
<td>-0.00676</td>
<td>-0.00876</td>
<td>-0.01087</td>
<td>-0.01287</td>
<td>-0.01487</td>
</tr>
<tr>
<td>Adjusted R-Squared</td>
<td>0.93470</td>
<td>0.93423</td>
<td>0.93428</td>
<td>0.93434</td>
<td>0.93432</td>
<td>0.93437</td>
</tr>
</tbody>
</table>

Policy Implications
Our research indicates that because obesity is relatively more elastic to changes in education, a more efficient policy to reduce obesity in these areas would be to educate people on the effects their lifestyle has had on their health and offer healthier alternatives.

Regional Culture
We attribute cross sectional heterogeneity to differences in regional culture. These differences in regional culture can be considered a type of "Paula Dean Effect" which typifies lifestyles in certain regions in the U.S. that are more conducive to obesity.

Empirical Analysis
The data was restricted from 2005 to 2010 to see if data interpolation affected accuracy of the model. The data transformation which occurred in the earlier years did not appropriately capture the affect commute time has on the obesity rate. The coefficient of educational attainment, however, remained significant in both time periods.

Empirically, we find that since 2001, obesity is a function of the relative prices of healthy and non-healthy foods across regions, as well as per capita income and educational attainment. From 2005 to 2010, we find that average commute time to work is a significant factor in the state obesity rate as well. Our results indicate that obesity is an inferior good due to its negative relationship with per capita income. In addition, we find obesity to be very inelastic to changes in the relative price of healthy and non-healthy food over both time periods. For every one percentage increase in the relative price of healthy food, the obesity rate increased by only 0.062 percent. Our findings suggest that in order to most effectively reduce the state obesity rate, public policies should focus on increasing educational attainment rather than lowering the relative price of healthy food. We find regional culture to be the largest indicator of state obesity rate. This suggests that, regardless of the price of food, some people will choose to adopt an unhealthy lifestyle as a result of cultural influence.

Data Transformations
Relative Price: Calculated based on the break down of the Consumer Price Index regarding specific food products, published by the Bureau of Labor Statistics. The relative price of healthy foods was determined by the average price of bananas, tomatoes, lemons fresh chicken and lettuce per lb. The relative price of unhealthy foods was determined by the average price of white bread, ground beef, white potatoes, and bacon per lb. Each food with equal weight.

Average Commute: The U.S. Census Bureau published data in 2000 and from 2005 to 2010. Simple averages were used to interpolate remaining data values.

Educational Attainment: Data was collected from the U.S. Census Bureau in 2000 and from 2006 to 2009. Simple averages were used to interpolate remaining data values.

Theory

General Functional Form
\[ OBR_i = R(F, P, C, EA, UR, AC) \]

- \( OBR_i \): Adult Obesity Rate as a percentage of the \( i^{th} \) state from 2001 to 2010
- \( P \): Relative price of healthy and non-healthy foods measured over the Northwest, Midwest, South and West, of the United States from 2001 to 2010.
- \( C \): Per Capita Income of the \( i^{th} \) state from 2001 to 2010
- \( EA \): Educational Attainment of the \( i^{th} \) state from 2001 to 2010 measured as the percentage of people 25 years and older who have completed a Bachelor’s degree or higher
- \( UR \): Unemployment rate of the \( i^{th} \) state from 2001 to 2010
- \( AC \): Average commute time to work of the \( i^{th} \) state measured in minutes from 2001 to 2010

Econometric Equation and Variables

\[ OBR_i = \beta_0 + \beta_1 R + \beta_2 PC + \beta_3 EA + \beta_4 UR + \beta_5 AC + \epsilon \]

*Bold indicates preferred results. The regressions were run in the order which they are listed in the table. The number listed first for each of the variables are the coefficient values and below those, in parenthesis are the probability values.

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References
