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ABSTRACT

'Rational Overeating' in a Feast-Or-Famine World: Economic Insecurity and the Obesity Epidemic*

Obesity rates have risen dramatically in the US since the 1980s, but well-identified studies have struggled to explain the magnitude of the observed changes. In this paper, we estimate the causal impact of economic insecurity on obesity rates. Specifically, we construct a synthetic panel of demographic groups over the period 1988 to 2012 by combining the newly developed Economic Security Index (ESI) with data from the National Health and Nutrition Examination Surveys (NHANES). According to our estimates, increased economic insecurity over this time period explains 50% of the overall population-level increase in obesity.

JEL Classification: D10, I12, I18, J60

Keywords: obesity, economic insecurity, economic security index

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1 Introduction

Obesity rates have risen dramatically in the US since the 1980s (Wang and Beydoun, 2007; OECD, 2014). The majority of research in this area has focused on changes in dietary quality or the implicit price of a calorie as explanations for this unprecedented increase (Cutler et al., 2003; Chou et al., 2004; Finkelstein et al., 2005; Sassi, 2010). However, these studies typically find that these factors explain at most a small proportion of the observed increase in obesity rates (Taubes, 1998; Atkinson, 2008; Cawley, 2015). In this paper, we examine an alternative economic explanation for the global obesity epidemic. Specifically, we examine whether increased *economic insecurity* (defined, roughly speaking, as the extent to which an individual's financial well-being is at risk) can be causally linked to the contemporaneous increase in obesity.

A number of recent studies, inspired by theory and evidence from behavioral ecology, posit that economic insecurity may trigger a physiological fattening response, in which at-risk individuals gain weight in a biological attempt to "prepare for the famine" (Smith, 2009; Smith et al., 2009; Offer et al., 2010; Wisman and Capehart, 2010; Smith, 2012b; Watson et al., 2016; Staudigel, 2016; Watson, 2017). Using large representative surveys for the US from 1988 to 2012, we create a synthetic panel of measures of both economic insecurity and obesity rates by age/race/ethnicity/gender (henceforth referred to as "demographic group") and year, and use fixed effects panel data methods to examine the causal relationship between differential changes in economic insecurity and obesity. The main advantage of examining the relationship between economic insecurity and obesity at the demographic group level is that there are few time-varying unobserved factors that potentially influence both, in particular because an individual's demographic group is exogenous to his/her personal choices relating to diet, exercise, career, etc. Using a synthetic panel approach, we are able to control for both group and time level factors that are potentially related to both economic insecurity and obesity.

A disadvantage of this approach is that it is difficult to measure economic insecurity at the group level using conventional cross-sectional data, as the aim is to capture the "uncertainty of future income," which is a probability distribution. We solve this problem by making use of the newly developed *Economic Security Index* (ESI) (Hacker et al., 2014). The ESI is calculated using the annual matched longitudinal panel embedded in the Current Population Survey (CPS) to estimate the probability of a 25% year-to-year household income decline for different groups in the US population. Currently, annual ESI estimates are available back to 1986, covering much of the period over which the obesity epidemic has occurred. While the ESI is available at a more disaggregated level than we exploit in our paper, we worry that characteristics such as household income, family structure and geographical location are potentially endogenously determined with obesity rates and economic insecurity. For this reason, we focus solely on variation across demographic groups over time.

Along with this measure of economic insecurity, we use repeated cross-sections from the National Health and Nutrition Examination Surveys (NHANES) to measure obesity rates over time for different demographic groups, as well as other time-varying factors such as income level and employment status that could plausibly be related to both economic insecurity and obesity. We then estimate a variety of panel data models using this synthetic panel of demographic groups. In most specifications, we control for both group and time fixed effects, hence our estimates focus on the relationship between changes in economic insecurity and changes in obesity rates within groups over time. We find robust evidence of a causal link between economic insecurity and obesity. Adding controls for other potentially important confounding factors, such as individual and group income and unemployment has little effect on our estimates. Overall, we find that increased economic insecurity explains 50% of the overall population-level increase in obesity observed in this period.

This paper makes a major contribution to our understanding of why obesity rates have increased dramatically in the US and why this has been particularly true for certain demographic groups. We are the first paper to our knowledge to create a synthetic panel at the demographic group level, which we believe has major advantages over looking at this relationship at the country (Offer et al., 2010; Smith, 2012a; de Vogli et al., 2013) or individual level (Smith et al., 2009; Barnes et al., 2013). In particular, one has to be concerned that at the country level that there could be unobserved factors that lead countries to have both more economic insecurity and higher obesity rates (for example: attitudes toward public provision of health care or other social services), while at the individual level, there are potentially many events that might lead to both changes in economic insecurity and obesity (for example, a change in occupation), making it difficult to control for confounding factors. Nonetheless, our findings are consistent with previous evidence using cross-country data, which has found that countries that have liberalized their economies the most have had the largest increase in obesity rates (de Vogli et al., 2013). The evidence taken together suggests that increased obesity and the various health problems that accompany it could be considered unanticipated costs of economic liberalization, and perhaps of economic crisis in general, such as those recently experienced in Greece, Spain and Portugal (OECD, 2014).

2 Theoretical Motivation

It is easy to see that neoclassical price theory can be applied to consumer decisions relating to obesity: income effects, the implicit price of a calorie (variously defined), and the opportunity cost of time (spent, for example, in physical exercise or the preparation of healthy meals) are among the first to come to mind. In biological perspective, however, body fat serves a vital function in the natural history of most animal species: as a hedge against the risk of starvation. The economic insecurity hypothesis we aim to test is grounded in the assumption that the psychology and physiology surrounding human energy homeostasis (i.e., the visceral and perhaps partly subconscious feelings and urges that govern our behaviour relating to energy intake and expenditure) retain some vestige of an evolutionary history in which an intermittent food supply posed an important adaptive problem. In particular, we hypothesize that real and measurable (as opposed to perceived or self-reported) threats to material well-being might influence body weight even in modern societies in which the threat of actual starvation is negligible.

The relationships between income, income shocks, and body fat can be elucidated in a simple optimal fattening framework. Consider the following two-period, two-state model: Suppose that a consumer lives for two periods, receives either high ($\breve{w}$) or low ($\widehat{w}$) income in each period, and chooses first-period consumption (c_1) and body fat (f_1) such that the sum of expected lifetime utilities is maximized. The consumer's first-period decision can be stated as:

$$\max_{c_1, f_1} u(c_1) + E(u(\widetilde{w}_2 + \delta f_1)) \tag{1}$$

subject to

$$c_1 + f_1 \geq w_1$$

where w_1 is the realized income level in period 1, $\widetilde{w}_2$ is a random variable representing income in period 2, and $\delta \in (0,1)$ is the factor by which metabolic energy depreciates when stored as body fat. If we assume further that the probability π_t of receiving the low-income payoff $\widehat{w}$ in period t is fixed but unknown, then the realized value of w_1 will have two distinct effects: it determines i) the size of the period 1 income constraint, and ii) it influences the consumer's subjective beliefs about the probability of receiving the low-income payoff in period 2. Moreover, if $u(\cdot)$ is increasing, continuously differentiable, and strictly concave, it is easy to show that these two "income effects" on optimal body fat (f_1) work in opposite directions. Consider, for instance, the special case in which the probability of receiving $\widehat{w}$ is either π_{secure} or π_{insecure} (where $\pi_{\text{secure}} < \pi_{\text{insecure}}$). Then the first-order conditions for (1) become:

$$u'(c_1) = P(w_2 = \widehat{w}|w_1)\delta u'(\widehat{w} + \delta f_1) + (1 - P(w_2 = \widehat{w}|w_1))\delta u'(\breve{w} + \delta f_1) \tag{2}$$

and

$$c_1 + f_1 = w_1 \tag{3}$$

where

$$P(w_2 = \widehat{w}|w_1 = \breve{w}) < P(w_2 = \widehat{w}|w_1 = \widehat{w}) \tag{4}$$

by Bayes's Rule.[1] Because comparative statics on (2) and (3) imply both that $\frac{\partial f_1}{\partial P(w_2 = \widehat{w}|w_1)} > 0$ and that $\frac{\partial f_1}{\partial w_1} > 0$, (4) implies that the unambiguously positive effect of current income (w_1) on body fat (f_1) is offset by an unambiguously negative "income security" effect.[2] In other words, a negative income shock today will make the consumer thinner (because less money is available for precautionary fattening) but it also makes him fatter (because it gives him reason to believe that low income is more likely tomorrow). At this level of abstraction, we cannot draw *a priori* conclusions about the relative magnitudes of these two effects with confidence, but the theory tells us that they will depend on the distribution of income payoffs and the degree of concavity in the utility function.

This view of modern obesity is also consistent with the ubiquitous "self-control" problems associated with weight control: given a longer time horizon, the process of Bayesian updating can endogenously generate the declining rate of time preference known as "hyperbolic discounting" (Sozou, 1998). But it is to our broader conclusion–that risk of income loss may cause weight gain–that we turn our attention below.

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[1] In particular, for arbitrary prior beliefs $P(\pi_1 = \pi_{\text{insecure}}) = 1 - P(\pi_1 = \pi_{\text{secure}}) = p$, $p \in (0,1)$, $P(w_2 = \widehat{w}|w_1 = \breve{w}) = 1 - \frac{p(1-\pi_{\text{insecure}})^2 + (1-p)(1-\pi_{\text{secure}})^2}{p(1-\pi_{\text{insecure}}) + (1-p)(1-\pi_{\text{secure}})}$ and $P(w_2 = \widehat{w}|w_1 = \widehat{w}) = \frac{p\pi_{\text{insecure}}^2 + (1-p)\pi_{\text{secure}}^2}{p\pi_{\text{insecure}} + (1-p)\pi_{\text{secure}}}$. Expression (4) follows directly.

[2] The expressions for $\frac{\partial f_1}{\partial P(w_2 = \widehat{w}|w_1)}$ and $\frac{\partial f_1}{\partial w_1}$ implied by the first-order conditions are: $\frac{\partial f_1}{\partial P(w_2 = \widehat{w}|w_1)} = \frac{\delta(u'(\breve{w} + \delta f_1) - u'(\widehat{w} + \delta f_1))}{u''(c_1) + \delta^2 P(w_2 = \widehat{w}|w_1) u''(\widehat{w} + \delta f_1) + \delta^2(1 - P(w_2 = \widehat{w}|w_1)) u''(\breve{w} + \delta f_1)}$ and $\frac{\partial f_1}{\partial w_1} = \frac{u''(c_1)}{u''(c_1) + \delta^2 P(w_2 = \widehat{w}|w_1) u''(\widehat{w} + \delta f_1) + \delta^2(1 - P(w_2 = \widehat{w}|w_1)) u''(\breve{w} + \delta f_1)}$. Both are positive by monotonicity/concavity of $u(\cdot)$. The latter expression is, of course, not precisely the "opportunity cost of time" effect discussed in the literature; this would be more akin to examining the effects of the changes in the parameter δ (which can be interpreted as the "price" of body fat). Under the conditions we specify, however, the sign of $\frac{\partial f_1}{\partial \delta}$ is ambiguous, with an unambiguously positive substitution effect and an offsetting (unambiguously negative) income effect. Assuming the substitution effect dominates, the time-cost prediction that body fat will increase when the "price" of being thin (i.e., the value of δ) rises is borne out.

3 Data

We utilize data from two sources: the Current Population Survey (CPS) and the National Health and Nutrition Examination Survey (NHANES).

3.1 CPS and the ESI

As our primary measure of economic insecurity, we use the Economic Security Index (ESI) developed by Yale University's *Institution for Social and Policy Studies* and described in Hacker et al. (2014). The ESI is derived from the US Current Population Survey (CPS), in which households can be linked year-to-year based on their residential address and the characteristics of individuals in the household. While the CPS is not designed to be a longitudinal dataset, a number of papers have taken advantage of this embedded feature of the data to link households across years (Moscarini and Thomsson, 2007; Baicker and Levy, 2008; Elsby et al., 2016). The ESI is defined as the proportion of individuals in a given demographic group who experience a year-to-year decline of at least 25% of available household income (adjusted for household size, out-of-pocket medical expenses, household debt service, and the buffering effect of wealth, but excluding retirement events) (Hacker et al., 2014).

It is important to emphasize that we view ESI as a measure of the extent to which people experience uncertainty, rather than resource deprivation. The obvious alternative measure–the group-level unemployment rate–has the advantage of being widely available, but suffers from the disadvantage of failing to measure threats to household income other than job loss. Moreover, since the most commonly used unemployment statistics exclude discouraged workers, they are likely to understate the household-level insecurity induced by prolonged downturns in the economy. Nevertheless, we provide robustness tests that make use of group-level unemployment rates in Section 4, below.

The ESI is available annually starting in 1986, but we use a 5-year moving average in our analysis, for three reasons: First, because realized income shocks are noisy (but serially correlated) indicators of insecurity, a rational assessment of risk should be based not just on current-year experience, but also on experienced insecurity in recent years (Smith et al., 2009). Second, the highest-quality obesity data for the US are available only as pooled bi- and tri-annual samples, making annual analysis infeasible. Third, given that we examine variation in ESI across 72 demographic groups (described below), annual CPS cell size becomes quite small in some cases, diminishing the precision of the ESI estimates. Using a 5-year moving average ameliorates all of these concerns. In some regressions we also include demographic-group-level estimates of the unemployment rate and mean income levels; for purposes of comparability we also construct these from the CPS as 5-year moving averages.

3.2 NHANES

The National Health and Nutrition Examination Survey (NHANES) is an ongoing survey that provides individual-level measured height and weight (along with other demographic and health information) for nationally representative repeated cross-sections of the US civilian population. Our data begin with the six-year NHANES III survey (1988–1994), which can be subdivided into two nationally representative 3-year samples (1988–1991 and 1992–1994), and continue with the "continuous NHANES," published as nationally representative 2-year samples from 1999 to 2012. This gives us a total of nine time periods spanning a period of 24 years in which obesity rates rapidly increased in the US.

We define obesity as having body mass index (BMI; defined as weight in kilograms divided by the square of height in meters) of 30 or greater. This is the most widely used definition in the medical literature, although some have argued for differential measures for gender and ethnic groups (Camhi et al., 2011). In our robustness analysis, we also examine the impact of ESI directly on BMI, on other BMI thresholds, on waist-to-height ratio, and on self-reported 10-year weight gain.

3.3 Descriptive Analysis

All of our analysis focuses on variation in ESI across 72 demographic groups defined by twelve 5-year-age-group cells (starting with 20-24; the last group is 75 and older) and three race/ethnicity groups (White Non-Hispanic, Black Non-Hispanic, Hispanic), with all analyses fully stratified by gender. Figure 1 shows trends in obesity rates for each demographic group. While obesity has increased significantly over time for all demographic groups, one can see large variation both across groups and over time in the pattern of this change, with declines in obesity rates even seen for some demographic groups in some time periods. Figure 2 shows the trends in ESI. While there is a less pronounced upward trend for ESI, the general pattern across groups and over time is similar to the pattern for obesity rates.

Figure 3 shows the relationship between obesity rates and the ESI for each demographic group by time period. The picture here is striking: a strong positive correlation can be seen between obesity and ESI both across demographic groups and within demographic groups over time. This simple visual analysis would seem to support the hypothesis that increasing economic insecurity has caused increased obesity, however, one might be concerned that there are other factors that have influenced both economic insecurity and obesity either across demographic groups or over time. For this reason, we next turn to a regression analysis that will allow us to focus on within-group variation over time (while controlling for population-level changes over time) in order to identify the causal relationship between ESI and obesity.

4 Regression Results

The main concern when examining the causal link between economic insecurity and obesity is that there might be unobserved factors that influence both outcomes at an individual level. For example, people who are less forward-looking might end up in less secure jobs and also have unhealthy diets. Aggregating the analysis to the level of the demographic group alleviates these concerns to a certain extent but one might still be worried that unobservable characteristics like forward looking behaviour might vary across demographic groups. For this reason, our main regression estimates focus on within-group variation over time. Specifically, we estimate regressions that include demographic-group fixed effects and hence ask the question whether *changes* over time in ESI are related to *changes* over time in obesity rates *within* demographic groups. As long as there are not time-varying group-level unobservables that impact both economic insecurity and obesity rates (and changes in obesity rates do not cause changes in economic insecurity), then this approach will reveal the causal impact of economic insecurity (as proxied by the ESI) on obesity.

We implement this approach by estimating the following regression model:

$$BMI_{ijt} = \alpha_j + ESI_{jt}\beta + X_{ijt}\gamma + \sigma_{ijt} \tag{5}$$

where BMI_{ijt} is the obesity status (body mass index ≥ 30) for individual i from demographic group j at time t, ESI_{jt} is the value of the economic security index experienced at time t by individuals in demographic group j, X_{ijt} is a vector of both individual and group-level characteristics for individual i from demographic group j at time t that could related to both ESI and obesity, and σ_{ijt} is a normal disturbance term that allows for correlated outcomes within demographic group j by year t cells.[3] Importantly, this regression model also includes α_j, a demographic group-specific fixed effect, which controls for any non-time-varying differences in obesity rates across demographic groups that are potentially correlated with ESI.

The economic insecurity hypothesis predicts $\beta > 0$. Because we use a linear probability model in most specifications, our estimates of β can be interpreted as the marginal effect of an increase in the probability of experiencing a 25% income drop (i.e., an increase in an individual's ESI) on the probability of being obese.

In Table 1, we present sample means by year, including the individual

[3]This is important for correct inference because our main independent variable, ESI, only varies by demographic group and year (Moulton, 1990).

covariates X_{ijt} that we include in our regression model. These variables have been chosen because previous research has suggested they may be important determinants of BMI. As discussed previously, some of these variables (in particular: employment status, income and marital status) are potentially endogenously determined with obesity rates. In unreported results, we find little difference in the estimated impact of ESI on obesity if we instead exclude these variables from the regression model.

Our main results are presented in Table 2. The first column presents the results from a simple group-level regression of ESI on percent obese with no other covariates. The coefficient estimated here quantifies the overall correlation seen in Figure 3. Taken at face value, the results indicate that a 1% increase in the probability of a man (woman) in a particular demographic group experiencing a 25% income drop is corresponds to a 1.2(1.8)% increase in the likelihood of a man (woman) in the same group being obese. In the second column, we shift to an individual-level analysis and include additional controls for an individual's education, marital status, employment status and income. This leads to a small increase in the size of the relationship between ESI and obesity for men and a small reduction for women but to similar substantive conclusions for both groups.

In the third column of Table 2, we introduce demographic group fixed effects. As discussed above, this controls for any time-invariant differences across demographic groups that are related to both ESI and obesity. This change in specification leads to an increase in the size of the relationship between ESI and obesity for both men and women. While these estimates deal with the main concerns about between-group unobserved heterogeneity, one remaining concern is that overall trends in both obesity rates and ESI could be driven by unobservables. For example, at the aggregate level, changes in the price of food could be related to both aggregate uncertainty in the economy and obesity levels. To alleviate this concern, in the fourth column we add year fixed effects as additional controls. Unsurprisingly, since this greatly reduces the observed within-group variation in both ESI and obesity rates, adding year fixed effects reduces the size of the coefficient on ESI. We now find that a 1%

increase in the probability of a man (woman) experiencing a 25% income drop is corresponds to a 0.8(1.0)% increase in the likelihood of being obese. Given the controls included in the regression model, we believe that this finding provides strong evidence that increases in economic insecurity, as proxied by ESI, lead to increases in obesity.

One could argue that aggregate trends are also important at the group level. One approach to dealing with this issue is adding a group-level linear time trend variable for each demographic group. We have done this (in unreported regressions), and while our results are qualitatively robust to this approach, our estimates generally become statistically insignificant. The same results are obtained if we instead control for year fixed effects for each demographic category (i.e., race/ethnicity and age, but not the interaction of the two) while still controlling for group fixed effects. As an alternative to these approaches, we report a model that includes demographic category by year fixed effects, without controlling for group fixed effects: in other words, we allow for differential non-linear temporal variation in obesity rates by gender/race-ethnicity groups and gender/age groups but not by gender/race-ethnicity/age groups (which would leave no independent variation in ESI). The results from this specification are presented in the fifth column. This leads to a slight reduction (to 0.5) in the coefficient for men and a slight increase (to 1.4) in the coefficient for women. Again, we have strong evidence for a causal link between economic insecurity and obesity.

It is worth noting that several of the individual-level covariates in Table 2 are also statistically significant. For men, income is found to have a strong inverse U-shaped relationship with obesity, with middle income men (approximately three times the poverty level) the most obese. There is a similar finding for education, with those with high school degrees or some college more likely to be obese than those with less than high school or with college degrees. Married men are more likely to be obese, while currently employed men are less likely to be obese. Fewer individual-level variables predict obesity status with precision for women; the only consistently statistically significant relationships are for currently employed women and those with university degrees, who in both cases are less likely to be obese.

The consistency of our estimates even after controlling for both demographic group fixed effects and demographic category flexible time effects suggests that our model is measuring the causal relationship between economic insecurity, as proxied by ESI, and obesity. Notably, the addition of demographic group fixed effects, as well as individual control variables, leads to larger estimates of the impact of ESI on obesity which is inconsistent with the idea that group-level unobservables are correlated with both higher levels of economic insecurity and higher levels of obesity. In fact, these estimates suggest that groups with high levels of economic insecurity (both because of observable and time-invariant unobservable characteristics) have lower levels of obesity. The specifications presented in the last two columns of Table 2 account for most important confounders that make it difficult to identify the causal relationship between economic insecurity and obesity. There are tradeoffs between controlling for more time-varying confounders versus controlling for more between-group confounders, so for our remaining results, we present estimates from both specifications and focus on robust findings.

We next examine the extent to which the relationship between ESI and obesity varies by demographic category and with various individual-level characteristics. Table 3 presents estimates from specifications in which we interact ESI separately with A) race/ethnicity, B) age, C) employment status, D) income quartile, and E) education. Notably, the coefficient on ESI is positive for every race/ethnicity group except Hispanic men in the demographic-by-year specification and white women in the group fixed effects specification (in both these cases the coefficient is negative but not significantly so). It is also notable that for both genders, the marginal effect of economic insecurity is largest for black non-Hispanics. Broken out by 5-year age groups, nearly every coefficient is again positive. Marginal effects are also consistently positive across individuals with varying employment status, although the effect is always smallest among the currently unemployed group–perhaps reflecting the fact that this group has no job to lose and hence less reason to worry about further negative income shocks. Interestingly, the marginal effect of ESI on obesity generally increases with income quartile and education, for both men and women. This demonstrates that economic insecurity has negative consequences for rich as well as poor individuals, and indeed the effect is perhaps amplified among those who, consistent with optimal fattening theory, have sufficient resources to fatten when risk is present.

It could be argued that our measure of body mass (BMI$\geq$30) inadequately captures changes in the distribution of body mass (and/or height) across the population. In Table 4 we test for robustness of our estimates by using alternative measures of body mass as dependent variable. In addition to testing alternative BMI cut-off values, we include results for BMI as a continuous variable, waist-to-height ratio, and 10-year weight change (in pounds, as self-reported retrospectively by individuals 35 years and older in NHANES). The coefficient on ESI is positive in nearly every case, and statistically significant in most. The smaller coefficients for the extreme BMI cut-offs (BMI$\geq$20 and BMI$\geq$35) are perhaps notable, but these results could simply be due to the smaller number of individuals sampled at the tails of the BMI distribution (which, in and of itself, would yield smaller coefficients in a linear probability model). Overall, we find consistent evidence supporting the hypothesis that increased economic insecurity leads to weight gain.

A final concern with the interpretation of our results is that our proxy for economic insecurity, ESI, could just be capturing other group-level differences in income or employment dynamics that are also related to obesity rates, potentially through consumer demand channels. In Table 5 we show the effect of adding controls for group (mean) income relative to the poverty line and group unemployment rate in a particular year (both calculated from the same CPS data used to calculate ESI, and similarly adjusted with a 5-year moving average). In columns (1) and (2), we add a control for the unemployment rate among the same demographic group in the same time period. This has little impact on our estimated coefficient on ESI, although for men, we lose some precision in our estimated as the group employment rate and ESI are strongly correlated. In columns (3) and (4), we add a control for mean income among the same demographic group in the same time period. Again, this has no impact on our estimates of the impact of ESI on obesity, but provides some suggestive evidence that increasing income is also related to increasing obesity rates. Finally, in columns (5) and (6), we control for both the group unemployment rate and mean income and find similar results. Overall, these results confirm that ESI is measuring something different from shocks to unemployment and income, and that the uncertainty it is measuring is important for explaining changes in obesity rates over time.

5 Conclusion

Finally, we return to the question we began with: what proportion of the observed increase in obesity can be explained by changes in economic insecurity? To answer this question, we use specification (3) from Table 2 (which includes group but not year fixed effects), to generate predicted obesity rates for each demographic group, both during the initial six-year NHANES III (1988–1992) sample period, and separately for the most recent six-year sample period (2007–2012). Our model predicts that for men, the obesity rate increases from 23.0% to 33.6% over this period of time (the actual change being from 19.6% to 34.7%), and that for women, the obesity rate increases from 31.2% to 34.7% (the actual change being from 24.6% to 37.3%). Measured in percentage points, our regression model explains 70% of the observed change in obesity rates for men, and 28% of the observed change for women (or approximately 57%, on average, of the adult population). We also repeated this exercise by estimating specification (3) from Table 2 *without* controlling for ESI. This model, which controls for demographic changes in the population as well as changes in individual characteristics, explains just 5% of the observed change for men, and 9% of the change for women (7% overall). These results suggest that ESI explains 50% of the overall trend in adult obesity in the US from 1988 to 2012, but the smaller coefficients obtained (e.g., in specification (4) of Table 2) when year fixed effects are included leave open the possibility that this estimate could, in part, be capturing parallel trends in other variables (e.g., dietary quality) not included in our regressions and hence this finding should be considered an upper-bound estimate. Nevertheless, we are aware of no other studies of the obesity epidemic that can credibly claim to explain a comparable proportion of the overall increase in obesity observed over this time period.

There is a small but growing literature on the rise in economic insecurity around the world (Rohde et al., 2014; Osberg and Sharpe, 2014). It has been noted elsewhere (e.g., Smith (2012a, 2017)) that obesity rates have risen fastest in countries that have most aggressively pursues policies of economic liberalization (most notably: the US, the UK, Australia, New Zealand, Spain, and Iceland). The suite of policies typically employed in pursuit of a more efficient economy (privatization of public services, weakening of labor protections and the social safety net, decreased anti-trust enforcement, monetary policy emphasizing stable prices over full employment, and trade agreements that facilitate the outsourcing of low-skill jobs) may have been well intended, but they also plausibly exacerbate the problem of economic insecurity by shifting material risk to individual households. They may also have spawned a global obesity epidemic.

References

Atkinson, Richard L., "Could viruses contribute to the worldwide epidemic of obesity?," *Pediatric Obesity*, 2008, *3* (S1), 37–43.

Baicker, Katherine and Helen Levy, "Employer Health Insurance Mandates and the Risk of Unemployment," *Risk Management and Insurance Review*, 2008, *11* (1), 109–132.

Barnes, Michael G., Trenton G. Smith, and Jonathan K. Yoder, "Effects of household composition and income security on body weight in working-age men," *Obesity*, January 2013. PMID: 23703907.

Camhi, Sarah M., George A. Bray, Claude Bouchard, Frank L. Greenway, William D. Johnson, Robert L. Newton, Eric Ravussin,

Donna H. Ryan, Steven R. Smith, and Peter T. Katzmarzyk, "The Relationship of Waist Circumference and BMI to Visceral, Subcutaneous, and Total Body Fat: Sex and Race Differences," *Obesity*, 2011, *19* (2), 402–408.

Cawley, John, "An economy of scales: A selective review of obesity's economic causes, consequences, and solutions," *Journal of health economics*, 2015, *43*, 244–268.

Chou, Shin-Yi, Michael Grossman, and Henry Saffer, "An Economic Analysis of Obesity: Results from the Behavioral Risk Factor Surveillance System," *Journal of Health Economics*, October 2004, *23*, 565–587.

Cutler, D. M., E. L. Glaeser, and J. M. Shapiro, "Why Have Americans Become More Obese?," *Journal of Economic Perspectives*, Summer 2003, *17* (3), 93–118.

de Vogli, Roberto, Anne Kouvonen, Marko Elovainio, and Michael Marmot, "Economic globalization, inequality and body mass index: a cross-national analysis of 127 countries," *Critical Public Health*, 2013, pp. 1–15.

Elsby, Michael W. L., Donggyun Shin, and Gary Solon, "Wage Adjustment in the Great Recession and Other Downturns: Evidence from the United States and Great Britain," *Journal of Labor Economics*, 2016, *34* (S1), S249–S291.

Finkelstein, Eric A., Christopher J. Ruhm, and Katherine M. Kosa, "Economic Causes and Consequences of Obesity," *Annual Review of Public Health*, 2005, *26* (1), 239–257.

Hacker, Jacob S, Gregory A Huber, Austin Nichols, Philipp Rehm, Mark Schlesinger, Rob Valletta, and Stuart Craig, "The Economic Security Index: a new measure for research and policy analysis," *Review of Income and Wealth*, 2014, *60* (S1), S5–S32.

Moscarini, Giuseppe and Kaj Thomsson, "Occupational and Job Mobility in the US," *Scandinavian Journal of Economics*, 2007, *109* (4), 807–836.

Moulton, Brent R., "An Illustration of a Pitfall in Estimating the Effects of Aggregate Variables on Micro Units," *The Review of Economics and Statistics*, 1990, *72* (2), 334–338.

OECD, "OBESITY Update," accessed August 8, 2017 June 2014.

Offer, Avner, Rachel Pechey, and Stanley Ulijaszek, "Obesity under affluence varies by welfare regimes: The effect of fast food, insecurity, and inequality," *Economics and Human Biology*, 2010, *8*, 297–308.

Osberg, Lars and Andrew Sharpe, "Measuring economic insecurity in rich and poor nations," *Review of Income and Wealth*, 2014, *60* (S1), S53–S76.

Rohde, Nicholas, Kam Ki Tang, and DS Rao, "Distributional characteristics of income insecurity in the US, Germany, and Britain," *Review of Income and Wealth*, 2014, *60* (S1), S159–S176.

Sassi, Franco, *Obesity and the Economics of Prevention: Fit Not Fat*, OECD, 2010.

Smith, Trenton G., "Reconciling Psychology with Economics: Obesity, Behavioral Biology, and Rational Overeating," *Journal of Bioeconomics*, 2009, *11* (3), 249–282.

_ , "Behavioural Biology and Obesity," in Avner Offer, Rachel Pechey, and Stanley Ulijaszek, eds., *Insecurity, Inequality, and Obesity in Affluent Societies*, Oxford University Press, 2012.

_ , "Review of *Obesity and the Economics of Prevention: Fit Not Fat* by Franco Sassi, 2010," *American Journal of Agricultural Economics*, 2012, *94* (3), 815–821.

_ , "Household-level financial uncertainty could be *the* primary driver of the global obesity epidemic," *Behavioral and Brain Sciences*, 2017, *40.*

— , **Christiana Stoddard, and Michael G. Barnes**, "Why the Poor Get Fat: Weight Gain and Economic Insecurity," *Forum for Health Economics & Policy*, 2009, *12*, Article 5.

— , **Steven Stillman, and Stuart Craig**, "The US Obesity Epidemic: New Evidence from the Economic Security Index," *AgEconSearch Working Papers 2013-06*, 2013, *http://purl.umn.edu/151419.*

Sozou, P.D., "On Hyperbolic Discounting and Uncertain Hazard Rates," *Proceedings of the Royal Society of London B: Biological Sciences*, October 1998, *265* (1409), 2015–2020.

Staudigel, Matthias, "A soft pillow for hard times? Economic insecurity, food intake and body weight in Russia," *Journal of Health Economics*, 2016, *50*, 198–212.

Taubes, Gary, "As obesity rates rise, experts struggle to explain why," *Science*, May 1998, *280* (5368), 1367–1368.

Wang, Youfa and May A. Beydoun, "The Obesity Epidemic in the United States–Gender, Age, Socioeconomic, Racial/Ethnic, and Geographic Characteristics: A Systematic Review and Meta-Regression Analysis," *Epidemiologic Reviews*, January 2007, *29* (1), 6–28. PMID: 17510091.

Watson, Barry, "Does Economic Insecurity Cause Weight Gain Among Canadian Labor Force Participants?," *Review of Income and Wealth*, 2017, pp. n/a–n/a.

— , **Lars Osberg, and Shelley Phipps**, "Economic Insecurity and the Weight Gain of Canadian Adults: A Natural Experiment Approach," *Canadian Public Policy*, 2016, *42* (2), 115–131.

Wisman, Jon D. and Kevin W. Capehart, "Creative Destruction, Economic Insecurity, Stress, and Epidemic Obesity," *American Journal of Economics and Sociology*, JUL 2010, *69* (3), 936–982.

Figure 1: Obesity Rates Over Time by Demographic Group

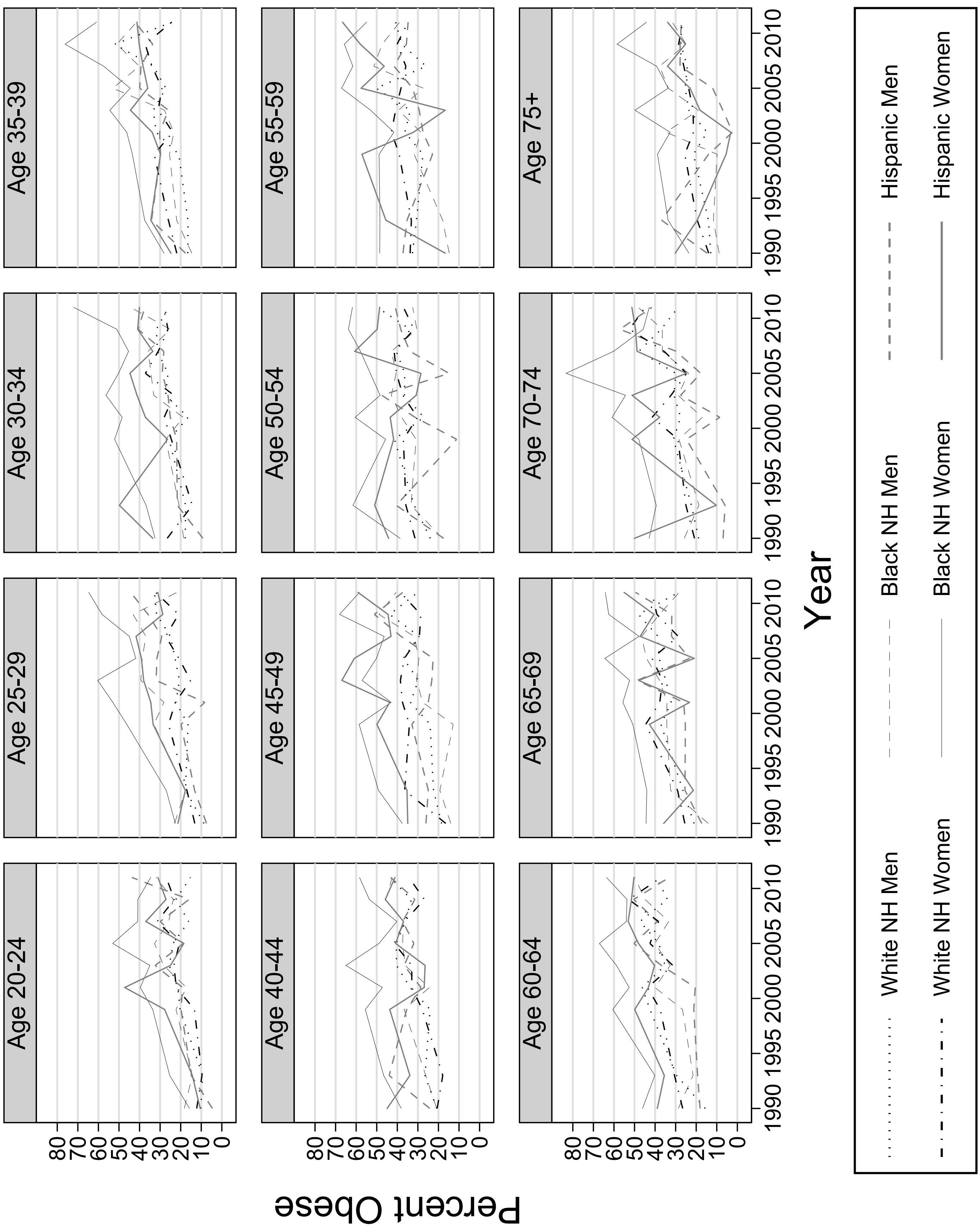

Figure 2: Economic Security Index Over Time by Demographic Group

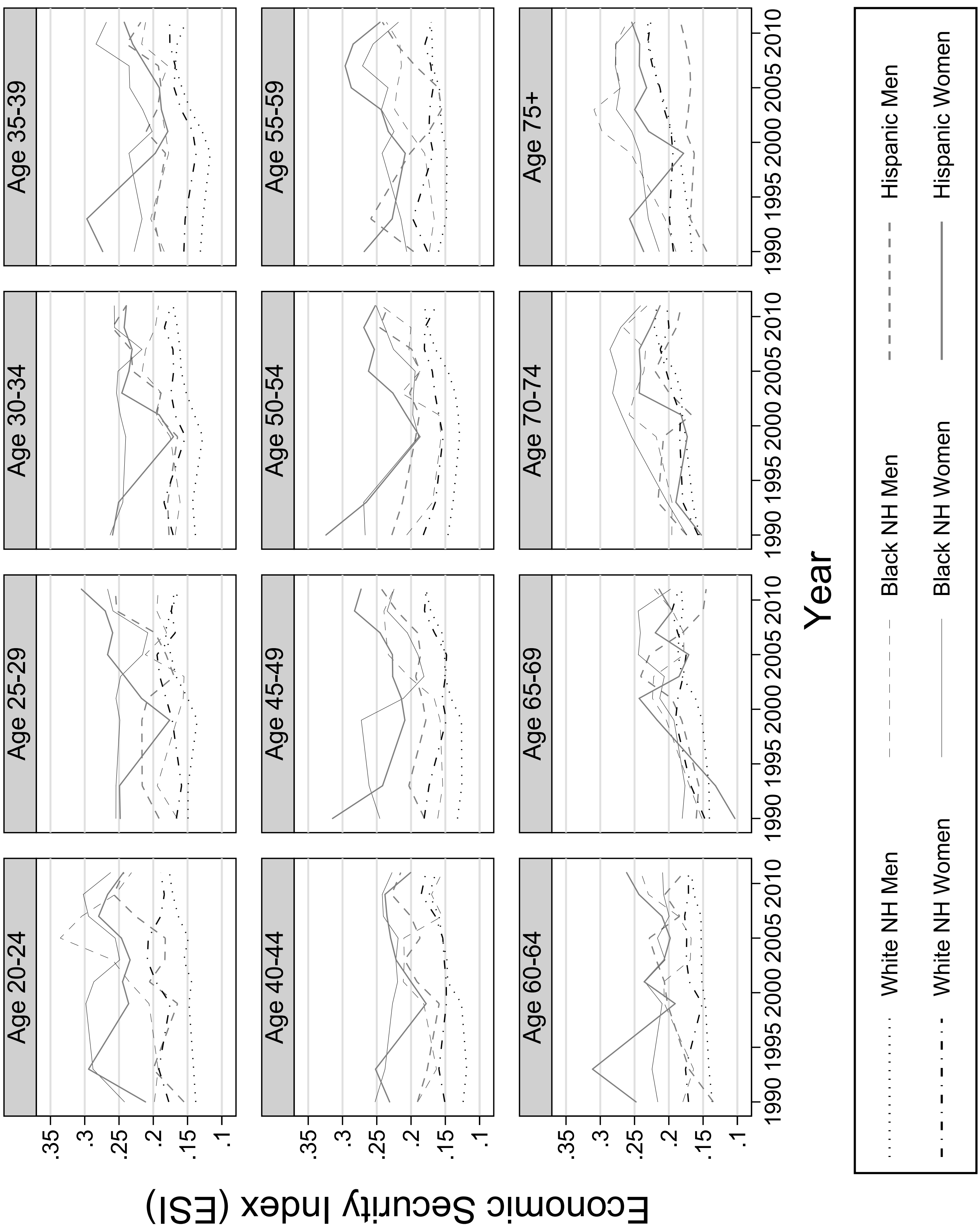

Figure 3: Obesity vs. Economic Security Index by Demographic Group

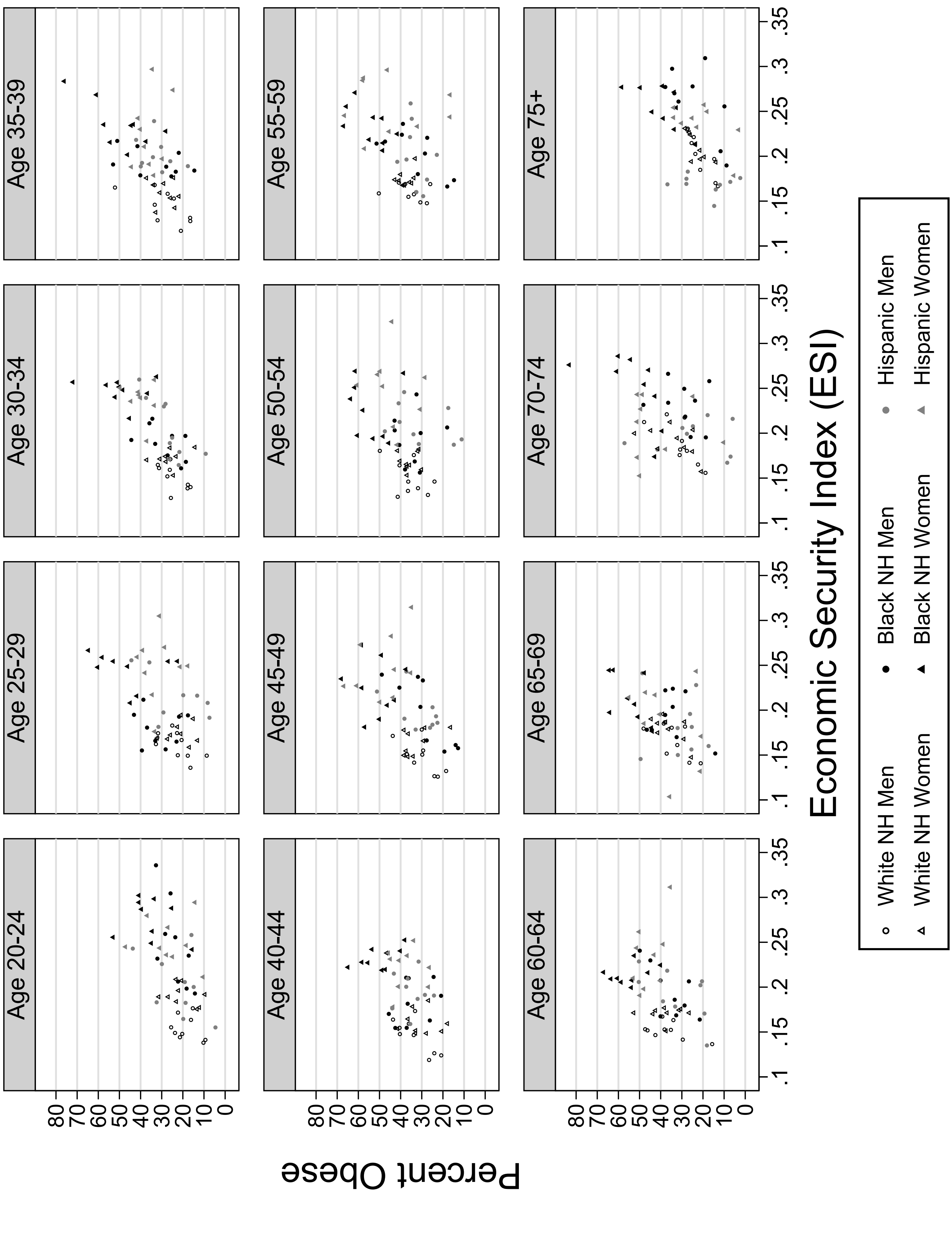

Table 1: Sample Means by Year

	1990	1993	1999	2001	2003	2005	2007	2009	2011
Men									
ESI	0.164	0.173	0.170	0.179	0.185	0.192	0.194	0.204	0.205
Obese	0.182	0.214	0.271	0.268	0.301	0.318	0.341	0.362	0.356
White Non-Hispanic	0.462	0.380	0.482	0.535	0.554	0.528	0.508	0.510	0.450
Black Non-Hispanic	0.251	0.287	0.183	0.202	0.202	0.234	0.211	0.196	0.310
Hispanic	0.287	0.334	0.334	0.263	0.244	0.238	0.281	0.293	0.240
Age 20-34	0.305	0.311	0.234	0.249	0.262	0.266	0.234	0.238	0.268
Age 35-49	0.234	0.251	0.245	0.283	0.237	0.264	0.246	0.258	0.238
Age 50-64	0.191	0.178	0.220	0.227	0.201	0.215	0.264	0.260	0.265
Age 65+	0.270	0.261	0.301	0.241	0.300	0.255	0.257	0.244	0.230
Employed	0.635	0.634	0.602	0.651	0.585	0.658	0.604	0.590	0.566
Unemployed	0.051	0.045	0.023	0.032	0.037	0.029	0.036	0.077	0.072
Married	0.695	0.692	0.697	0.684	0.668	0.676	0.662	0.654	0.602
Never Married	0.172	0.172	0.164	0.172	0.182	0.163	0.177	0.173	0.223
High School	0.274	0.281	0.216	0.231	0.255	0.243	0.258	0.248	0.235
Some College	0.153	0.158	0.207	0.238	0.260	0.268	0.239	0.261	0.287
College	0.130	0.135	0.163	0.216	0.180	0.188	0.185	0.202	0.210
Income/Poverty Ratio	2.70	2.52	2.95	2.97	2.79	2.85	2.83	2.82	2.62
Household Size	3.29	3.26	3.12	3.20	2.99	3.05	3.10	3.23	3.10
Observations	3,896	3,515	1,770	2,157	2,131	2,163	2,622	2,730	2,134
Women									
ESI	0.207	0.216	0.192	0.199	0.205	0.209	0.218	0.223	0.220
Obese	0.266	0.317	0.375	0.351	0.369	0.396	0.402	0.416	0.449
White Non-Hispanic	0.459	0.416	0.434	0.541	0.559	0.517	0.476	0.505	0.434
Black Non-Hispanic	0.266	0.306	0.212	0.205	0.210	0.254	0.218	0.188	0.324
Hispanic	0.275	0.277	0.354	0.254	0.231	0.229	0.306	0.307	0.242
Age 20-34	0.290	0.304	0.233	0.243	0.227	0.256	0.225	0.246	0.240
Age 35-49	0.246	0.268	0.264	0.281	0.246	0.261	0.258	0.270	0.245
Age 50-64	0.196	0.176	0.231	0.223	0.221	0.236	0.255	0.240	0.282
Age 65+	0.268	0.252	0.272	0.253	0.306	0.247	0.261	0.243	0.233
Employed	0.495	0.483	0.480	0.500	0.460	0.516	0.497	0.488	0.472
Unemployed	0.036	0.031	0.022	0.014	0.029	0.016	0.022	0.042	0.050
Married	0.540	0.525	0.526	0.574	0.522	0.551	0.532	0.530	0.494
Never Married	0.135	0.166	0.151	0.135	0.150	0.154	0.156	0.174	0.192
High School	0.325	0.339	0.235	0.237	0.261	0.243	0.242	0.224	0.212
Some College	0.157	0.171	0.240	0.291	0.283	0.306	0.276	0.301	0.331
College	0.111	0.114	0.136	0.180	0.168	0.195	0.175	0.185	0.218
Income/Poverty Ratio	2.57	2.42	2.82	2.82	2.63	2.77	2.67	2.59	2.49
Household Size	3.24	3.18	3.20	3.14	2.90	3.00	3.12	3.23	3.05
Observations	3,735	4,461	1,793	2,118	2,099	2,018	2,693	2,856	2,159

Table 2: Impact of Economic Insecurity (ESI) on Obesity by Gender

	(1)	(2)	(3)	(4)	(5)
			Men		
ESI	1.152***	1.347***	3.410***	0.767**	0.494*
	(0.205)	(0.220)	(0.217)	(0.334)	(0.279)
Employed		-0.00814	-0.0466***	-0.0449***	-0.0450***
		(0.0121)	(0.00877)	(0.00880)	(0.00879)
Unemployed		0.0188	-0.0205	-0.0164	-0.0168
		(0.0178)	(0.0161)	(0.0160)	(0.0160)
Income/Poverty Ratio		0.0335***	0.0493***	0.0531***	0.0530***
		(0.00957)	(0.00895)	(0.00893)	(0.00894)
Square of Income/Poverty Ratio		-0.00434***	-0.00738***	-0.00806***	-0.00811***
		(0.00159)	(0.00150)	(0.00150)	(0.00150)
Married		0.0486***	0.0515***	0.0536***	0.0539***
		(0.0101)	(0.00984)	(0.00987)	(0.00985)
Never Married		-0.0333***	-0.00160	-0.00251	0.000239
		(0.0125)	(0.0117)	(0.0117)	(0.0115)
High School		0.0417***	0.0264***	0.0250***	0.0260***
		(0.00883)	(0.00821)	(0.00824)	(0.00827)
Some College		0.0656***	0.0398***	0.0358***	0.0360***
		(0.00920)	(0.00835)	(0.00845)	(0.00849)
College		0.00946	-0.0200*	-0.0227**	-0.0226**
		(0.0117)	(0.0104)	(0.0104)	(0.0105)
R^2	0.089	0.015	0.041	0.045	0.048
Observations	324	23,118	23,118	23,118	23,118
			Women		
ESI	1.811***	1.544***	2.045***	0.951**	1.422***
	(0.209)	(0.229)	(0.387)	(0.394)	(0.449)
Employed		-0.00311	-0.0380***	-0.0353***	-0.0357***
		(0.0110)	(0.00784)	(0.00785)	(0.00789)
Unemployed		0.0106	-0.0208	-0.0177	-0.0154
		(0.0201)	(0.0188)	(0.0188)	(0.0190)
Income/Poverty Ratio		-0.0160	-0.00860	0.000354	0.000359
		(0.0100)	(0.00883)	(0.00873)	(0.00885)
Square of Income/Poverty Ratio		0.000474	-0.00139	-0.00281*	-0.00292*
		(0.00165)	(0.00147)	(0.00147)	(0.00149)
Married		-0.00897	-0.0116	-0.0117	-0.0124
		(0.00923)	(0.00792)	(0.00786)	(0.00782)
Never Married		-0.0388**	0.00662	-0.00208	-0.00277
		(0.0151)	(0.0113)	(0.0112)	(0.0112)
High School		-0.00398	-0.00960	-0.0129	-0.0118
		(0.0101)	(0.00900)	(0.00895)	(0.00891)
Some College		0.0149	0.0114	-0.0134	-0.0138
		(0.0114)	(0.00908)	(0.00920)	(0.00912)
College		-0.0594***	-0.0710***	-0.0939***	-0.0940***
		(0.0125)	(0.0108)	(0.0110)	(0.0110)
R^2	0.189	0.020	0.058	0.069	0.073
Observations	324	23,932	23,932	23,932	23,932
Demographic FEs	No	No	Yes	Yes	Yes
Year FEs	No	No	No	Yes	Yes
Group FEs	No	No	Yes	Yes	No
Demographic×Year FEs	No	No	No	No	Yes

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Robust standard errors that account for within group by year correlation in parentheses. The first specification is run on data aggregated at the group level. A quadratic in household size is also included in the covariates but not presented.

Table 3: Heterogeneous Impacts of Economic Security on Obesity

	(1)	(2)	(3)	(4)
	Men		Women	
A) Economic Security Index Interacted with Race/Ethnicity				
White	0.449	1.791*	-0.0576	1.402***
	(0.388)	(0.924)	(0.665)	(0.431)
Black	0.979***	1.982*	1.678**	1.437
	(0.373)	(1.024)	(0.759)	(0.901)
Hispanic	0.619	-1.874	0.830*	2.012
	(0.764)	(1.247)	(0.433)	(1.635)
R^2	0.045	0.048	0.069	0.073
B) Economic Security Index Interacted with Age Group				
Age 20-24	0.214	0.421	-0.340	1.156**
	(0.716)	(0.419)	(0.595)	(0.545)
Age 25-29	1.823***	1.303**	1.646	1.793***
	(0.662)	(0.529)	(1.071)	(0.578)
Age 30-34	1.374**	0.795*	1.436	1.921***
	(0.658)	(0.453)	(1.011)	(0.624)
Age 35-39	2.308**	0.474	2.022	1.345**
	(0.955)	(0.587)	(1.320)	(0.582)
Age 40-44	0.347	-0.154	0.0216	1.609***
	(0.711)	(0.436)	(0.821)	(0.598)
Age 45-49	1.300	0.157	0.0439	2.109***
	(0.863)	(0.498)	(1.027)	(0.572)
Age 50-54	0.0554	-0.368	1.639	1.621***
	(0.696)	(0.506)	(1.083)	(0.575)
Age 55-59	0.934	-0.413	1.529*	1.146*
	(0.937)	(0.773)	(0.804)	(0.597)
Age 60-64	1.518	-0.263	1.651***	1.182**
	(0.958)	(0.598)	(0.628)	(0.575)
Age 65-69	0.565	-0.278	0.617	1.475***
	(0.908)	(0.475)	(0.891)	(0.560)
Age 70-74	1.865*	-0.687	-0.767	0.879
	(0.975)	(0.538)	(1.691)	(0.745)
Age 75+	0.620**	0.648*	1.128**	1.609**
	(0.313)	(0.355)	(0.459)	(0.815)
R^2	0.045	0.049	0.070	0.074
C) Economic Security Index Interacted with Employment Status				
Employed	0.803**	0.570*	0.960**	1.456***
	(0.382)	(0.307)	(0.424)	(0.455)
Unemployed	0.252	0.0836	0.697	1.106
	(0.674)	(0.638)	(0.703)	(0.742)
Out of Labour Force	0.771**	0.470	0.958**	1.307***
	(0.349)	(0.311)	(0.403)	(0.503)
R^2	0.045	0.048	0.069	0.073
Observations	23,118	23,118	23,932	23,932
Demographic FEs	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
Group FEs	Yes	No	Yes	No
Demographic×Year FEs	No	Yes	No	Yes

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$. Robust standard errors that account for within group by year correlation in parentheses. All covariates from Table 2 are included in each regression.

Table 3: (continued)

	(1)	(2)	(3)	(4)
	Men		Women	
D) Economic Security Index Interacted with Income Quartile				
Bottom Quartile	0.692**	0.438	0.871**	1.303***
	(0.339)	(0.290)	(0.390)	(0.454)
Second Quartile	0.693**	0.435	0.817**	1.267***
	(0.335)	(0.283)	(0.388)	(0.448)
Third Quartile	0.807**	0.530*	1.008**	1.461***
	(0.340)	(0.284)	(0.400)	(0.452)
Top Quartile	0.928***	0.646**	1.243***	1.696***
	(0.353)	(0.296)	(0.415)	(0.461)
R^2	0.045	0.048	0.070	0.074
E) Economic Security Index Interacted with Education				
No High School	0.477	0.271	0.760*	0.745
	(0.345)	(0.315)	(0.405)	(0.519)
High School	0.928**	0.675*	1.061**	1.069**
	(0.425)	(0.358)	(0.445)	(0.481)
Some College	0.828**	0.584	1.529***	1.493***
	(0.404)	(0.361)	(0.473)	(0.493)
College	1.286***	1.008**	1.947***	1.954***
	(0.471)	(0.420)	(0.497)	(0.518)
R^2	0.045	0.048	0.070	0.074
Observations	23,118	23,118	23,932	23,932
Demographic FEs	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
Group FEs	Yes	No	Yes	No
Demographic×Year FEs	No	Yes	No	Yes

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Robust standard errors that account for within group by year correlation in parentheses. All covariates from Table 2 are included in each regression.

Table 4: Impact of Economic Insecurity on Different Measures of Weight by Gender

	(1)		(2)		(3)		(4)		(5)		(6)	
	Men											
	BMI		BMI≥20		BMI≥25		BMI≥35		Waist/Height Ratio		10-yr Wt Gain	
ESI	9.711**	4.827	0.357*	0.147	0.608*	1.061**	0.304	-0.0201	0.121**	0.105**	36.97*	4.650
	(3.750)	(3.101)	(0.201)	(0.185)	(0.351)	(0.420)	(0.259)	(0.155)	(0.0608)	(0.0474)	(19.36)	(10.43)
R^2	0.069	0.072	0.028	0.032	0.071	0.072	0.028	0.032	0.176	0.179	0.080	0.082
Observations	23,118	23,118	23,118	23,118	23,118	23,118	23,118	23,118	22,226	22,226	15,934	15,934
	Women											
	BMI		BMI≥20		BMI≥25		BMI≥35		Waist/Height Ratio		10-yr Wt Gain	
ESI	13.12**	19.87***	0.369*	1.092***	0.582	2.052***	0.550*	-0.0660	0.0847	0.262**	2.508	98.76***
	(5.675)	(5.213)	(0.202)	(0.345)	(0.375)	(0.409)	(0.297)	(0.248)	(0.0921)	(0.123)	(21.85)	(34.61)
R^2	0.099	0.103	0.034	0.037	0.090	0.092	0.046	0.051	0.165	0.171	0.093	0.092
Observations	23,932	23,932	23,932	23,932	23,932	23,932	23,932	23,932	22,808	22,808	16,244	16,244
Demographic FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Group FEs	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Demographic×Year FEs	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Robust standard errors that account for within group by year correlation in parentheses. All covariates from Table 2 are included in each regression.

Table 5: Robustness of Main Results to Controlling for Other Economic Statistics

	(1)	(2)	(3)	(4)	(5)	(6)
			Men			
ESI	0.557	0.521*	0.679**	0.739*	0.552	0.742*
	(0.386)	(0.281)	(0.335)	(0.440)	(0.380)	(0.422)
Group Unemployment Rate	0.623*	0.116			0.419	0.0243
	(0.338)	(0.393)			(0.344)	(0.425)
Group Income/Poverty Ratio			0.0795**	0.0374	0.0670*	0.0371
			(0.0351)	(0.0407)	(0.0354)	(0.0436)
Employed	-0.0447***	-0.0450***	-0.0444***	-0.0450***	-0.0444***	-0.0450***
	(0.00880)	(0.00879)	(0.00882)	(0.00879)	(0.00882)	(0.00879)
Unemployed	-0.0167	-0.0168	-0.0168	-0.0167	-0.0170	-0.0167
	(0.0160)	(0.0160)	(0.0160)	(0.0160)	(0.0160)	(0.0160)
Income/Poverty Ratio	0.0533***	0.0530***	0.0543***	0.0531***	0.0543***	0.0531***
	(0.00892)	(0.00895)	(0.00895)	(0.00894)	(0.00894)	(0.00895)
Square of Income/Poverty Ratio	-0.00810***	-0.00811***	-0.00828***	-0.00813***	-0.00827***	-0.00813***
	(0.00150)	(0.00150)	(0.00150)	(0.00150)	(0.00150)	(0.00150)
R^2	0.045	0.048	0.045	0.048	0.045	0.048
Observations	23,118	23,118	23,118	23,118	23,118	23,118
			Women			
ESI	0.957**	1.349***	0.798**	1.120	0.805**	1.137
	(0.398)	(0.450)	(0.393)	(0.765)	(0.398)	(0.783)
Group Unemployment Rate	-0.143	0.151			-0.167	0.0986
	(0.312)	(0.298)			(0.291)	(0.316)
Group Income/Poverty Ratio			0.0763*	-0.0121	0.0769*	-0.00951
			(0.0412)	(0.0224)	(0.0412)	(0.0244)
Employed	-0.0353***	-0.0356***	-0.0350***	-0.0356***	-0.0351***	-0.0356***
	(0.00785)	(0.00789)	(0.00784)	(0.00789)	(0.00784)	(0.00789)
Unemployed	-0.0177	-0.0154	-0.0181	-0.0155	-0.0181	-0.0154
	(0.0188)	(0.0190)	(0.0188)	(0.0190)	(0.0188)	(0.0190)
Income/Poverty Ratio	0.000430	0.000312	0.00123	0.000288	0.00132	0.000273
	(0.00871)	(0.00886)	(0.00876)	(0.00886)	(0.00874)	(0.00886)
Square of Income/Poverty Ratio	-0.00282*	-0.00291*	-0.00295**	-0.00290*	-0.00296**	-0.00290*
	(0.00146)	(0.00149)	(0.00147)	(0.00149)	(0.00147)	(0.00149)
R^2	0.069	0.073	0.069	0.073	0.069	0.073
Observations	23,932	23,932	23,932	23,932	23,932	23,932
Demographic FEs	Yes	Yes	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Group FEs	Yes	No	Yes	No	Yes	No
Demographic×Year FEs	No	Yes	No	Yes	No	Yes

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Robust standard errors that account for within group by year correlation in parentheses. All covariates from Table 2 are included in each regression.