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The Impact of Minimum Wage Rates on Obesity in the United States during the Great Recession

Benjamin C. Mallicoat
University of Tennessee - Knoxville, bmallico@vols.utk.edu

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University of Tennessee

Abstract

Meltzer and Chen (2011) found that changes in the real minimum wage were negatively correlated with BMI levels in the United States from 1984 to 2007. This study extends that analysis by looking at the years 2007 to 2013 to better understand the relationship between real minimum wage and obesity during the Great Recession. The literature on how the business cycle affects health is mixed. While unemployment is detrimental to individual health, at the population level some studies have found mortality to operate in a procyclical fashion; mortality declines during recessions. Studies attempting to explore this phenomenon further often examine how the business cycle affects health habits individually. The literature has found obesity to be both procyclical and counter-cyclical. However, studies that focus on the underlying dynamics of obesity (calorie intake and expenditure) tend to lend credence to the counter-cyclical hypothesis. The Great Recession saw reduced inflation and multiple federal minimum wage increases. Given these recessionary effects, I conceded that the Meltzer and Chen (2011) correlation could potentially be reversed but hypothesized that it would still hold and show a negative correlation between real minimum wage and obesity. The results suggested a positive correlation with a coefficient of .44, refuting my hypothesis. I reason that this could have been caused by recessionary effects and/or a third factor that influences both variables: income inequality.

Introduction

The prevalence of obesity in the United States has ballooned relative to both the country's past and also other member countries of the Organization for Economic Co-operation and Development (OECD). According to the Behavioral Risk Factor Surveillance System Survey (BRFSS), the percentage of obese Americans has almost doubled since 1995 going from 14.9 percent to 29.4 percent (CDC, 2015). Due to the survey methods changing in 2011, these percentages are not directly comparable, but even so the increase is conclusively significant. Of the thirty-four OECD member countries, the United States ranked highest for prevalence of obesity in 2012 with a measured level of 35.3 percent versus the 18.4 percent OECD average ("Obesity Update," 2014). So, while obesity has become a health problem for most of the post-industrial world, the United States is dealing with a particularly acute situation.

Rudimentarily, weight gain is the result of an unbalanced caloric intake/ caloric expenditure ratio. Changes in both of these variables are likely to blame for the obesity epidemic. The United States has seen a more sedentary lifestyle in the second half of the 20th century with the advent of television and prevalence of video games coupled with a decline in jobs requiring robust physical labor (Philipson & Posner, 2003). Even though these lifestyle changes minimize physical activity, caloric intake has risen. Often blamed is the increased access to high calorie fast food, and the relative expense of healthier foods (produce, minimally-processed meals) compared to less-healthy options (fast food, highly-processed prepackaged meals) (Cutler, Glaesner, & Shapiro, 2003). Meltzer and Chen (2011) focus on this availability of fast food in their analysis of the impact minimum wage might have on BMI in the United States. They use a 'real minimum wage' term that takes into account federal and state-level legislation and is determined using consumer price indices (CPIs) to control for inflation. Since this paper extends

their study in order to include the Great Recession, it is important to consider their findings and review their supporting literature.

Literature Review

Meltzer and Chen (2011) find a negative correlation between real minimum wage and BMI during their study period from 1984 to 2006. Their linear regressions suggest that a one-dollar increase in minimum wage is associated with a 0.06 decrease in mean BMI. Using these regressions, they found the average real minimum wage decreased from a maximum of $6.40 in 1984 to a minimum of $5.82 in 2006, explaining only 1 to 2 percent of the total increase in BMI over the period. However, when considering the major decline in real minimum wage from 1970 to 1984 (outside the study period) this formula can explain 10 percent of the total increase. Since minimum wage labor comprises about one third of the cost of fast food, they cite multiple studies to draw a connection from lower wage costs to cheaper fast food to higher prevalence of obesity (Meltzer and Chen, 2011). Aaronson, French, and McDonald (2008) show that minimum wage hikes increase restaurant prices, especially in competitive labor markets. This positive correlation also operates in the opposite direction; lower minimum wages should drive lower restaurant prices in competitive markets. Chou, Grossman, and Safer (2004) found that among their three food price variables (fast food restaurant price, full service restaurant price, and food at home price), BMI responds most acutely to changes in the fast food price variable. These two studies, along with others cited by Meltzer and Chen (2011), serve to link lower minimum wage costs to increases in population BMI/obesity.

Though their study does not establish causation, they provide evidence to suggest that this is a causal pathway. First, there is no reason to believe that the causation would run in the opposite direction; it is unlikely that increasing levels of obesity somehow influence the

federal/state minimum wage legislation and inflation that shape the real minimum wage. It is also possible that there is a third, uncontrolled-for factor that is behind both the fall in real minimum wage and the rise in BMI. Meltzer and Chen (2011) recognize this but state that likely culprits, such as varying state-level income, are controlled for by their fixed effects model. Another possible explanation is that lower wage costs make healthier food less accessible for minimum wage earners and that this effect is the main driver of the higher obesity levels. However, this is unlikely for a few reasons. First, when broken down into income quintiles, the effect of minimum wage is greater among high income persons than it is lower income persons who are likely to be dependent on minimum wage (Meltzer and Chen, 2011). Furthermore, in recent years the upper quintiles have seen higher increases in obesity relative to lower wage earners (Chang and Lauderdale, 2005). Considering that low-income persons consume so little food away from home, this differential would be expected if the price of food away from home is actually driving increases in obesity (Frazao et al., 2007).

Before considering how the Great Recession could possibly influence real minimum wage and obesity, it is important to identify alternatives and objections to the line of reasoning offered by Meltzer and Chen (2011). Cotti and Tefft (2012) designed a study to capture the supply-side effects of increasing minimum wage that Meltzer and Chen (2011) suspected were meaningful for fast food prices. They did indeed find that increasing the minimum wage does increase the price of fast food. However, the results of their study suggest that the increased price of fast food does not automatically translate into reduced BMI or obesity levels. They give a couple of explanations to explain this phenomenon. First, perhaps the fast food prices are already so low that increases would need to be great in order to affect consumption (Tefft, 2012). This explanation fits well with the finding that persons in the upper income quintiles eat more away

from home than lower-income persons (Frazao et al., 2007); higher-income persons would be able to handle higher price increases before adjusting their fast food consumption. Another possible explanation is that the fast food price increases were coupled with consumption substitutions that were no better in nutritional or caloric content (Tefft, 2012). Either way, this study effectively challenges Meltzer and Chen (2011) by potentially breaking their chain of causation between 'increased fast food prices' and 'increased prevalence of BMI/obesity.'

These alternatives to the Meltzer and Chen (2011) narrative must be accompanied by further considerations before moving forward, particularly what effects the Great Recession might have on both obesity and real minimum wage. First, I will address the real minimum wage. Elsby et al. (2013) draw from the United States and United Kingdom to show that real wages have classically been procyclical, rising when economic times are favorable. They also indicate reduced inflation during the Great Recession for both countries. However, during the Great Recession they found mixed results between the United States and the United Kingdom. American real wages were minimally affected by the recession while British real wages were significantly adversely affected (Elsby et al., 2013). So, with real wages minimally affected in the United States there would be no downward pressure to lower/maintain the minimum wage. This is exactly what was observed; in fact, from 2007 to 2010 the federal minimum wage was increased from $5.15 to $7.25 (U.S. Department of Labor). This story does not hold for the United Kingdom where there was downward pressure on all wages. Though their minimum wage is set to increase every year, the increase does not always keep up with inflation. Since 2008, according to Corlett and Whittaker (2014), the United Kingdom consumer price index (CPI)-adjusted minimum wage has been falling. This comparison to the United Kingdom is included

simply to show what the United States minimum wage could have done absent the federal increases that served to offset inflation.

With these considerations in mind, the outlook for real minimum wage during the study period 2007-2013 seems rather positive. Elsby et al. (2013) noted that inflation slowed during the Great Recession, which the study period captured. On top of slowed inflation, there were three federal minimum wage increases that amounted to a 40.7 percent nominal increase between the years 2007-2010 (U.S. Department of Labor). According to the negative correlation Meltzer and Chen (2011) found, this projected improvement in the real minimum wage would be expected to decrease or slow obesity rates.

While the Great Recession effects on real minimum wage seem to stand on rather solid ground, the Great Recession effects on obesity are harder to establish. It will be helpful to start by observing the effects on mortality and narrow to the effects on health behaviors before finally constructing a picture of what effects the recession could have on obesity. Colman and Dave (2013) examine a number of studies on the relationship between the economic cycle and mortality. They conclude that the results are mixed; some find that the relationship is procyclical while others show that it is counter-cyclical. To cite a counter-cyclical example, Gerdtham and Ruhm (2006) use a sample of OECD countries to suggest that a 1 percent decrease in national unemployment is associated with a .4 percent increase in total mortality (with severe economic crises such as the collapse of the Soviet Union being an exception). Ruhm (2000) delves deeper and finds strong evidence that health improves when the economy temporarily declines. Unemployment rates were negatively related to total mortality but also to 8 out of 10 of the specific causes of fatalities (suicides being an important exception). It may seem counterintuitive that recessions and resulting high unemployment could be beneficial to mortality and health

behaviors. However, it is important to note that these are population level effects; it is established that being laid off is detrimental to one's health but the population level indices often suggest positive outcomes (Nandi et al., 2013). Nandi et al. (2013) reasons that it may be less problematic for health to be unemployed when many others are unemployed as well; it is also possible that those who manage to remain employed may have better health during the recession.

A variety of studies have been published since the Great Recession that attempt to reconcile the mixed findings concerning mortality during recessions by investigating individual health habits. Nandi et al. (2013) investigate levels of smoking, alcohol consumption, weight, and physical activity in U.S. metropolitan areas before and after the Great Recession. They found that an increase in the unemployment rate was only slightly correlated with an increase in alcohol-related behaviors but none of the others. Applied to the current study, alcohol consumption could possibly have an effect on levels of obesity, but since weight and physical activity were not found to have any correlation with unemployment, it seems that the effects were not significant.

Other studies have explored how the Great Recession might have affected the underlying factors contributing to obesity - primarily eating habits and exercise. Colman and Dave (2013) conduct an impressively comprehensive study on the impact unemployment may have on an individual's energy expenditure. They cite various studies that have returned mixed results on the effects that unemployment might have on obesity; these studies assume a change in energy intake or expenditure, which Colman and Dave hope to examine more closely with this study. They found that unemployment does in fact result in more recreational energy expenditure (Colman and Dave, 2013). This makes sense as the person would have more free time to possibly devote to exercise/recreation. However, this increase does not make up for the losses in job-

related energy expenditure that ultimately result in a net decrease of total energy expenditure. This close look at energy expenditure lends credence to the studies that find obesity to be counter-cyclical. Breaking their sample up by education, Colman and Dave (2013) found that this decrease in energy expenditure hits low-educated men the strongest. This finding serves to substantiate the importance of their study since employment during the Great Recession has declined mostly within manufacturing, mining, and construction (Colman and Dave, 2013). Examining how recessions and unemployment affect the underlying mechanics of obesity (energy intake vs. expenditure) seems to provide a more compelling picture than studying only obesity/BMI itself.

There has also been work done on how recessions influence eating habits. If they tend to decrease energy expenditure as Colman and Dave 2013 have suggested and also increase caloric intake, then the studies finding obesity to be counter-cyclical are substantially supported. Dave and Kelley (2012) found that higher unemployment is associated with reduced consumption of fruit and vegetables. Their work also suggests the substitution of unhealthy foods but this is statistically weak. A 1 percent increase in the state monthly unemployment rate was found to correspond with a ~1 percent decrease in the frequency of fruit and vegetable consumption. The affect is expected to be this low since the impact was measured over all individuals and not just the unemployed. With the national unemployment rate doubling from 5 percent to 10 percent during the Great Recession these study results suggest a 10-20 percent decrease in fruit and vegetable consumption among the most vulnerable populations (Dave and Kelley, 2012). Like Colman and Dave (2013) found, these most vulnerable populations tend to be the low-educated. This study identified reduced family income and adverse mental health as drivers for the reduced fruit and vegetable consumption associated with unemployment (Dave and Kelley, 2012).

This body of literature draws a picture of what might be expected of obesity during the study period. With the studies about general health behaviors and the underlying dynamics of obesity, it seems that the counter-cyclical narrative of obesity is best supported. It is possible however, that the Great Recession is not even the most influential factor to consider when predicting the rates of obesity during the study period. Ng et al. (2014) have found that overall caloric intake and purchases have declined starting in 2003. They view these trends as dependent on public health efforts and completely independent of the Great Recession. The BRFSS data on obesity obtained for the study will ultimately shed light on what happened between 2007-2013.

With all indications pointing to a rise in the real minimum wage and muddled indications suggesting a possible rise in obesity, it is possible that this analysis will not mirror the correlation found by Meltzer and Chen (2011). Ultimately, the Great Recession and other possible factors (i.e. increased public health efforts) have the potential to change the correlations previously identified by Meltzer and Chen (2011). However, I predict that these factors will not be enough to completely reverse the correlation and that I will find decreases in the real minimum wage to correspond with increases in obesity levels.

Methods

Real minimum wage data were obtained from the Bureau of Labor Statistics; this includes both nominal minimum wages and July series consumer price indices (CPIs). Meltzer and Chen's (2011) study ended in 2006; this study started in 2007 where theirs end. BRFFSS data for obesity were available up until 2013, setting the end boundary of the study period. The real minimum wage was calculated for each state using 2013 dollars by multiplying the nominal wage and the 2013 CPI/current year CPI ratio (i.e. 2007 nominal minimum wage*(2013

CPI/2007 CPI)). In the case that the federal nominal minimum wage exceeded the state nominal minimum wage, the federal standard was used. Most fast food restaurant business counts as interstate commerce, therefore federal laws apply to them. Minnesota, Oklahoma, Montana, and Nevada also had graduated minimum wage laws not superseded by federal law for at least one year during the study period. For these states, businesses under a certain threshold of employees (most often 10 full-time) or a certain gross annual sales (most often $150,000) could pay a lower minimum wage. However, the upper minimum wage bound was used for these states in this study; the majority of fast food establishments would exceed these numbers. Figure 1 shows the average real minimum wage (unweighted for population) across the study period giving a rough picture of rises and falls. Three federal wage increases in the years 2007, 2008, and 2009 take the federal minimum wage from $5.15 to $7.25; this increase can be seen in Figure 1. However, in the absence of federal increases, the average real minimum wage decreases steadily. This is very similar to Meltzer and Chen's (2011) findings from 1984 to 2007; federal increases would spike the real minimum age, which would then steadily drop off.

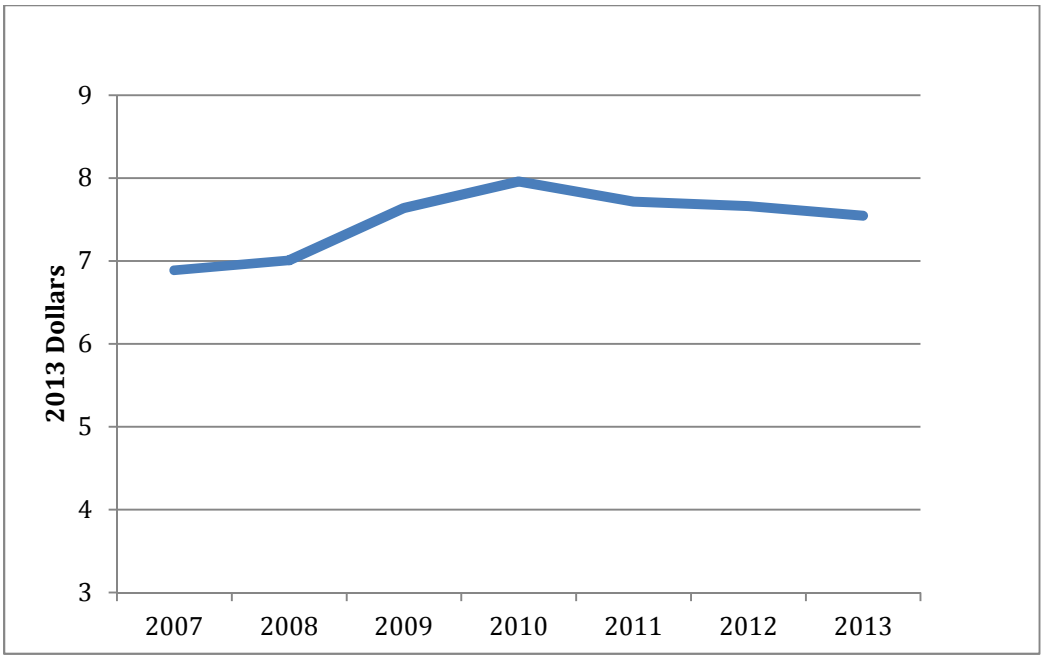

Figure 1. Average of state real minimum wages from 2007 to 2013 in 2013 dollars (U.S. Department of Labor)

Obesity data were obtained from the Behavior Risk Fact Surveillance System (BRFSS) that is conducted by the Centers for Disease Control and Prevention (CDC) annually. These surveys are completed over the phone and represent non-institutionalized American civilian adults ages 18 and up. Data were obtained for each individual state from 2007 to 2013. The BRFSS changed their methods in 2011, which makes comparing data across the threshold difficult. However, since this study uses fixed effects regression, year and state effects are controlled for. Therefore the methodological change was an obstacle that this study took measures to avoid. The BRFSS also provided the control variables for this study including race and ethnicity, age, marital status, education, and income. Figure 2 shows how nationwide obesity rates have changed over the study period. From 2007 to 2012 the rate is comparatively minimal (even falling from 2011 to 2012), while there is a significant spike from 2012 to 2013.

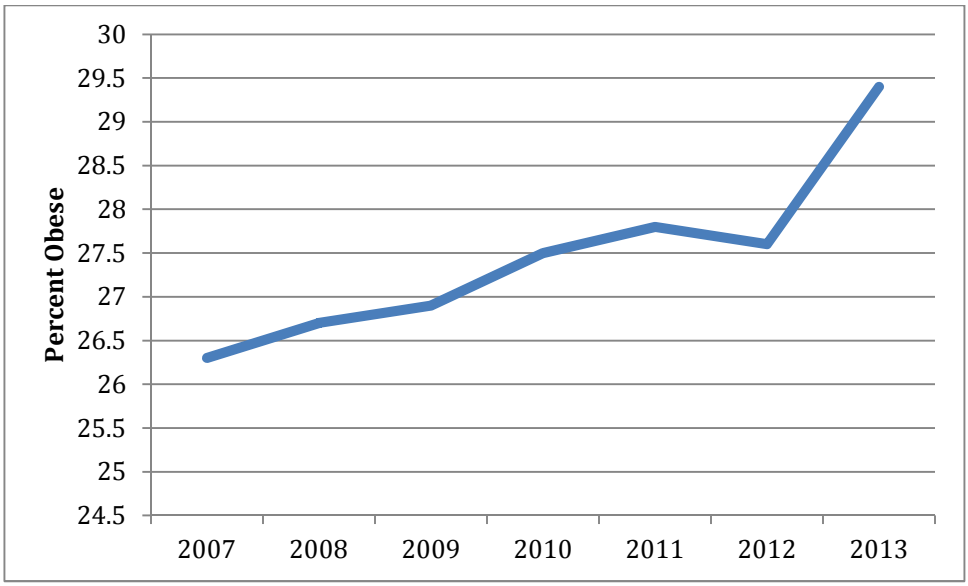

Figure 2. Nationwide (including D.C.) prevalence of obesity from 2007 to 2013 (CDC)

Fixed effects linear regression models were used to study the effect real minimum wage might have on obesity. The regressions controlled for race and ethnicity, age, marital status, education, and income. The fixed effects model controls for year and state effects. These control variables were obtained from the BRFSS. The statistical analysis was performed using Stata software, version 13.

Results

Table 1. Summary statistics of each variable including: observations, mean, standard deviation, minimum, maximum, and range, 2007-2013; n=350 observations (50 states x 7 years)

	Obs.	Mean	Std. Dev.	Min.	Max
Obesity	350	27.10743	3.294869	18.2	35.4
Real min wage	350	7.471734	0.716174	5.726662	9.213399
%White	350	75.31	15.03383	22.7	95.9
%Black	350	8.648	8.8429	0	36
%Multiracial	350	1.909714	3.328468	0	28.1
%Hispanic	350	8.708571	9.129965	0.9	44.3
%Other	350	5.421714	6.222419	0.6	44.5
%years18-25	350	12.23	1.996742	5	17.6
%years25-34	350	17.41514	2.066425	10.6	24.7
%years35-44	350	17.836	2.302227	14.1	29.6
%years45-54	350	18.99229	1.288776	15.4	29.4
%years55-64	350	15.72743	1.264567	11.2	19.5
%years65+	350	17.808	2.057384	10	23.5
%Income$15000	350	10.14914	3.408028	4	20.9
%Income~$24999	350	16.48057	3.492205	7.9	27.4
%Income~$34999	350	11.34543	1.830017	7	19.4
%Income~$49999	350	15.16543	1.771286	10.9	19.9
%Income$50000	350	46.872	7.683426	29.2	67.2
%Less than HS	350	11.114	3.89541	4.1	20.5
%HS or GED	350	29.934	3.79117	21.1	41.3
%Some post-HS	350	29.06	3.646791	21.6	39.2
%College	350	29.87429	6.744789	16.1	50.2
%Married	350	57.87371	5.813116	44.8	68.9
%Partnered	350	3.760857	1.25941	0.9	8.1
%Separated	350	1.895143	0.7580735	0.5	4.1
%Divorced	350	9.725714	1.707768	5.9	14.1
%Never Married	350	20.23857	3.916978	12.6	31.1
%Widowed	350	6.520571	1.014694	3.4	9.4

Table 2. Regression statistics including the variables: race and ethnicity, age, income, education, and marital status

Obesity	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]	
Real min wage	0.4449434	0.1361208	3.27	0.001	0.1769635	0.7129233
White	-0.3550751	0.560098	-0.63	0.527	-1.457735	0.7475852
Hispanic	-0.4579811	0.5605731	-0.82	0.415	-1.561577	0.6456144
Black	-0.180907	0.5529989	-0.33	0.744	-1.269591	0.9077774
Multiracial	-0.4325123	0.5720026	-0.76	0.45	-1.558609	0.6935845
Other	-0.5850808	0.5625561	-1.04	0.299	-1.69258	0.5224186
years18-25	-0.2310223	0.788862	-0.29	0.77	-1.784048	1.322004
years25-34	-0.2152696	0.7927146	-0.27	0.786	-1.77588	1.345341
years35-44	-0.2813486	0.790423	-0.36	0.722	-1.837448	1.27475
years45-54	-0.2548178	0.7951939	-0.32	0.749	-1.820309	1.310674
years5564	0.7636195	0.8016469	0.95	0.342	-0.8145761	2.341815
years65+	-0.3900647	0.8218384	-0.47	0.635	-2.008011	1.227882
Income$15000	-0.2322988	0.8661565	-0.27	0.789	-1.937494	1.472896
income1~$24999	-0.2614642	0.8646324	-0.3	0.763	-1.963659	1.44073
income2~$34999	-0.2583483	0.8636085	-0.3	0.765	-1.958527	1.44183
income3~$49999	-0.4789937	0.8689976	-0.55	0.582	-2.189782	1.231795
Income$50000	-0.2639973	0.8635091	-0.31	0.76	-1.96398	1.435986
Less than HS	-0.116159	0.1474218	-0.79	0.431	-0.4063871	0.1740692
Hs or GED	-0.1133421	0.1383174	-0.82	0.413	-0.3856464	0.1589622
Some post-HS	-0.1739538	0.1453411	-1.2	0.232	-0.4600855	0.112178
College	-0.0989624	0.1264815	-0.78	0.435	-0.3479654	0.1500406
Partnered	-1.080426	0.8380084	-1.29	0.198	-2.730206	0.5693543
Married	-1.304765	0.8382493	-1.56	0.121	-2.955019	0.3454893
Divorced	-1.191643	0.8384613	-1.42	0.156	-2.842315	0.4590287
Widowed	-1.713403	0.8417228	-2.04	0.043	-3.370496	-0.0563109
Separated	-0.5699372	0.8532206	-0.67	0.505	-2.249665	1.109791
Never married	-1.33109	0.8365408	-1.59	0.113	-2.977981	0.3158007
_cons	243.7308	158.892	1.53	0.126	-69.07843	556.5401

The summary statistics for each variable are presented in Table 1. The regression statistics are presented in Table 2 above. Over the study period 2007-2013, the average real minimum wage went from $6.89 in 2007 to $7.54 in 2013 with a peak of $7.96 in 2010 (see Figure 1). The nationwide obesity prevalence went from 26.3 in 2007 to 29.4 in 2013. Obesity rose steadily between the years 2007 to 2010 before dipping in 2011 and then rising sharply in 2013 (see Figure 2). The regression showed a strong positive correlation between real minimum wage and obesity. These results suggest that every one-dollar increase in real minimum wage is associated with a 0.44 unit increase in obesity.

Discussion

The observed association runs counter to my hypothesis and that found by Meltzer and Chen (2011); an increase in the real minimum wage was correlated with an increase in obesity. There are many possible reasons for the discrepancies in my findings, ranging from methodological difference to effects from the Great Recession. It is also possible that there is in fact a third factor contributing to both real minimum wage and obesity that Meltzer and Chen (2011) do not identify. Given the causal pathways provided, the Meltzer and Chen (2011) conclusion seems the more likely, and I will discuss the results of the current study with this in mind.

There were a few methodological differences between this study and the one conducted by Meltzer and Chen (2011). Firstly, this analysis looked at obesity levels alone without including other BMI classifications while Meltzer and Chen (2011) considered all increases in BMI across every classification. The OECD Obesity Report (2014) found that incidence rates of overweight and obesity are stabilizing in the United States. It is possible that this study failed to

capture the entire picture of increasing BMI by focusing on obesity levels whose growth rates are no longer increasing at the rate they once were. Another methodological difference that could have led to our contrasting conclusions is the timeframe length employed by both studies. This study used seven years compared to the twenty-three years used by Meltzer and Chen (2011). This longer span allowed them to capture a more complete picture of the business cycle with multiple recessions and recoveries. The 2007-2013 span used by this study was very focused on the Great Recession and also included three consecutive federal minimum wage increases. This created an unusually positive climate for the real minimum wage. Meltzer and Chen (2011) also excluded persons over the age of sixty on the grounds that their income is likely to be a misleading measure of their total financial resources. This study controlled for age but did not completely exclude persons over the age of sixty. These methodological differences could have impacted the current study, but I believe the effects from the Great Recession are more causally important.

The Great Recession simultaneously had positive effects on real minimum wage (with slowed inflation) and possible negative effects on obesity (with causal support for the counter-cyclical narrative) (Elsby et al., 2013; Colman and Dave, 2013; Dave and Kelley, 2012). This pushed both real minimum wage and obesity levels towards the middle, effectively mitigating the predictions made by Meltzer and Chen (2011). The unusually positive climate for the real minimum wage was not accompanied by a corresponding decrease in obesity but instead a steady increase. It is possible that the correlation involves some type of lag structure; however I do not believe we will ever see the predicted decrease in obesity levels as there was a sharp national increase in obesity from 2012 to 2013 (see Figure 2). The real minimum wage quickly dipped

back down after the federal increases (Figure 1), and I believe there is possibly another factor at play.

A possible alternative explanation for these findings is that there is in fact a third factor at play influencing both obesity and real minimum wage. It could be possible that rising levels of income inequality have contributed to both sluggish increases in real minimum wage and increases in obesity. This would make sense in the context of this study since the United States has some of the highest levels of inequality in the OECD (OECD, 2015). The recovery from the Great Recession has not been distributed equally, causing the United States to register a higher Gini coefficient than before the recession (see Figure 3) (OECD, 2015). A number of ecologic studies compiled by Wilkinson and Pickett (2009) make this third factor a salient explanation.

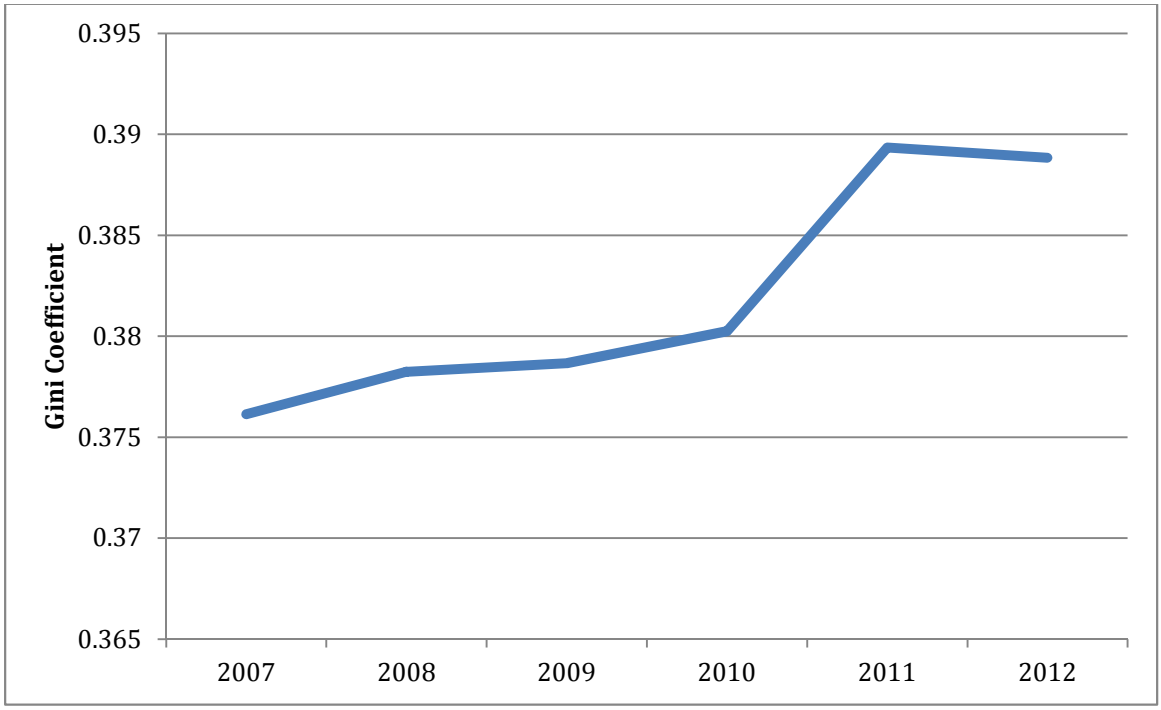

Figure 3. Income inequality in the United States as measure by the Gini coefficient from 2007 to 2012 (OECD)

A positive correlation between income inequality and obesity was confirmed by Wilkinson and Pickett (2009) in multiple test populations. First, this positive correlation is seen using a sample of OECD countries and the adults living there. The United States (highest level of income inequality) has a prevalence of obesity just over 30 percent while only 2.4 percent of the Japanese adult population (lowest level of income inequality) is obese. Using the 2007 UNICEF report on child wellbeing, Wilkinson and Pickett (2009) also find this same positive correlation among the children of these sample countries. Especially salient to the current study were the positive correlations found using U.S. state-level data. Both obesity and overweight levels were found to have a positive correlation with income inequality. Wilkinson and Pickett (2009) offer a couple of different causal explanations for these findings. They cite stress levels saying that high inequality populations experience more stress (especially lower-income persons) and eat more in order to distract themselves from this stress. They also cite "eating (or not eating) for status"; in the United States and United Kingdom being thin is associated with wealth and social position, so perhaps in more unequal societies (where status is more socially pronounced and important) there are more incentives for the wealthy and middle classes to differentiate themselves from lower-income persons (Wilkinson and Pickett 2009). The hypothesis of a correlation between income inequality and obesity levels is bolstered most recently by the sharp increases in both with the Great Recession recovery (see Figure 2 and Figure 3).

The impact income inequality might have on real minimum wage is slightly murkier than the positive correlation seen with obesity. If there is a correlation, I predict that it is a negative one. Runaway pay rates for top executives are commonly blamed for increasing income inequality. This arguably unfair pay rate is a reflection of the imbalance of power between those at the top and the laborers (possibly making minimum wage). In order to correct this imbalance,

Wilkinson and Pickett (2009) suggest that corporate tax loopholes be plugged, top tax rates be increased, and that legislation be passed to limit maximum pay in a company. Joseph Stiglitz (2012) calls for increased support of workers' collective action. It is plausible to believe that these solutions could result in a shift in power more conducive to legislation that would increase the minimum wage; the runaway pay rates associated with high income inequality could be contributing to a political power differential that is unfriendly to minimum wage increases. This inference is based on the close relationship between financial power and political power.

Financial power translates to political power comparatively readily in the United States. Moosbrugger (2012) identifies our single-member district electoral system as particularly vulnerable to interest group and corporate influence compared to the proportional representations systems common in Europe. The situation is not likely to reverse in the near future; in 2010, the *Citizens United v. Federal Election Commission* court case deemed that regulating interest group and corporate political spending was a violation of first amendment rights (Citizens United v. Federal Election Commission, 2010). A picture can be painted of the wealthy, powerful elites fighting politically to keep themselves as wealthy and powerful as possible. This would mean maintaining the status quo; minimum wage increases have the potential to upset the status quo maintained by a polarized income distribution. So, there could be a circular causation at play where high income inequality leads to a concentration of power that in turn maintains high income inequality.

Methodological differences and recessionary effects might explain why this study's results were contradictory to the Meltzer and Chen (2011) conclusion. A possible third factor, income inequality, could be influencing both independently. This could explain the perceived shift in the relationship between real minimum wage and obesity/BMI levels; these two variables

could be driven more by income inequality than by any direct relationship. It is important to keep this in mind when considering policy applications. If the United States wanted to effectively address the obesity epidemic it might be more beneficial to focus on income inequality as a whole rather than simply the real minimum wage (which might be a part of an inequality-reducing initiative).

Future research to test the hypothesis that income inequality impacts real minimum wage would be needed before moving forward with such a policy direction. A wider ranging study starting in 1984 and continuing through the Great Recession could possibly shed light on the contradictory results of this study versus Meltzer and Chen (2011). It is possible that the added Great Recession years would reverse the direction of the Meltzer and Chen (2011) correlation, but it could also be the case that these years would simply be absorbed by the wider data range and fit into the broader picture the authors paint: that increases in the real minimum wage lower population BMI levels. For this extended study, it would also seem appropriate to use all categories of BMI, instead of only obesity, to capture the whole story of population weight gain. Such a study would provide a clearer picture of the contemporary relationship between real minimum wage and obesity/BMI.

Limitations

Limitations of the current study are centered on the data sets used. The obesity and control variable data were obtained from BRFSS surveys that spanned two method eras. Starting in 2011, the BRFSS phone surveys began to include cell phones. It is possible that the inclusion of cell phone users could capture a certain population that was absent before. Another BRFSS limitation is that children are not included in the surveys. It is possible that real minimum wage has significant trickle down effects on the BMI levels of entire families. Cheaper fast food prices

might mean that adults choose this option to feed their families more often. It is also possible (though less likely) that families subsisting on minimum wage incomes find fast food a cheaper alternative to more expensive and healthier produce, etc. when their real income falls. This study also included persons over sixty years of age. As previously mentioned, the income of this age group in not likely to reflect their total financial resources, potentially skewing the dynamics this study attempted to measure. Barring the inclusion of persons 60+, these limitations are hard to overcome when using BRFSS data and would require outside supplemental data.

Works Cited

Aaronson, D., E. F., and J. MacDonald. (2008). The miniumum wage, restaurant prices, and labor market structure. *Journal of Human Resources, 43*(3), 688-720.

Centers for Disease Control and Prevention (CDC). (2007-2013). *Behavioral Risk Factor Surveillance Data.* Atlanta, GA: U.S. Department of Health and Human Services, CDC.

Chang, V. W., & V. S. Lauderdale. (2005). Income dispartities in body mass index and obesity in the United States. *Archives of Internal Medicine, 165*(18), 2122-2128.

Chou, S. Y., M. Grossman, & H. Saffer. (2004). An economic analysis of adult obesity: Results from the behavioral risk factor surveillance system. *Journal of Health Economics, 23*, 565-587.

Citizens United v. Federal Election Commission. 558 U.S. 310. Supreme Court of the United States. 2010. Oyez. Web.

Coleman, G., & D. Dave. (2013). Exercise, physical activity, and exertion over the business cycle. *Social Sciences & Medicine, 93*, 11-20.

Cotti, C., & N. Tefft. (2012). Fast food prices, obesity, and the minimum wage. *Economics and Human Biology, 11*, 134-147.

Corlett, A., & M. Whittaker. (2014). Turning Point? The minimum wage in 2014 and beyond. *Resolution Foundation*.

Dave, D., & I. R. Kelley. (2012). How does the business cycle affect eating habits? *Social Sciences & Medicine, 74*(2), 254-262.

Elsby, M. S., D. Shin, & G. Solon. (2013). *Wage Adjustment in the Great Recession*. NBER Working Paper No. 19478. National Bureau of Economic Research.

Gerdham, U. G., & C. J. Ruhm. (2006). Deaths rise in good economic times: evidence from the OECD. *Economics and Human Biology, 4*, 298-316.

Meltzer, D., Chen, Z. (2011). The Impact of Minimum Wage Rates on Body Weight in the United States. Grossman, M., & N. H. Mocan (Ed.), *Economic Aspects of Obesity*. Chicago: University of Chicago Press.

Moosbrugger, L. K. *The Vulnerability Thesis: Interest Group Influence and Institutional Design.* New Haven: Yale University Press, 2012. Print.

Nandi, A., T. J. C., Erin C. Strumpf, Jody Heymann, and Sam Harper. (2013). Economic conditions and health behaviors during the Great Recession. *Journal of Epidemiology & Community Health, 67*, 1038-1046.

Obesity Update. (2014). *Organization for Economic Co-operation and Development (OECD).*

Organization for Economic Co-operation and Development (OECD). (2015). *Income distribution and poverty* (Data file). Retrieved from stats.oecd.org

Philipson, T. J., & R. A. Posner. (2003). The long-run growth in obesity as a function of technological change. *Perspectives in Biology and Medicine*, *46*, (3 Suppl): S87-107.

Ruhm, C. J. (2000). Are recessions good for your health? *The Quarterly Journal of Economics, 115*(2), 617-650.

Stiglitz, J. *The Price of Inequality.* New York: W. W. Norton & Company. 2012. Print.

U.S. Department of Labor, Office of State Standards Program. (2014). *Changes in basic minimum wage in non-farm employment under state law: selected years 1968 to 2013,* Wage and Hour Division. Washington, DC.

Wilkinson, Richard and Pickett, Kate. *The Spirit Level.* New York: Bloomsbury Press. 2009. Print.