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The Business Cycle and Health: An Analysis of How Macroeconomic Conditions Impact Health Outcomes in the U.S.

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An Analysis of How Macroeconomic Conditions Impact Health Outcomes in the U.S.

By

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ABSTRACT

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The U.S. spends about twice as much per person on healthcare, yet the disease burden remains higher in the U.S. than in comparable countries (Sawyer and Cox 2018; Sawyer and Gonzales 2017). Although health status is perceived to be an outcome of individual decision making, the business cycle also affects health. While the effect of macroeconomic shocks on health outcomes has been studied extensively, results remain inconclusive. This analysis uses longitudinal data over 30 years and panel data models to examine the effect of macroeconomic conditions on obesity, diabetes, hypertension, depression, congestive heart failure, and heart attack or myocardial infarction. I find that health varies countercyclically with the business cycle when both real GDP and the unemployment rate are used as measures of the business cycle: as the economy improves, the probability of disease increases and health declines. A 1% increase in real GDP increases the probability of obesity, diabetes, hypertension, and depression by 0.264%, 0.021%, 0.102%, and 0.030%, respectively. A 1% increase in real GDP decreases vigorous exercise by 2.484 hours per week and increases alcohol consumption by 1.447 days per month. A recession year increases this countercyclical effect, perhaps because the time constraint shifts outward more than the income constraint shifts inward. My thesis fills several gaps in the existing literature, providing valuable knowledge on health determinants, the health costs of economic growth, and potential public health policy responses.

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CHAPTER ONE

INTRODUCTION

The objective of this thesis is to determine the impact of macroeconomic conditions on health outcomes in the U.S. The production of health is expensive, costing the United States $3.3 billion, or 17.9% of GDP, in 2016 (Centers for Medicare & Medicaid Services 2018). Despite spending about twice as much per person on healthcare, the disease burden remains higher in the U.S. than in comparable countries (Sawyer & Cox 2018; Sawyer & Gonzales 2017). Obesity is one of the main drivers of preventable chronic disease and healthcare costs in the United States (The State of Obesity 2018). Many factors impact health including genetics, socioeconomic status, environment, lifestyle, and behaviors. Macroeconomic conditions are another factor that influence the complex production of health. Health is subject to both time and income constraints. Unemployment shifts the time constraint outwards, creating more time for health producing activities. Simultaneously, unemployment shifts the income constraint inwards, which can have varying impacts on health depending on how people adjust their behaviors to adapt to lower income. The effect of the business cycle on health outcomes such as obesity has been extensively studied, yet remains inconclusive. If health is procyclical, recessions should cause a decline in health, while expansions should improve health. For example, job loss during recessions may lead to lower income. People may respond by consuming cheap, junk foods, leading to increased obesity. If health is countercyclical, recessions should improve health, while expansions should decrease health. For instance, job loss during recessions may lead to increased time. People may use this time to exercise and cook healthy meals, reducing obesity prevalence.

A. Health

Chronic diseases such as obesity, diabetes, hypertension, heart disease, and cancer are the leading causes of death and disability in the U.S. (Centers for Disease Control and Prevention 2018). Chronic disease prevalence and mortality is steadily increasing, with great economic consequences. About 1 in 5 children and 1 in 3 adults are obese, costing the healthcare system $147 billion per year (Finkelstein et al. 2009). Heart disease kills more than 859,000 Americans per year, accounting for one-third of all deaths (Centers for Disease Control and Prevention 2018). The burden of heart disease costs the healthcare system $199 billion per year and results in $131 billion in lost productivity (Benjamin et al. 2018). Diabetes costs the system and employers about $237 billion per year (American Diabetes Association 2018). Deaths attributable to hypertension increased by 10.5% from 2005 to 2015 (Benjamin et al. 2018). In 2016, about 6.7% of the U.S. population experienced at least one depressive episode, which was most common in those aged 18-25 years old (National Institute of Mental Health 2016). Clearly, chronic diseases affect millions of Americans and create great economic burden. Of the country's $3.3 trillion in annual healthcare spending, 90% is spent on treating chronic and mental health conditions (Centers for Disease Control and Prevention 2018). Thus, it is important to understand the factors impacting chronic disease prevalence to establish appropriate public health and economic policies.

B. The Business Cycle

Federal Reserve Economic Data (FRED) reveal how U.S. recessions impact various outcomes related to work and health. Figures 1-3 depict the percent change from one year ago of real gross domestic product (real GDP), average annual hours worked by

persons engaged for the United States, hours worked by full-time and part-time employees, real personal consumption expenditures, and health care services personal consumption expenditures over the business cycle since 1948. Shaded areas indicate recessions. Average annual hours worked by persons engaged for the United States has fluctuated procyclically with real GDP since the 1950s, although its variation in percent change from one year ago is much smaller (Fig. 1). Both measures decrease during recessions and rapidly recover shortly after (Fig. 1). This is consistent with economic theory that unemployment rises during recessions, leading to less average annual hours worked. Similarly, hours worked by full-time and part-time employees almost exactly follows fluctuations in real GDP over the business cycle (Fig. 2). Both measures have the same degree of variation in percent change from one year ago (Fig. 2). In addition to employment status and hours worked, personal consumption also changes over the business cycle. Consistent with income constraint theory, real personal consumption expenditures decrease during recessions, tracing the real GDP curve over the business cycle (Fig. 3). Surprisingly, the opposite trend is observed with health care services personal consumption expenditures, which appear to increase during recessions beginning in the late 1950s (Fig. 3). Thus, health care services personal consumption expenditures vary countercyclically with the business cycle and real GDP (Fig. 3). This observation could be explained two different ways. First, people may invest more in health during recessions, leading to improved health status. Second, people's health may decline during recessions, leading them to spend more money on health services. Thus, macroeconomic conditions can have complex and inconsistent effects on health.

Ultimately, chronic diseases are the leading cause of mortality and healthcare expenditure in the U.S. The business cycle affects many important outcomes including hours worked, personal consumption expenditure, and health expenditure. However, the true impact of the business cycle on health in the U.S. remains uncertain. This paper seeks to answer three research questions. First, do macroeconomic conditions significantly impact health outcomes in the U.S.? Second, do health outcomes vary procyclically or countercyclically with the business cycle? Third, do recession years increase the effect of the business cycle on health? I also conduct a secondary analysis to explain my findings.

Longitudinal data from the National Longitudinal Survey of Youth 1979 (NLSY79) surveys a representative sample of 12,686 men and women in the U.S. annually from 1979 – 1994 and biennially from 1994 – 2014. NLSY79 tracks key outcomes of respondents related to labor, education, health, family, and income. Health data include indicators such as BMI, heart disease, and mental health. I use health data from NLSY79 and macroeconomic conditions data from the National Bureau of Economic Research (NBER) and FRED to examine the effect of the business cycle on health outcomes. Fixed effects Ordinary Least Squares (OLS) regression models reveal four main findings. First, real GDP and the unemployment rate have a statistically significant countercyclical effect on probability of obesity, hypertension, diabetes, and depression. Second, this may be explained by decreased exercise and increased alcohol consumption during economic expansions. Third, a recession year increases the countercyclical effect of the business cycle on probability of chronic diseases. Fourth, the probability of heart disease is not significantly affected by the business cycle.

My research fills several gaps in the existing literature by studying a single cohort for over 30 years and spanning five recessions, analyzing numerous health outcomes to capture overall health and wellbeing, and using various measures for the business cycle. The results of this study contribute to the debate in the literature on the impact of the business cycle on health. In conclusion, this thesis provides valuable knowledge on health determinants, the health costs of economic growth, and potential public health policy responses.

The subsequent chapter of this thesis provides a literature review of procyclical and countercyclical evidence on the business cycle and health as well as the health outcomes previously studied. Data and methodology are reviewed in chapters three and four, respectively. Chapters five and six present descriptive statistics and results. Chapter seven provides a discussion of results. Finally, a conclusion is provided in chapter eight.

CHAPTER TWO

LITERATURE REVIEW

A. Theoretical Framework

The relationship between macroeconomic conditions and health has been studied extensively, but results remain inconclusive. The production of health is subject to both time and income constraints. When unemployment is high, wages and the opportunity cost of time are low. Thus, the substitution effect dictates that recessions will increase time-intensive investments in health such as physical activity and home-cooked meals. The income constraint can have varying effects on health. Lower income can lead to lower caloric consumption if people eat less or cook at home. On the other hand, lower income can also lead to higher caloric consumption if people eat inexpensive, energy-dense fast foods. Other factors correlated to unemployment such as health insurance, stress, alcohol consumption, and smoking can also impact health outcomes.

B. Procyclical Evidence

Prior literature on the effect of the business cycle on health falls into two major groups: the procyclical group and the countercyclical group. Both groups examine effects during recessions utilizing unemployment, either individual employment status or state unemployment, as a proxy for economic conditions. BMI, calculated from height and weight using the standard formula (BMI = kg/m^2), is widely used as a measure for health. The universally accepted classifications for BMI are normal (18.5-24.9), overweight (25.0-29.9), obese (30.0-39.9), and severely obese (40.0+). The procyclical group argues that recessions are bad for health because the income constraint shifts inward more than the time constraint shifts outward. Although people may have more time to exercise, they

may have less money to spend on health-producing activities such as buying healthy food or health insurance. Colman and Dave (2014) is one of the first longitudinal studies in this area to estimate the effect of unemployment on food consumption, exercise, and BMI using data from the Panel Study of Income Dynamics (PSID) and NLSY79 from 1998 – 2010. They aim to determine whether, and to what degree, job loss has a causal effect on health outcomes, focusing on first-order internal effects of job loss. They use several indicators for individual employment status including unemployment, unemployment due to being laid off, unemployment due to firm going out of business, and long-term unemployment. Regressions are estimated using both fixed effects and random effects models. Researchers find that becoming unemployed is associated with a small increase in leisure-time exercise, a decline in purchases of fast food, and a substantial decline in total physical activity, resulting in a slight net increase in body weight. The negative effects on physical activity and fast food consumption are stronger with longer unemployment. The results suggest that men's total physical activity may decline disproportionately compared to women's due to the loss of physically demanding jobs in construction and manufacturing. Overall, unemployment is only weakly associated with BMI.

Another study examining the relationship between local labor market conditions and weight-related health and mental health finds similar procyclical results. Charles and DeCicca (2008) utilize cross-sectional health data from the National Health Interview Surveys from 1997 – 2001, with a sample of 27,159 working-aged men from 58 of the largest metropolitan statistical areas (MSA) in the U.S. Economic conditions are measured using the MSA-level unemployment rate from the Bureau of Labor Statistics

(BLS). Weight-related health is measured using BMI, while mental health is captured using the K6 Non-Specific Psychological Distress scale. The results demonstrate systematic evidence of a procyclical relationship between local economic conditions and weight-related and mental health. These results are stronger in the lowest predicted employment decile and African-Americans.

Procyclical results have been replicated in other countries as well. Latif (2014) uses longitudinal data from the National Population Health Survey in Canada to determine the effect of macroeconomic conditions, measured by the provincial unemployment rate, on individual obesity and BMI. The study utilizes seven cycles of longitudinal data, yielding 26,173 person-cycle observations. Fixed effects models reveal that the unemployment rate has a significant, positive impact on the probability of being severely obese (defined as $BMI \geq 35$) and significantly increases BMI. The study does not find any significant effect of the unemployment rate on the probability of being overweight or obese. These results support a procyclical relationship between macroeconomic conditions and health in Canada, as seen in the U.S.

Others confirm the procyclical relationship between macroeconomic conditions and weight-related health in Europe. Böckerman et al. (2014) examine this relationship in Finland using data from the National Public Health Institute. The study utilizes annual individual health microdata from 1978 – 2002, with a sample size of 5,000 participants and a response rate of 73%. Respondents' places of residence are aggregated to 20 provinces. The second dataset from Statistics Finland captures economic conditions through the regional employment-to-population ratio and change in real GDP. The study

finds that an improvement in regional economic conditions decreases BMI, independent of physical activity.

These procyclical findings can be explained by investigating how unemployment impacts specific health-producing activities such as physical activity and eating healthy. Colman and Dave (2013) use the American Time Use Survey (ATUS), which contains over 112,000 observations collected from 2003 – 2010, to create a standardized measure based on the metabolic equivalent of task (MET) to capture physical activity. Time spent on sleeping, personal care, housework, childcare, work, education, eating and drinking, watching TV, socializing, and more are also collected. The independent variable is a one-month-lagged employment-to-population ratio obtained from the BLS. Researchers find that while job loss increases recreational exercise, TV-watching, sleeping, and housework, it decreases total physical exertion, with the effect strongest in low socioeconomic status men. The decline in total physical activity observed during recessions may be one factor explaining procyclical findings.

Additionally, changes in food consumption during recessions have also been studied. Dave and Kelly (2012) rely on Behavioral Risk Factor Surveillance System (BRFSS) data from 1990 – 2009 to explore the relationship between the monthly state-level unemployment rate and consumption of healthy versus unhealthy foods. Researchers find that unemployment is associated with reduced consumption of fruits and vegetables and increased consumption of "unhealthy" foods such as snacks and fast food, demonstrating both income and substitution effects. The effects are significant, but expectedly small: a one percentage point increase in the monthly state unemployment rate decreases the monthly frequency of fruit and vegetable consumption by 0.10-0.15 times,

while a higher unemployment rate may raise the frequency of unhealthy food consumption by 0.5-3.0%. The aggregation of these procyclical studies suggests that recessions are bad for health because they result in lower total physical activity, substitution of fruits and vegetables for unhealthy foods, and increases in BMI.

C. Countercyclical Evidence

The countercyclical group, led by C.J. Ruhm, argues that recessions are good for health because the time constraint shifts outward more than the income constraint shifts inward. Ruhm (2002) argues that leisure-time increases during economic upturns, making it easier to pursue health-producing activities such as exercise, preventative care, and healthy eating, which are time intensive. Using state unemployment rates as a proxy for economic conditions and mortality as a proxy for health, he finds that a one percentage point rise in the state unemployment rate, relative to its historical average, is associated with a 0.50-0.6% decrease in total mortality. This countercyclical relationship is explained using microdata from BRFSS, which reveal decreases in smoking and obesity, improved diet, and increased physical activity during economic downturns.

Other studies also find a countercyclical relationship between macroeconomic conditions and health, directly opposing procyclical data. Ruhm (2005) analyzes microdata from the BRFFS from 1987 – 2000, revealing a decrease in smoking and excess weight and an increase in leisure physical activity during economic downturns. The decrease in smoking affects primarily heavy smokers, weight loss occurs among the severely obese, and increases in physical activity are observed in those previously inactive. Specifically, a one percentage point drop in the employment rate reduces the estimated prevalence of smoking, obesity, and physical inactivity by 0.6%, 0.4%, and

0.7%, respectively. The employment rate is used as a proxy for economic conditions. The sample size is large, exceeding 50,000 participants in each year analyzed, with total observations of almost 1.5 million. It must be noted that these findings are short-term results of temporary economic fluctuations and do not necessarily reflect long-term health outcomes. Overall, this study suggests that unhealthy behaviors decrease when the economy deteriorates.

Countercyclical data is observed in other countries as well. Gerdtham and Ruhm (2006) use aggregate data from 23 Organization for Economic Cooperation and Development (OECD) countries from 1960 – 1997 to examine how macroeconomic conditions affect deaths. Using fixed effects models, data demonstrate that a one percentage point decrease in the national unemployment rate is associated with an increase of 0.4% in total mortality. These findings are more pronounced for countries with weak social insurance systems, as measured by the share of GDP spent on public social expenditure. Thus, an improvement in economic conditions is correlated with an increase in total mortality.

Interestingly, Zhang et al. (2014) find that the relationship between macroeconomic conditions and health changes depending on whether state-level or county-level unemployment data is analyzed. The study utilizes BRFSS data from 2007, 2009, and 2011, with a total sample size of 722,692 American adults aged 18 or older. Using multivariate linear and logistic regressions, researchers find that state unemployment rates are negatively associated with individual BMI across years, while county unemployment rates are significantly positively associated with BMI and obesity rates in all years. The positive relationship between county unemployment rates and BMI

is reduced after the economic recession of 2008 – 2009. These results indicate that macroeconomic conditions at different levels can have opposing associations with individuals' obesity risk over time.

D. Health Outcomes

Most literature focuses on two health outcomes: mortality and BMI. However, macroeconomic conditions can impact many other health outcomes including hypertension, diabetes, high cholesterol, heart disease, and strokes. Obesity is a risk factor for all these health issues, which only a few studies address. Ruhm (2003) uses microdata from the 1972 – 1981 National Health Interview Surveys to study how various physical health and medical care utilization outcomes fluctuate with macroeconomic conditions. Outcomes include reporting one or more medical problems, hospitalizations, restricted activity days, acute and chronic conditions, ischemic heart disease, chronic morbidity, and non-psychotic mental disorders. The most notable finding is the strong countercyclical pattern of heart disease, a leading cause of mortality. A one percentage point fall in the state unemployment rate is correlated with 4.3%, 13.3%, and 12.8% increases in the prevalence of ischemic heart disease for the full sample, 30-64-year-old employed individuals, and working men aged 30-55, respectively. Interestingly, mental health outcomes are procyclical, perhaps due to reduced stress during economic upturns.

Another study in Asia-Pacific countries finds a similar countercyclical relationship between the business cycle and cardiovascular disease mortality. Lin (2009) uses panel data on health outcomes, macroeconomic conditions, and medical care resources obtained from eight Asia-Pacific countries (Hong Kong, Japan, South Korea, Malaysia, the Philippines, Singapore, Taiwan and Thailand) from 1976 – 2003. The total

sample size is 224, with an average of 28 observations per country. Fixed effects models reveal that the unemployment rate is negatively and significantly associated with total mortality, cardiovascular mortality, motor vehicle accidents, and infant mortality. A one percentage point increase in the unemployment rate is correlated with a 0.9% decrease in cardiovascular disease fatalities. Estimates of 4-year lags of national unemployment rates demonstrate no evidence of lasting health impacts. This is consistent with the short-term findings of Ruhm (2005). Some studies examine the impact of the business cycle on cardiovascular disease through mortality. However, changes in the prevalence of heart disease, diabetes, hypertension, and high cholesterol over the business cycle have been ignored, representing a major gap in the literature.

Stress is a major risk factor for heart disease, hypertension, and high cholesterol. It is well-documented in the literature that stress, depression, and suicide increase during recessions, displaying a procyclical relationship. Job loss intuitively increases stress. Economic theory suggests that increased stress during recessions can also stem from future expectations of decreased income. Luo et al. (2011) analyze the relationship between suicide rates and the business cycle from 1928 – 2007 using data from the Centers for Disease Control and Prevention, Vital Statistics of the United States, U.S. Census Bureau, NBER, and BLS. Graphical analyses reveal that the overall suicide rate generally increases during recessions and falls during expansions, with varying age-specific effects. Nonparametric tests of association reveal that the overall suicide rate rose relatively in 11 of 13 recessions and fell relatively in 10 of 13 expansions. Finally, the overall suicide rate is positively and significantly correlated with the national unemployment rate, supporting a procyclical relationship.

Similarly, Latif (2015) examines the impact of the provincial unemployment rate on mental health in Canada, using longitudinal data from the National Population Health Survey from 1994 – 2006. Mental health is proxied by the short form depression scale. Fixed effects models reveal that the unemployment rate has a significant, positive impact on depression that is heterogeneous across different sub-groups such as gender, age, marital status, and education. The study notes that stress can lead to risky behaviors such as alcohol consumption, smoking, and substance use, which have long term implications in chronic conditions such as heart disease and cancer.

Ultimately, the literature remains split on how macroeconomic conditions, specifically economic downturns, impact health and obesity. My research adds new knowledge to existing literature in several ways. The first major advantage is the use of longitudinal data over a long time period. The procyclical versus countercyclical split in the literature may stem from the use of different cross-sectional data over varying, short time periods. Therefore, there is a need to analyze a single cohort over a long time period to determine the true effect of macroeconomic conditions on health. The majority of prior research on the effect of macroeconomic conditions on health has used cross-sectional data, particularly the BRFSS, producing correlational results. On the other hand, causal links can be concluded using panel data. To my knowledge, Colman and Dave (2014) are the only researchers in this field to use NLSY79 longitudinal data. However, they analyze data from 1998 – 2010, covering only two recessions. My analysis includes NLSY79 longitudinal data following a single cohort from 1979 – 2014, spanning five recessions. The second novelty of my research is the analysis of health outcomes other than mortality, weight, and obesity. Most studies use BMI as a sole measure for health, while

this thesis includes other important outcomes such as diabetes, hypertension, depression, congestive heart failure, and heart attack or myocardial infarction, which have been ignored in prior literature. These other measures of health provide greater context into the overall health and wellbeing of individuals, rather than reducing health to BMI. The third major gap in the literature is the use of unemployment as the sole proxy for macroeconomic conditions. The unemployment rate is an imperfect measure that does not account for discouraged workers and may be a flawed estimate of the business cycle. This research uses several measures of the business cycle including unemployment rate, real GDP, and a dummy variable for recession years as defined by NBER. Thus, my research examines the business cycle as a continuum rather than focusing on recessions proxied by unemployment.

CHAPTER THREE

DATA

A. Health Outcomes

Conducted by the U.S. Bureau of Labor Statistics as part of the National Longitudinal Surveys (NLS) program, the National Longitudinal Survey of Youth 1979 (NLSY79) is a nationally representative sample of 12,686 young men and women who were 14-22 years old when first surveyed in 1979. The survey gathers longitudinal information on the labor market activities, health, educational experiences, family background, family life, assets and income, and other significant life events of respondents. Participants were interviewed annually from 1979 – 1994 and biennially since then until 2014. Due to deaths, attrition, and the dropping of two subsamples, the total eligible survey sample dropped to approximately 8,400 in 1998 and 7,070 in 2014.

The NLSY79 collects information on over 2,500 variables related to health including various health conditions, mental health, healthcare usage, health insurance, health behaviors, work-related health, and cognition. Information on weight is collected in each survey year, while information on height is collected in select years. Weight and height data can be used to calculate body-mass index (BMI). Aside from BMI, the other health outcomes analyzed are diabetes, hypertension, depression, congestive heart failure, and heart attack or myocardial infarction. The creation of the health variables is described in detail in the methodology section of the subsequent chapter. I conduct a secondary analysis to examine the effect of the business cycle on health behaviors including exercise, alcohol consumption, and food choice.

Using information available from NLSY79, I control for age, education level, real annual income, poverty, region (northeast, north central, south, west), urban living (urban or rural), time period (5 year periods from 1979 – 2014), and time trends. Individual fixed effects control for time-invariant factors such as race and ethnicity and sex. It must be noted that NLSY79 data is analyzed biennially after 1994, thus effects between survey years are not accounted for.

B. Macroeconomic Conditions

I obtain macroeconomic conditions data from the National Bureau of Economic Research (NBER), which tracks U.S. business cycle expansions and contractions. NBER defines a recession as a significant decline in economic activity spread throughout the economy over several months and often reflected by real GDP, real income, employment, and other factors. A dummy variable for recession year is evaluated in separate estimations, in which recession years, as defined by NBER, are assigned a value of 1. In separate estimations, business cycles are proxied by annual real GDP and unemployment rates from Federal Reserve Economic Data (FRED) for the period 1979 – 2014. I use CPI data from FRED to deflate the nominal income data from NLSY79.

CHAPTER FOUR

METHODOLOGY

The methodology is based in the economic concepts of shifts in time and income constraints during economic expansions and recessions (Ruhm 2000; Colman and Dave 2014). I evaluate how, and to what degree, the business cycle impacts health outcomes. To determine the causal impact of macroeconomic conditions on various health outcomes, I estimate linear Ordinary Least Squares (OLS) and fixed effects regressions on longitudinal data, controlling for individual, period, and regional fixed effects as well as time and regional time trends in separate estimations. I run regressions for each health outcome (obesity, diabetes, hypertension, depression, congestive heart failure, and heart attack or myocardial infarction), using real GDP and the unemployment rate as proxies for the business cycle in separate estimations. Additional controls include age, real annual income, education level, poverty, and urban living. In my secondary analysis, I run regressions for health behaviors (vigorous exercise, light exercise, alcohol consumption, reading nutritional information on food labels, and reading ingredient information on food labels), using real GDP as the proxy for the business cycle. The estimation equations are as follows:

(1) $HealthOutcome_{it} = \beta_0 + \beta_1 BC_t + \beta_k \sum_{k=2}^{K} X_k + \gamma_i + \delta_p + \varepsilon_{it}$

(2) $HealthOutcome_{it} = \beta_0 + \beta_1 BC_t + \beta_2 (Recession_t \; x \; BC_t) + \beta_k \sum_{k=2}^{K} X_k + \gamma_i + \delta_p + \varepsilon_{it}$

Where i = individual and t = year

The variable $HealthOutcome_{it}$ represents the health outcomes studied in separate estimations, including obesity, diabetes, hypertension, depression, congestive heart failure, and heart attack or myocardial infarction. While weight data is provided annually

in NLSY79, height data is only reported in 1981, 1982, 1985, and 2006 onwards. For the years 1986 through 2004, I use the average of the heights reported in 1985 and 2006. From weight and height data, I calculate respondents' body-mass index (BMI) using the standard formula. I analyze BMI as a binary variable (obese or not obese), with obesity defined as BMI $\geq$ 30.0. It must be noted that weight and height are self-reported and thus subject to error. For the other health outcomes, respondents report the year in which they were first diagnosed by a physician with the respective diseases. I create binary variables for each health outcome, assigning a value of 1 for years in which respondents were first diagnosed with diseases and a value of 0 for all other years. If respondents were diagnosed in odd years from 1995 – 2013, these values are shifted to even years from 1996 – 2014 since NLSY79 data is collected biennially after 1994. This methodology identifies all new cases of each disease for each year. In the secondary analysis, $HealthOutcome_{it}$ represents health behaviors including vigorous and light exercise (measured in hours/week), alcohol consumption (measured in number of days alcohol was consumed in the last month), and food choice (binary variables measuring whether or not individuals looked at nutritional and ingredient information on labels when purchasing food). Data for health behaviors was analyzed biennially from 2002 – 2014 for all variables excluding alcohol consumption data from 2004, which was missing.

The variable BC_t is the business cycle, measured by the unemployment rate and real GDP in separate estimations. $Recession_t$ is a dummy variable equal to 1 if it is a recession year and 0 otherwise. The sign of β_1 in estimation (1) reveals whether $HealthOutcome_{it}$ is procyclical or countercyclical. The sign of β_2 in estimation (2) reveals how a recession year affects $HealthOutcome_{it}$ relative to the normal business

cycle. β_0 is the expected $HealthOutcome_{it}$ if it is not a recession year. X_k are individual level control variables such as age and real income. γ_i are individual fixed effects, which capture all time-invariant individual characteristics such as race, ethnicity, and sex. δ_p are period fixed effects, which capture all other macroeconomic shocks apart from expansions and recessions, such as policy changes, terrorist attacks or presidential elections. Fixed effects OLS regressions control for individual, period, and regional fixed effects. Additional controls include time trend and regional time trend to control for the general trends of variables over time. ε_{it} is the error term for unobservable effects not accounted for by the model and which are uncorrelated to the independent variables.

CHAPTER FIVE

DESCRIPTIVE STATISTICS

The continuous variables in the study include BMI, age, GDP, the unemployment rate, and real income. The mean BMI of the sample is 25.021±5.515 (Table 1). Thus, the average person in the sample is overweight. The average age of the sample is 32.005 ± 9.876 years (Table 1). The average GDP from 1979 – 2014 is $10.662 ± $3.279 billion dollars (Table 1). The average unemployment rate from 1979 – 2014 is 6.585% ± 1.488% (Table 1). The average real income of the sample is $32.369 ± $70.393 thousand dollars (Table 1). Thus, there is a large range in real income.

This study examines six health outcomes. The prevalence of obesity, diabetes, hypertension, depression, congestive heart failure, and heart attack or myocardial infarction in the sample are 16.071%, 0.335%, 0.881%, 0.343%, 0.042%, and 0.073%, respectively (Table 2). The majority of the obese population are ages 20-49 (Table 3). Most of the sample diagnosed with diabetes are 40-49 years old (Table 3). Similarly, the disease burden of hypertension, depression, congestive heart failure, and heart attack or myocardial infarction is greatest in those 40-49 years old (Table 3). Since the disease burden of the sample is distributed disproportionately among those 40-49 years old, age is a risk factor for chronic diseases. Thus, I control for age in my regression estimations.

CHAPTER SIX

RESULTS

A. Unemployment Rate and Health

Health varies countercyclically with the business cycle. The first proxy used for the business cycle is unemployment rate. Health generally improves as the unemployment rate increases. All reported effects are statistically significant at a 1% level of significance unless otherwise stated. Statistical insignificance is evaluated at a 5% level of significance. Table 4 shows the relationship between the unemployment rate and obesity. A one percentage point increase in the unemployment rate decreases the probability of obesity by 0.0068%. This effect diminishes to -0.0033% after controlling for the time trend and individual, period, and regional fixed effects, but remains statistically significant. Interacting recession year and unemployment rate yields a coefficient of -0.0005, indicating that a recession year increases the negative effect of unemployment rate on probability of obesity. Age is a risk factor for obesity. Each additional year of life increases the probability of obesity by 0.0114%. Controlling for individual, period, and regional fixed effects decreases the effect of age to 0.0105%. Poverty decreases the probability of obesity by 0.96%, controlling for individual fixed effects. This finding remains statistically significant after controlling for time trends and individual, period, and regional fixed effects. Real income, education level, and urban living have statistically insignificant effects on the probability of obesity.

Table 6 shows that the unemployment rate and hypertension have an inverse relationship. A one percentage point increase in the unemployment rate decreases the probability of hypertension by 0.0014%. Controlling for individual, period, and regional

fixed effects reduces this effect to -0.0008%. The effect of the unemployment rate on hypertension becomes less significant once time trends are controlled for, suggesting that changes in hypertension are primarily caused by other time variant factors. Interacting recession year and unemployment rate yields a coefficient of 0.0002, indicating that a recession year reduces the negative effect of unemployment rate on probability of hypertension at a significance level of 5%. The probability of hypertension increases as age increases: each additional year of life increases the probability of hypertension by 0.0012%. After controlling for time trends and individual, period, and regional fixed effects, age has an even greater impact on the probability of hypertension, increasing it by 0.0023%. Thus, controlling for time trends reveals that age may be a more important determinant of hypertension than the unemployment rate. Real income, education level, poverty, and urban living have statistically insignificant effects on the probability of hypertension.

The unemployment rate has a statistically insignificant effect on the probability of diabetes, depression, congestive heart failure, or heart attack or myocardial infarction (Table 5; Table 7; Table 8; Table 9). Age, real income, education level, poverty, and urban living have a statistically insignificant impact on probability of diabetes or depression (Table 5; Table 7). Education level is associated with the probability of heart disease. Compared to college-educated individuals, those with some high school or college education have a 0.06% to 0.08% increased probability of congestive heart failure at a 5% level of significance (Table 8). Similarly, when controlling for the time trend and individual, period, and regional fixed effects, those with some high school or college education have a 0.17% to 0.19% increased probability of heart attack or myocardial

infarction, compared to college-educated individuals (Table 9). Age, real income, poverty, and urban living have statistically insignificant effects on probability of heart disease (Table 8; Table 9).

B. Real GDP and Health

The natural log of real GDP is used as another proxy for the business cycle. The same countercyclical relationship between the business cycle and health is observed when using real GDP as a proxy. All reported effects are statistically significant at a 1% level of significance unless otherwise stated. Statistical insignificance is evaluated at a 5% level of significance. Table 10 shows the relationship between real GDP and obesity. A 1% increase in real GDP increases the probability of obesity by 0.2907%. Controlling for individual and period fixed effects reduces this effect to 0.2637%. A recession year has a statistically insignificant effect on the relationship between real GDP and probability of obesity. Poverty and urban living significantly impact obesity. An individual in poverty is 1.01% less likely to be obese compared to an individual not in poverty, controlling for individual fixed effects. This effect decreases in magnitude as time trends and period and regional fixed effects are accounted for, but remains statistically significant. Compared to individuals living in rural areas, living in an urban area increases the probability of obesity by 0.93% at a 5% level of significance, controlling for time trend and individual, period, and regional fixed effects. Age, real income, and education level have statistically insignificant effects on probability of obesity.

The probability of diabetes, hypertension, and depression increase as real GDP rises (Table 11; Table 12; Table 13). Controlling for individual and period fixed effects, a

1% increase in real GDP increases the probability of diabetes, hypertension, and depression by 0.0207%, 0.1018%, and 0.0300%, respectively. A recession year increases the effect of real GDP on probability of diabetes, hypertension, and depression by 0.0001% at a 5% level of significance. Age, real income, education level, poverty, and urban living have statistically insignificant effects on probability of diabetes, hypertension, and depression.

Real GDP has a statistically insignificant effect on the probability of heart disease (Table 14; Table 15). After controlling for individual and period fixed effects, the effect of real GDP on congestive heart failure and heart attack or myocardial infarction becomes statistically insignificant. Education level significantly impacts the probability of heart disease. Compared to college-education individuals, those with some high school or college education have a 0.06% to 0.08% increased probability of congestive heart failure at a 5% level of significance (Table 14). Similarly, when controlling for the time trend and individual, period, and regional fixed effects, those with some high school or college education have a 0.17% to 0.19% increased probability of heart attack or myocardial infarction, compared to college-educated individuals (Table 15). Age, real income, poverty, and urban living have statistically insignificant effects on probability of heart disease.

A secondary analysis of the relationship between real GDP and health behaviors explains these countercyclical findings. Table 16 shows the association between real GDP and vigorous exercise, light exercise, alcohol consumption, reading nutritional information on food labels, and reading ingredient information on food labels, controlling for individual, period, and regional fixed effects. A 1% increase in real GDP reduces

vigorous and light exercise by 2.484 and 1.834 hours per week, respectively. A 1% increase in real GDP increases alcohol consumption by 1.447 days per month. A 1% increase in real GDP increases reading nutritional and ingredient information on food labels by 0.371% and 0.322%, respectively.

CHAPTER SEVEN

DISCUSSION

I find that health varies countercyclically with the business cycle, with the probability of disease decreasing during recessions. The differential impact of real GDP and unemployment rate on health may be because the unemployment rate does not consider discouraged workers, separate between part-time versus full-time workers, or account for the quality of jobs. Since the labor force participation rate has steadily declined since 2008, the unemployment rate may not be the most accurate measure of the labor market or the business cycle (Bureau of Labor Statistics 2019). Perhaps real GDP is a better indicator of economic conditions, capturing effects that the unemployment rate does not.

The results of this study are consistent with the previous countercyclical findings of Ruhm (2005) and Zhang et al. (2014). I find that the effect of macroeconomic conditions on obesity prevalence is an order of magnitude smaller than the findings of Ruhm (2005), perhaps because he uses the employment rate as a proxy for the business cycle instead of the unemployment rate. Additionally, Ruhm (2005) analyzes three categories for BMI (overweight, obese, and severely obese), while this study analyzes BMI as a binary variable (obese or not obese). Finally, Ruhm (2005) uses cross-sectional data, which does not control for unobservable heterogeneity such as genetics, culture, and health behaviors. Thus, my use of panel data and stringent individual and time fixed effects explains the smaller magnitude of effect. Zhang et al. (2014) find that state unemployment rates are negatively associated with individual BMI, in agreement with my findings. However, the results that health declines as the economy improves directly

contradict previous findings of a procyclical relationship between local economic conditions and health (Charles and DeCicca 2008; Colman and Dave 2014; Latif 2014). This suggests that micro- and macro- economic conditions may have opposing effects on health.

My findings provide new information on the relationship between the business cycle and health outcomes other than obesity, which few other studies have examined. While Ruhm (2003) and Lin (2009) find that the unemployment rate negatively and significantly impacts cardiovascular disease, I do not find any significant impact of real GDP or unemployment rate on heart disease. Ruhm (2003) uses cross-sectional data, while Lin (2009) studies cardiovascular mortality in Asian-Pacific countries, which may contribute to the disparity in our findings. My research is the first to examine the relationship between macroeconomic conditions and prevalence of diabetes and hypertension. Obesity is a risk factor for diabetes and hypertension, with all three diseases being significantly associated (Kotsis et al. 2005; Mokdad et al. 2003). Thus, my findings that diabetes and hypertension also vary countercyclically with the business cycle are logical. Latif (2015) and Luo et al. (2011) find a procyclical relationship between the unemployment rate and depression. I do not find any significant relationship between the business cycle and depression when the unemployment rate is used as a proxy. Interestingly, I find that depression increases when real GDP increases, which may be due to work-related stress during economic upturns (Siegrist 2008; Tennant 2001).

There are several economic explanations for why health may improve during recessions. The first argument is that during economic downturns, the time constraint

shifts outward more than the income constraint shifts inward. When unemployment is high, the opportunity cost of time is low. Thus, people have more time to invest in health-producing activities such as exercising and cooking home-cooked meals. Ruhm (2000) finds that a one percentage point increase in the state unemployment rate is associated with a roughly 1% increase in regular physical activity and a 2% decrease in daily intake of dietary fat. Unemployment is associated with increased recreational and leisure-time exercise (Colman and Dave 2013; Colman and Dave 2014). Among the unemployed, those who exercise more have better mental health (Underlid 1996). Conversely, when employment is high, people are less likely to invest in time-intensive, health-producing activities. Xu (2013) emphasizes the importance of time in health production, finding that increasing wages and hours worked during economic upturns is associated with greater cigarette consumption, less physical activity, and fewer physician visits. Additionally, expansions are generally associated with increased unhealthy behaviors such as cigarette and alcohol consumption (Charles and DeCicca 2008; Ruhm 2000; Ruhm 2005; Ruhm and Black 2002). This is consistent with my findings that exercises decreases and alcohol consumption increases as real GDP rises. Thus, the relative time-intensiveness of health-producing activities may explain why health improves during economic contractions.

Another explanation is the relationship between income and eating habits. It is well established that those of lower socioeconomic status tend to have less healthy diets (Shahar et al. 2005; Xie et al. 2003). While obesity is often associated with poverty, recent increases in obesity have disproportionately occurred in higher income brackets (Chang and Lauderdale 2005). This may be because higher income and socioeconomic status is associated with eating out more (Lachat et al. 2012; Ma et al. 2006). Thus, as the

economy improves and people have more disposable income, their consumption of commercially prepared foods increases. Eating out is in turn associated with poorer nutrition, obesity, and lower health outcomes (Bezerra and Sichieri 2009). Part of this increasing obesity is due to large marketplace food portions (Young and Nestle 2002). My secondary analysis shows that people become more aware of their food choices as the economy improves by paying greater attention to nutritional and ingredient information on food labels. However, this positive effect may be outweighed by increased eating out and other unhealthy behaviors in combination with reduced exercise. Contrarily, when the economy declines, people have less disposable income to spend on eating out, which may explain decreased obesity and improved health. Additionally, decreased income may lead to eating less in general. Those with lower family income living at less than 131% of poverty have lower dietary fiber intake (Storey and Anderson 2014). Therefore, changes in eating behaviors over the business cycle as the income constraint shifts may explain why health is countercyclical.

The relationship between income inequality and health may also explain why health varies countercyclically with the business cycle. While many assume that a rising tide lifts all boats, the business cycle does not impact income quintiles uniformly (Hoover et al. 2009). Income inequality in the U.S. has risen steadily since the 1980s, during both recessions and expansions (Congressional Budget Office 2018). Thus, economic upturns may disproportionately benefit higher income groups, leading to increased income inequality. Meta-analyses have shown that increased income inequality is associated with worse population health outcomes (Pickett and Wilkinson 2015; Wilkinson and Pickett 2006). Additionally, income inequality is positively correlated with obesity prevalence

and diabetes mortality (Pickett et al. 2005). Interestingly, these findings may be mediated by relative deprivation, which is associated with higher probability of death, worse self-reported health, and higher BMI (Eibner and Evans 2005). Thus, health may decline as the economy improves due to greater income inequality.

Finally, increased work-related stress during economic expansions may explain worse health outcomes. First, work stress is associated with obesity and increased BMI (Brunner et al. 2007; Kouvonen et al. 2005; Luckhaupt et al. 2014). This may be because work stress promotes unhealthy eating and sedentary lifestyles. Second, occupational stress and low emotional support are linked to increased prevalence of type 2 diabetes in women (Agardh et al. 2003; Norberg et al. 2007). Third, job strain is positively associated with cardiovascular disease, particularly among men (Belkic et al. 2004; Eller et al. 2009; Kivimäki et al. 2006). Finally, work stress has even been shown to precipitate depression and anxiety in previously healthy young workers, which may explain my finding that real GDP and depression are positively correlated (Melchior et al. 2007). Ultimately, as the economy improves, health may decline due to increased occupational stress.

Worsening health has several economic consequences including lower productivity and higher healthcare costs. Goetzel et al. (2004) estimate that for employers, the economic burden of illness for hypertension, heart disease, and depression and other mental illnesses is $392, $368, and $348 per employee per year, respectively. Worldwide, obesity accounts for 0.7%-2.3% of a country's total health expenditures, with medical costs for obese people about 30% higher than normal weight people (Withrow and Alter 2011). The combined medical costs associated with treatment of obesity and

associated diseases including diabetes, heart disease, and cancer are estimated to increase by $48-$66 billion per year in the U.S. by 2030 (Wang et al. 2011). Clearly, poor population health is expensive and may warrant public policies to combat these negative economic effects.

CHAPTER EIGHT

CONCLUSION

This thesis utilizes economic theory and fixed effects regression models to analyze the relationship between macroeconomic conditions and health. I examine the impact of the business cycle on prevalence of obesity, diabetes, hypertension, depression, congestive heart failure, and heart attack or myocardial infarction. I find that health varies countercyclically with the business cycle when both real GDP and the unemployment rate are used as proxies. As the economy improves, the probability of obesity, diabetes, hypertension, and depression increase and health declines. The business cycle does not significantly impact probability of heart disease. I identify other factors such as age, education level, poverty, and urban living that significantly impact the probability of disease. I make several contributions to existing literature by analyzing longitudinal data over 30 years, examining a variety of health outcomes to capture overall health and wellbeing, and using two proxies for the business cycle. Several theoretical explanations exist for why health varies countercyclically with the business cycle including time and income constraints, individual behavior, income inequality, and work-related stress. NLSY79 collects data that can be used to study these theories. However, given the limited time available, I did not test these theories or analyze all the health outcomes data available from NLSY79. Future research can broaden the scope of study to include explanatory variables and more health outcomes such as asthma. The results of my thesis add valuable and new knowledge to the existing procyclical versus countercyclical debate in the literature. By estimating the health costs of economic growth, these findings have implications for both public health and economic policy.

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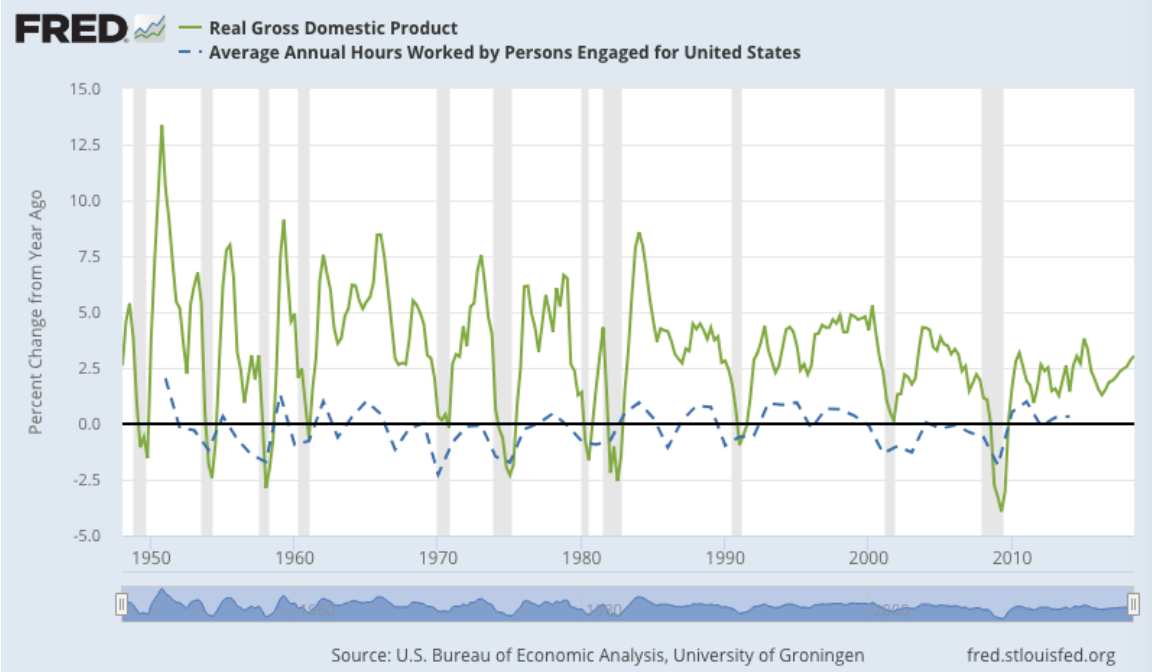
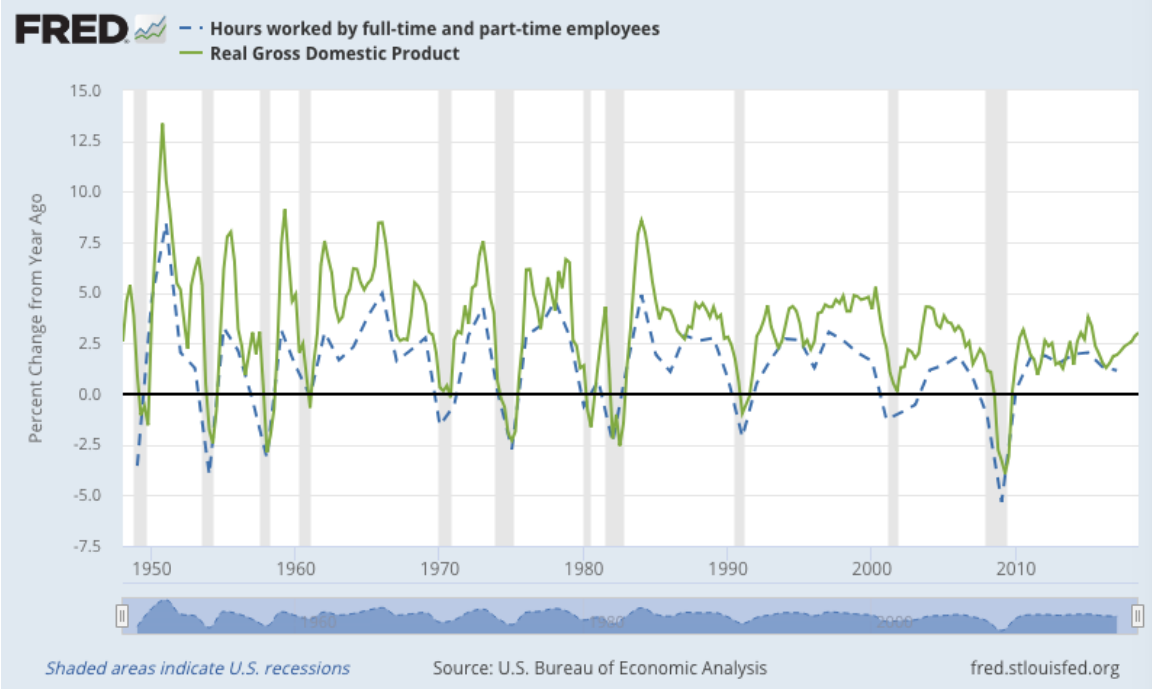
Figure 1. Real GDP and Average Annual Hours Worked



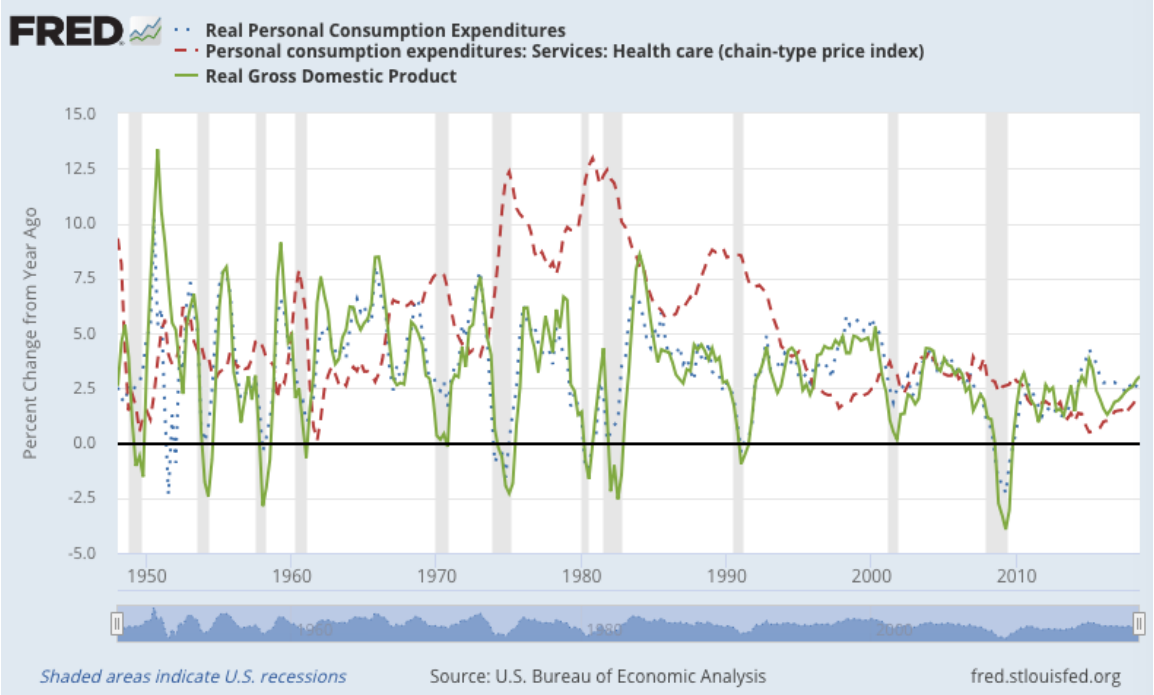
Note: Percent change from a year ago of quarterly real gross domestic product in billions of chained 2012 dollars with seasonally adjusted annual rate (solid, green line) and percent change from a year ago of average annual hours worked by persons engaged for United States in millions of hours, not seasonally adjusted (dashed, blue line) from 1948-2018. Shaded areas represent U.S. recessions.
Source: U.S. Bureau of Economic Analysis, retrieved from FRED, Federal Reserve Bank of St. Louis, https://fred.stlouisfed.org/, November 7, 2018.

Figure 2. Real GDP and Hours Worked by Part-time and Full-time Employees



Note: Percent change from a year ago of quarterly real gross domestic product in billions of chained 2012 dollars with seasonally adjusted annual rate (solid, green line) and percent change from a year ago of hours worked by full-time and part-time employees in millions of hours, not seasonally adjusted (dashed, blue line) from 1948-2018. Shaded areas represent U.S. recessions.
Source: U.S. Bureau of Economic Analysis, retrieved from FRED, Federal Reserve Bank of St. Louis, https://fred.stlouisfed.org/, November 7, 2018.

Figure 3. Real GDP and Consumption Expenditures



Note: Percent change from a year ago of quarterly real gross domestic product in billions of chained 2012 dollars with seasonally adjusted annual rate (solid, green line), percent change from a year ago of quarterly real personal consumption expenditures in billions of chained 2012 dollars with seasonally adjusted annual rate (dotted, blue line), and percent change from a year ago of quarterly health care services personal consumption expenditures with 2012 chain-type price index, seasonally adjusted (dashed, red line) from 1948-2018. Shaded areas represent U.S. recessions.
Source: U.S. Bureau of Economic Analysis, retrieved from FRED, Federal Reserve Bank of St. Louis, https://fred.stlouisfed.org/, November 7, 2018.

Table 1. Descriptive Statistics

Variable	N	Mean	SD	Min	Max
BMI	325,910	25.021	5.515	3.725	176.414
Age	329,836	32.005	9.876	14.000	58.000
GDP (in billions of dollars)	329,836	10.662	3.279	6.759	16.900
Unemployment Rate	329,836	6.585	1.488	4.000	9.700
Real Income (in thousands of dollars)	231,051	32.369	70.393	0.000	1181.790

Table 2. Prevalence of Disease in Sample

Disease	Prevalence in Sample
Obesity	16.071%
Diabetes	0.335%
Hypertension	0.881%
Depression	0.343%
Congestive Heart Failure	0.042%
Heart Attack or Myocardial Infarction	0.073%

Note: Reported percentages are percent of sample with disease.

Table 3. Age Distribution of Disease Burden

Age Group	% Obese	% Diabetes	% Hypertension	% Depression	% Congestive Heart Failure	% Heart Attack or Myocardial Infarction
14-19	2.504	0.996	1.308	1.591	0.714	0.417
20-29	23.508	6.612	6.021	8.303	1.428	3.335
30-39	31.772	25.999	27.899	27.032	15.713	17.500
40-49	29.570	51.994	52.322	50.089	57.859	60.003
50-58	12.647	14.402	12.453	12.986	24.286	18.747

Note: Reported percentages are distribution of diseased population by age group.

Table 4. The Effect of Unemployment Rate on Obesity

VARIABLES	(1) OLS	(2) FE OLS	(3) FE OLS	(4) FE OLS	(5) FE OLS	(6) FE OLS	(7) FE OLS
Unemployment Rate	-0.0068***	-0.0036***	-0.0016**	-0.0016**	-0.0033***	-0.0027***	-0.0014*
	(0.0007)	(0.0006)	(0.0008)	(0.0008)	(0.0008)	(0.0008)	(0.0008)
Recession#UnemploymentRate							-0.0005***
							(0.0002)
Age	0.0114***	0.0105***	0.0105***	0.0105***	0.0029*	0.0056***	0.0106***
	(0.0002)	(0.0002)	(0.0005)	(0.0005)	(0.0016)	(0.0014)	(0.0005)
ln(realincome)	-0.0039***	-0.0012	-0.0012	-0.0011	-0.0015	-0.0014	-0.0013
	(0.0008)	(0.0009)	(0.0011)	(0.0011)	(0.0011)	(0.0011)	(0.0011)
Education = 1, Some Elementary Education	0.0670***	0.0121	0.0115	0.0126	0.0119	0.0118	0.0112
	(0.0198)	(0.0534)	(0.0537)	(0.0537)	(0.0536)	(0.0536)	(0.0537)
Education = 2, Some Middle School Education	0.1154***	0.0249	0.0237	0.0239	0.0238	0.0247	0.0235
	(0.0108)	(0.0248)	(0.0248)	(0.0248)	(0.0248)	(0.0248)	(0.0248)
Education = 3, Some High School Education	0.1007***	0.0079	0.0084	0.0078	0.0083	0.0087	0.0084
	(0.0093)	(0.0158)	(0.0158)	(0.0159)	(0.0159)	(0.0158)	(0.0158)
Education = 4, Some College Education	0.0633***	0.0138	0.0141	0.0133	0.0134	0.0142	0.0140
	(0.0093)	(0.0149)	(0.0149)	(0.0149)	(0.0149)	(0.0149)	(0.0149)
Poverty = 1, In Poverty	0.0159***	-0.0096***	-0.0092***	-0.0092***	-0.0094***	-0.0090***	-0.0094***
	(0.0032)	(0.0032)	(0.0032)	(0.0032)	(0.0032)	(0.0032)	(0.0032)
Urban = 1, Urban	-0.0065***	0.0072*	0.0085**	0.0089**	0.0088**	0.0084**	0.0085**
	(0.0024)	(0.0042)	(0.0042)	(0.0042)	(0.0042)	(0.0042)	(0.0042)
Constant	-0.1790***	-0.1292***	-0.1461***	-0.1374***	-0.0008	-0.0588*	-0.1461***
	(0.0129)	(0.0185)	(0.0197)	(0.0212)	(0.0332)	(0.0300)	(0.0197)
Observations	153,582	153,582	153,582	153,437	153,437	153,582	153,582
R-squared	0.0832	0.1344	0.1352	0.1354	0.1356	0.1356	0.1352
Individual FE	NO	YES	YES	YES	YES	YES	YES
Period FE	NO	NO	YES	YES	YES	YES	YES
Regional FE	NO	NO	NO	YES	YES	NO	NO
Time Trend	NO	NO	NO	NO	YES	NO	NO
Regional Time Trend	NO	NO	NO	NO	NO	YES	NO
Number of ID		12,028	12,028	12,025	12,025	12,028	12,028

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5. The Effect of Unemployment Rate on Diabetes

VARIABLES	(1) OLS	(2) FE OLS	(3) FE OLS	(4) FE OLS	(5) FE OLS	(6) FE OLS	(7) FE OLS
Unemployment Rate	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0000	-0.0001
	(0.0001)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Recession#UnemploymentRate							0.0001**
							(0.0001)
Age	0.0005***	0.0005***	0.0003**	0.0003**	0.0003	0.0006	0.0003**
	(0.0000)	(0.0000)	(0.0001)	(0.0001)	(0.0005)	(0.0006)	(0.0001)
ln(realincome)	-0.0004***	-0.0004***	-0.0001	-0.0001	-0.0001	-0.0000	-0.0000
	(0.0001)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Education = 1, Some Elementary Education	0.0022	0.0100	0.0095	0.0094	0.0094	0.0096	0.0096
	(0.0040)	(0.0123)	(0.0123)	(0.0124)	(0.0124)	(0.0124)	(0.0123)
Education = 2, Some Middle School Education	0.0017	-0.0054	-0.0060	-0.0061	-0.0061	-0.0059	-0.0060
	(0.0021)	(0.0052)	(0.0052)	(0.0052)	(0.0052)	(0.0052)	(0.0052)
Education = 3, Some High School Education	0.0015	0.0013	0.0011	0.0011	0.0011	0.0011	0.0011
	(0.0019)	(0.0024)	(0.0024)	(0.0024)	(0.0024)	(0.0024)	(0.0024)
Education = 4, Some College Education	0.0007	0.0009	0.0010	0.0010	0.0010	0.0010	0.0010
	(0.0019)	(0.0022)	(0.0022)	(0.0022)	(0.0022)	(0.0022)	(0.0022)
Poverty = 1, In Poverty	0.0001	-0.0004	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001
	(0.0005)	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)
Urban = 1, Urban	-0.0000	-0.0005	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001
	(0.0004)	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)
Constant	-0.0073***	-0.0070**	-0.0048	-0.0042	-0.0050	-0.0113	-0.0048
	(0.0026)	(0.0031)	(0.0036)	(0.0037)	(0.0088)	(0.0115)	(0.0036)
Observations	153,582	153,582	153,582	153,437	153,437	153,582	153,582
R-squared	0.0045	0.0039	0.0049	0.0049	0.0049	0.0049	0.0049
Individual FE	NO	YES	YES	YES	YES	YES	YES
Period FE	NO	NO	YES	YES	YES	YES	YES
Regional FE	NO	NO	NO	YES	YES	NO	NO
Time Trend	NO	NO	NO	NO	YES	NO	NO
Regional Time Trend	NO	NO	NO	NO	NO	YES	NO
Number of ID		12,028	12,028	12,025	12,025	12,028	12,028

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 6. The Effect of Unemployment Rate on Hypertension

VARIABLES	(1) OLS	(2) FE OLS	(3) FE OLS	(4) FE OLS	(5) FE OLS	(6) FE OLS	(7) FE OLS
Unemployment Rate	-0.0014***	-0.0012***	-0.0008***	-0.0008***	-0.0005*	-0.0005*	-0.0009***
	(0.0002)	(0.0002)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Recession#UnemploymentRate							0.0002**
							(0.0001)
Age	0.0012***	0.0012***	0.0009***	0.0009***	0.0023***	0.0023***	0.0009***
	(0.0000)	(0.0001)	(0.0002)	(0.0002)	(0.0008)	(0.0008)	(0.0002)
ln(realincome)	-0.0007***	-0.0011***	-0.0003	-0.0003	-0.0002	-0.0002	-0.0002
	(0.0002)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Education = 1, Some Elementary Education	-0.0023	0.0048	0.0031	0.0028	0.0030	0.0033	0.0032
	(0.0051)	(0.0130)	(0.0132)	(0.0131)	(0.0131)	(0.0132)	(0.0132)
Education = 2, Some Middle School Education	0.0031	-0.0109	-0.0131	-0.0133	-0.0133	-0.0129	-0.0130
	(0.0034)	(0.0082)	(0.0081)	(0.0082)	(0.0081)	(0.0081)	(0.0081)
Education = 3, Some High School Education	0.0040	-0.0001	-0.0009	-0.0010	-0.0011	-0.0010	-0.0009
	(0.0031)	(0.0043)	(0.0042)	(0.0043)	(0.0042)	(0.0043)	(0.0042)
Education = 4, Some College Education	0.0027	-0.0012	-0.0011	-0.0012	-0.0012	-0.0011	-0.0011
	(0.0031)	(0.0040)	(0.0040)	(0.0040)	(0.0040)	(0.0040)	(0.0040)
Poverty = 1, In Poverty	0.0008	-0.0015	-0.0009	-0.0009	-0.0009	-0.0008	-0.0009
	(0.0008)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)
Urban = 1, Urban	-0.0024***	-0.0025**	-0.0011	-0.0011	-0.0011	-0.0011	-0.0012
	(0.0007)	(0.0012)	(0.0012)	(0.0012)	(0.0012)	(0.0012)	(0.0012)
Constant	-0.0111***	-0.0051	-0.0057	-0.0073	-0.0317**	-0.0302**	-0.0058
	(0.0042)	(0.0052)	(0.0059)	(0.0062)	(0.0149)	(0.0150)	(0.0059)
Observations	153,582	153,582	153,582	153,437	153,437	153,582	153,582
R-squared	0.0117	0.0099	0.0130	0.0130	0.0131	0.0132	0.0130
Individual FE	NO	YES	YES	YES	YES	YES	YES
Period FE	NO	NO	YES	YES	YES	YES	YES
Regional FE	NO	NO	NO	YES	YES	NO	NO
Time Trend	NO	NO	NO	NO	YES	NO	NO
Regional Time Trend	NO	NO	NO	NO	NO	YES	NO
Number of ID		12,028	12,028	12,025	12,025	12,028	12,028

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 7. The Effect of Unemployment Rate on Depression

VARIABLES	(1) OLS	(2) FE OLS	(3) FE OLS	(4) FE OLS	(5) FE OLS	(6) FE OLS	(7) FE OLS
Unemployment Rate	-0.0003**	-0.0002	0.0000	0.0000	-0.0000	-0.0000	-0.0000
	(0.0001)	(0.0001)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Recession#UnemploymentRate							0.0001**
							(0.0001)
Age	0.0005***	0.0004***	0.0002	0.0002	-0.0001	-0.0001	0.0002
	(0.0000)	(0.0000)	(0.0001)	(0.0001)	(0.0004)	(0.0004)	(0.0001)
ln(realincome)	-0.0010***	-0.0005***	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003
	(0.0001)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Education = 1, Some Elementary Education	-0.0085***	-0.0122*	-0.0128*	-0.0129*	-0.0129*	-0.0129*	-0.0127*
	(0.0024)	(0.0068)	(0.0066)	(0.0066)	(0.0066)	(0.0066)	(0.0066)
Education = 2, Some Middle School Education	-0.0035	-0.0023	-0.0028	-0.0028	-0.0028	-0.0029	-0.0028
	(0.0025)	(0.0053)	(0.0053)	(0.0053)	(0.0053)	(0.0053)	(0.0053)
Education = 3, Some High School Education	-0.0038	-0.0056*	-0.0056*	-0.0057*	-0.0056*	-0.0057*	-0.0056*
	(0.0024)	(0.0033)	(0.0033)	(0.0033)	(0.0033)	(0.0033)	(0.0033)
Education = 4, Some College Education	-0.0028	-0.0041	-0.0041	-0.0041	-0.0041	-0.0042	-0.0041
	(0.0024)	(0.0032)	(0.0032)	(0.0032)	(0.0032)	(0.0032)	(0.0032)
Poverty = 1, In Poverty	-0.0004	-0.0007	-0.0005	-0.0005	-0.0005	-0.0005	-0.0004
	(0.0005)	(0.0007)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)
Urban = 1, Urban	-0.0008*	-0.0011	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007
	(0.0004)	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)
Constant	0.0044	0.0030	0.0044	0.0025	0.0082	0.0091	0.0044
	(0.0029)	(0.0037)	(0.0042)	(0.0043)	(0.0089)	(0.0074)	(0.0042)
Observations	153,582	153,582	153,582	153,437	153,437	153,582	153,582
R-squared	0.0039	0.0031	0.0042	0.0042	0.0042	0.0042	0.0042
Individual FE	NO	YES	YES	YES	YES	YES	YES
Period FE	NO	NO	YES	YES	YES	YES	YES
Regional FE	NO	NO	NO	YES	YES	NO	NO
Time Trend	NO	NO	NO	NO	YES	NO	NO
Regional Time Trend	NO	NO	NO	NO	NO	YES	NO
Number of ID		12,028	12,028	12,025	12,025	12,028	12,028

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 8. The Effect of Unemployment Rate on Congestive Heart Failure

VARIABLES	(1) OLS	(2) FE OLS	(3) FE OLS	(4) FE OLS	(5) FE OLS	(6) FE OLS	(7) FE OLS
Unemployment Rate	-0.0001**	-0.0001**	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
	(0.0000)	(0.0000)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Recession#UnemploymentRate							-0.0000
							(0.0000)
Age	0.0001***	0.0001***	0.0001***	0.0001***	0.0002	0.0002	0.0001***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0001)	(0.0000)
ln(realincome)	-0.0002***	-0.0002**	-0.0002*	-0.0002*	-0.0002*	-0.0001*	-0.0002*
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Education = 1, Some Elementary Education	0.0002**	0.0001	-0.0000	0.0000	0.0000	-0.0000	-0.0000
	(0.0001)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)
Education = 2, Some Middle School Education	0.0012***	-0.0003	-0.0004	-0.0004	-0.0004	-0.0003	-0.0004
	(0.0005)	(0.0024)	(0.0024)	(0.0024)	(0.0024)	(0.0024)	(0.0024)
Education = 3, Some High School Education	0.0007***	0.0008***	0.0008**	0.0008**	0.0008**	0.0008**	0.0008**
	(0.0001)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Education = 4, Some College Education	0.0006***	0.0007***	0.0006***	0.0006***	0.0006***	0.0006***	0.0006***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Poverty = 1, In Poverty	-0.0002	-0.0004**	-0.0004*	-0.0004*	-0.0004*	-0.0004*	-0.0004*
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Urban = 1, Urban	-0.0002	-0.0001	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
	(0.0001)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Constant	-0.0000	-0.0003	-0.0014*	-0.0013	-0.0028	-0.0027	-0.0014*
	(0.0005)	(0.0006)	(0.0008)	(0.0009)	(0.0028)	(0.0022)	(0.0008)
Observations	153,582	153,582	153,582	153,437	153,437	153,582	153,582
R-squared	0.0008	0.0008	0.0013	0.0013	0.0013	0.0014	0.0013
Individual FE	NO	YES	YES	YES	YES	YES	YES
Period FE	NO	NO	YES	YES	YES	YES	YES
Regional FE	NO	NO	NO	YES	YES	NO	NO
Year FE	NO	NO	NO	NO	YES	NO	NO
Time Trend	NO	NO	NO	NO	NO	YES	NO
Regional Time Trend		12,028	12,028	12,025	12,025	12,028	12,028

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 9. The Effect of Unemployment Rate on Heart Attack or Myocardial Infarction

VARIABLES	(1) OLS	(2) FE OLS	(3) FE OLS	(4) FE OLS	(5) FE OLS	(6) FE OLS	(7) FE OLS
Unemployment Rate	-0.0001*	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Recession#UnemploymentRate							-0.0000
							(0.0000)
Age	0.0001***	0.0001***	0.0001*	0.0001*	0.0000	0.0000	0.0001*
	(0.0000)	(0.0000)	(0.0001)	(0.0001)	(0.0002)	(0.0002)	(0.0001)
ln(realincome)	-0.0001***	-0.0002***	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001
	(0.0000)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Education = 1, Some Elementary Education	0.0004***	0.0026**	0.0024*	0.0024*	0.0024*	0.0023*	0.0024*
	(0.0001)	(0.0013)	(0.0013)	(0.0013)	(0.0013)	(0.0013)	(0.0013)
Education = 2, Some Middle School Education	0.0032***	0.0047	0.0045	0.0045	0.0045	0.0045	0.0045
	(0.0007)	(0.0030)	(0.0030)	(0.0030)	(0.0030)	(0.0030)	(0.0030)
Education = 3, Some High School Education	0.0016***	0.0020***	0.0019***	0.0019***	0.0019***	0.0018***	0.0019***
	(0.0002)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)
Education = 4, Some College Education	0.0011***	0.0017***	0.0017***	0.0017***	0.0017***	0.0016***	0.0017***
	(0.0001)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)
Poverty = 1, In Poverty	0.0001	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001
	(0.0002)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Urban = 1, Urban	-0.0001	0.0004	0.0005	0.0005	0.0005	0.0005*	0.0005
	(0.0002)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Constant	-0.0021***	-0.0030***	-0.0030**	-0.0026**	-0.0011	-0.0020	-0.0030**
	(0.0007)	(0.0010)	(0.0012)	(0.0012)	(0.0039)	(0.0032)	(0.0012)
Observations	153,582	153,582	153,582	153,437	153,437	153,582	153,582
R-squared	0.0014	0.0012	0.0016	0.0016	0.0016	0.0018	0.0016
Individual FE	NO	YES	YES	YES	YES	YES	YES
Period FE	NO	NO	YES	YES	YES	YES	YES
Regional FE	NO	NO	NO	YES	YES	NO	NO
Time Trend	NO	NO	NO	NO	YES	NO	NO
Regional Time Trend	NO	NO	NO	NO	NO	YES	NO
Number of ID		12,028	12,028	12,025	12,025	12,028	12,028

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 10. The Effect of Real GDP on Obesity

VARIABLES	(1) OLS	(2) FE OLS	(3) FE OLS	(4) FE OLS	(5) FE OLS	(6) FE OLS	(7) FE OLS
ln(realGDP)	0.2907***	0.2305***	0.2637***	0.2643***	0.2483***	0.2522***	0.2593***
	(0.0132)	(0.0252)	(0.0372)	(0.0372)	(0.0368)	(0.0368)	(0.0384)
Recession#ln(realGDP)							-0.0001
							(0.0001)
Age	0.0040***	0.0041***	0.0042***	0.0042***	-0.0003	0.0014	0.0043***
	(0.0004)	(0.0007)	(0.0011)	(0.0011)	(0.0018)	(0.0016)	(0.0011)
ln(realincome)	-0.0076***	-0.0021**	-0.0013	-0.0012	-0.0018*	-0.0015	-0.0013
	(0.0008)	(0.0009)	(0.0010)	(0.0010)	(0.0011)	(0.0010)	(0.0010)
Education = 1, Some Elementary Education	0.0736***	0.0106	0.0106	0.0116	0.0113	0.0111	0.0105
	(0.0199)	(0.0533)	(0.0537)	(0.0536)	(0.0536)	(0.0536)	(0.0536)
Education = 2, Some Middle School Education	0.1125***	0.0243	0.0234	0.0235	0.0235	0.0244	0.0232
	(0.0108)	(0.0248)	(0.0248)	(0.0248)	(0.0248)	(0.0248)	(0.0248)
Education = 3, Some High School Education	0.0977***	0.0088	0.0086	0.0079	0.0081	0.0086	0.0085
	(0.0093)	(0.0158)	(0.0158)	(0.0159)	(0.0159)	(0.0158)	(0.0158)
Education = 4, Some College Education	0.0624***	0.0134	0.0143	0.0136	0.0133	0.0143	0.0143
	(0.0093)	(0.0149)	(0.0149)	(0.0149)	(0.0149)	(0.0149)	(0.0149)
Poverty = 1, In Poverty	0.0088***	-0.0101***	-0.0092***	-0.0092***	-0.0097***	-0.0092***	-0.0093***
	(0.0032)	(0.0032)	(0.0032)	(0.0032)	(0.0032)	(0.0032)	(0.0032)
Urban = 1, Urban	-0.0053**	0.0083**	0.0091**	0.0094**	0.0093**	0.0090**	0.0091**
	(0.0024)	(0.0042)	(0.0042)	(0.0042)	(0.0042)	(0.0042)	(0.0042)
Constant	-6.6421***	-5.2519***	-6.0071***	-6.0116***	-5.5755***	-5.7012***	-5.9085***
	(0.2919)	(0.5584)	(0.8249)	(0.8265)	(0.8174)	(0.8153)	(0.8532)
Observations	153,582	153,582	153,582	153,437	153,437	153,582	153,582
R-squared	0.0856	0.1351	0.1355	0.1356	0.1357	0.1358	0.1355
Individual FE	NO	YES	YES	YES	YES	YES	YES
Period FE	NO	NO	YES	YES	YES	YES	YES
Regional FE	NO	NO	NO	YES	YES	NO	NO
Time Trend	NO	NO	NO	NO	YES	NO	NO
Regional Time Trend	NO	NO	NO	NO	NO	YES	NO
Number of ID		12,028	12028	12025	12025	12,028	12,028

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 11. The Effect of Real GDP on Diabetes

VARIABLES	(1) OLS	(2) FE OLS	(3) FE OLS	(4) FE OLS	(5) FE OLS	(6) FE OLS	(7) FE OLS
ln(realGDP)	0.0144***	0.0294***	0.0207**	0.0206**	0.0211**	0.0221**	0.0252***
	(0.0022)	(0.0060)	(0.0093)	(0.0093)	(0.0091)	(0.0093)	(0.0095)
Recession#ln(realGDP)							0.0001**
							(0.0000)
Age	0.0001*	-0.0003**	-0.0002	-0.0002	-0.0001	0.0002	-0.0003
	(0.0001)	(0.0002)	(0.0003)	(0.0003)	(0.0005)	(0.0006)	(0.0003)
ln(realincome)	-0.0006***	-0.0005***	-0.0001	-0.0001	-0.0000	0.0000	-0.0000
	(0.0001)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Education = 1, Some Elementary Education	0.0025	0.0098	0.0094	0.0093	0.0094	0.0095	0.0095
	(0.0040)	(0.0123)	(0.0123)	(0.0124)	(0.0124)	(0.0124)	(0.0123)
Education = 2, Some Middle School Education	0.0016	-0.0054	-0.0061	-0.0061	-0.0061	-0.0059	-0.0059
	(0.0021)	(0.0052)	(0.0052)	(0.0052)	(0.0052)	(0.0052)	(0.0052)
Education = 3, Some High School Education	0.0014	0.0017	0.0011	0.0012	0.0011	0.0012	0.0012
	(0.0019)	(0.0024)	(0.0024)	(0.0024)	(0.0024)	(0.0024)	(0.0024)
Education = 4, Some College Education	0.0007	0.0010	0.0010	0.0011	0.0011	0.0011	0.0010
	(0.0019)	(0.0022)	(0.0022)	(0.0022)	(0.0022)	(0.0022)	(0.0022)
Poverty = 1, In Poverty	-0.0003	-0.0004	-0.0001	-0.0001	-0.0001	-0.0000	-0.0000
	(0.0005)	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)
Urban = 1, Urban	0.0000	-0.0002	-0.0000	-0.0001	-0.0000	-0.0000	-0.0000
	(0.0004)	(0.0007)	(0.0007)	(0.0007)	(0.0008)	(0.0007)	(0.0007)
Constant	-0.3266***	-0.6571***	-0.4649**	-0.4618**	-0.4766**	-0.5032**	-0.5652***
	(0.0488)	(0.1326)	(0.2062)	(0.2066)	(0.2002)	(0.2073)	(0.2101)
Observations	153,582	153,582	153,582	153,437	153,437	153,582	153,582
R-squared	0.0047	0.0042	0.0049	0.0049	0.0049	0.0050	0.0049
Individual FE	NO	YES	YES	YES	YES	YES	YES
Period FE	NO	NO	YES	YES	YES	YES	YES
Regional FE	NO	NO	NO	YES	YES	NO	NO
Time Trend	NO	NO	NO	NO	YES	NO	NO
Regional Time Trend	NO	NO	NO	NO	NO	YES	NO
Number of ID		12,028	12,028	12,025	12,025	12,028	12,028

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 12. The Effect of Real GDP on Hypertension

VARIABLES	(1) OLS	(2) FE OLS	(3) FE OLS	(4) FE OLS	(5) FE OLS	(6) FE OLS	(7) FE OLS
ln(realGDP)	0.0562***	0.1129***	0.1018***	0.1013***	0.1081***	0.1077***	0.1105***
	(0.0037)	(0.0096)	(0.0162)	(0.0162)	(0.0160)	(0.0161)	(0.0164)
Recession#ln(realGDP)							0.0001***
							(0.0000)
Age	-0.0003***	-0.0019***	-0.0015***	-0.0015***	0.0004	0.0003	-0.0017***
	(0.0001)	(0.0003)	(0.0005)	(0.0005)	(0.0008)	(0.0008)	(0.0005)
ln(realincome)	-0.0014***	-0.0016***	-0.0003	-0.0004	-0.0001	-0.0001	-0.0003
	(0.0002)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Education = 1, Some Elementary Education	-0.0011	0.0041	0.0027	0.0025	0.0026	0.0030	0.0030
	(0.0051)	(0.0132)	(0.0132)	(0.0131)	(0.0131)	(0.0132)	(0.0132)
Education = 2, Some Middle School Education	0.0026	-0.0112	-0.0133	-0.0134	-0.0134	-0.0130	-0.0131
	(0.0034)	(0.0082)	(0.0081)	(0.0082)	(0.0082)	(0.0081)	(0.0081)
Education = 3, Some High School Education	0.0034	0.0007	-0.0009	-0.0010	-0.0011	-0.0010	-0.0008
	(0.0031)	(0.0043)	(0.0042)	(0.0043)	(0.0042)	(0.0043)	(0.0042)
Education = 4, Some College Education	0.0025	-0.0012	-0.0011	-0.0012	-0.0011	-0.0009	-0.0010
	(0.0031)	(0.0040)	(0.0040)	(0.0040)	(0.0040)	(0.0040)	(0.0040)
Poverty = 1, In Poverty	-0.0006	-0.0017	-0.0010	-0.0010	-0.0008	-0.0008	-0.0009
	(0.0008)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)
Urban = 1, Urban	-0.0022***	-0.0018	-0.0009	-0.0009	-0.0009	-0.0009	-0.0010
	(0.0007)	(0.0012)	(0.0012)	(0.0012)	(0.0012)	(0.0012)	(0.0012)
Constant	-1.2597***	-2.5085***	-2.2691***	-2.2605***	-2.4444***	-2.4333***	-2.4629***
	(0.0814)	(0.2131)	(0.3595)	(0.3602)	(0.3559)	(0.3594)	(0.3651)
Observations	153,582	153,582	153,582	153,437	153,437	153,582	153,582
R-squared	0.0128	0.0112	0.0133	0.0133	0.0134	0.0134	0.0133
Individual FE	NO	YES	YES	YES	YES	YES	YES
Period FE	NO	NO	YES	YES	YES	YES	YES
Regional FE	NO	NO	NO	YES	YES	NO	NO
Time Trend	NO	NO	NO	NO	YES	NO	NO
Regional Time Trend	NO	NO	NO	NO	NO	YES	NO
Number of ID		12,028	12,028	12,025	12,025	12,028	12,028

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 13. The Effect of Real GDP on Depression

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	OLS	FE OLS	FE OLS	FE OLS	FE OLS	FE OLS	FE OLS
ln(realGDP)	0.0189***	0.0381***	0.0300***	0.0301***	0.0295***	0.0295***	0.0349***
	(0.0022)	(0.0053)	(0.0091)	(0.0092)	(0.0090)	(0.0090)	(0.0093)
Recession#ln(realGDP)							0.0001**
							(0.0000)
Age	-0.0000	-0.0006***	-0.0005*	-0.0005**	-0.0007	-0.0007	-0.0007**
	(0.0001)	(0.0002)	(0.0003)	(0.0003)	(0.0005)	(0.0004)	(0.0003)
ln(realincome)	-0.0012***	-0.0007***	-0.0003	-0.0003	-0.0003	-0.0003	-0.0002
	(0.0001)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Education = 1, Some Elementary Education	-0.0080***	-0.0124*	-0.0129*	-0.0130**	-0.0130**	-0.0130**	-0.0127*
	(0.0024)	(0.0067)	(0.0066)	(0.0066)	(0.0066)	(0.0066)	(0.0066)
Education = 2, Some Middle School Education	-0.0037	-0.0024	-0.0029	-0.0029	-0.0029	-0.0030	-0.0028
	(0.0025)	(0.0053)	(0.0053)	(0.0053)	(0.0053)	(0.0053)	(0.0053)
Education = 3, Some High School Education	-0.0039*	-0.0052	-0.0056*	-0.0056*	-0.0056*	-0.0057*	-0.0056*
	(0.0024)	(0.0033)	(0.0033)	(0.0033)	(0.0033)	(0.0033)	(0.0033)
Education = 4, Some College Education	-0.0028	-0.0040	-0.0040	-0.0040	-0.0040	-0.0041	-0.0040
	(0.0024)	(0.0032)	(0.0032)	(0.0032)	(0.0032)	(0.0032)	(0.0032)
Poverty = 1, In Poverty	-0.0009*	-0.0007	-0.0004	-0.0004	-0.0004	-0.0004	-0.0003
	(0.0005)	(0.0007)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)
Urban = 1, Urban	-0.0007*	-0.0008	-0.0006	-0.0006	-0.0007	-0.0006	-0.0006
	(0.0004)	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)
Constant	-0.4143***	-0.8404***	-0.6622***	-0.6663***	-0.6496***	-0.6477***	-0.7701***
	(0.0479)	(0.1179)	(0.2024)	(0.2031)	(0.1989)	(0.1988)	(0.2066)
Observations	153,582	153,582	153,582	153,437	153,437	153,582	153,582
R-squared	0.0043	0.0036	0.0042	0.0042	0.0042	0.0043	0.0043
Individual FE	NO	YES	YES	YES	YES	YES	YES
Period FE	NO	NO	YES	YES	YES	YES	YES
Regional FE	NO	NO	NO	YES	YES	NO	NO
Time Trend	NO	NO	NO	NO	YES	NO	NO
Regional Time Trend	NO	NO	NO	NO	NO	YES	NO
Number of ID		12,028	12,028	12,025	12,025	12,028	12,028

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 14. The Effect of Real GDP on Congestive Heart Failure

VARIABLES	(1) OLS	(2) FE OLS	(3) FE OLS	(4) FE OLS	(5) FE OLS	(6) FE OLS	(7) FE OLS
ln(realGDP)	0.0031***	0.0057***	0.0014	0.0014	0.0017	0.0016	0.0012
	(0.0007)	(0.0017)	(0.0028)	(0.0028)	(0.0028)	(0.0028)	(0.0028)
Recession#ln(realGDP)							-0.0000
							(0.0000)
Age	-0.0000	-0.0001*	0.0001	0.0001	0.0002	0.0002	0.0001
	(0.0000)	(0.0000)	(0.0001)	(0.0001)	(0.0002)	(0.0001)	(0.0001)
ln(realincome)	-0.0002***	-0.0002***	-0.0002**	-0.0002**	-0.0002*	-0.0002*	-0.0002**
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Education = 1, Some Elementary Education	0.0002***	0.0001	-0.0000	-0.0000	0.0000	-0.0000	-0.0000
	(0.0001)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)
Education = 2, Some Middle School Education	0.0012***	-0.0003	-0.0004	-0.0004	-0.0004	-0.0004	-0.0004
	(0.0005)	(0.0024)	(0.0024)	(0.0024)	(0.0024)	(0.0024)	(0.0024)
Education = 3, Some High School Education	0.0007***	0.0009***	0.0008**	0.0008**	0.0008**	0.0008**	0.0008**
	(0.0001)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Education = 4, Some College Education	0.0006***	0.0007***	0.0006***	0.0006***	0.0006***	0.0006***	0.0006***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Poverty = 1, In Poverty	-0.0003*	-0.0004**	-0.0004*	-0.0004*	-0.0004*	-0.0004*	-0.0004*
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Urban = 1, Urban	-0.0002	-0.0001	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
	(0.0001)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Constant	-0.0693***	-0.1278***	-0.0319	-0.0320	-0.0414	-0.0382	-0.0291
	(0.0159)	(0.0386)	(0.0623)	(0.0624)	(0.0609)	(0.0610)	(0.0614)
Observations	153,582	153,582	153,582	153,437	153,437	153,582	153,582
R-squared	0.0009	0.0009	0.0013	0.0013	0.0013	0.0014	0.0013
Individual FE	NO	YES	YES	YES	YES	YES	YES
Period FE	NO	NO	YES	YES	YES	YES	YES
Regional FE	NO	NO	NO	YES	YES	NO	NO
Time Trend	NO	NO	NO	NO	YES	NO	NO
Regional Time Trend	NO	NO	NO	NO	NO	YES	NO
Number of ID		12,028	12,028	12,025	12,025	12,028	12,028

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 15. The Effect of Real GDP on Heart Attack or Myocardial Infarction

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	OLS	FE OLS	FE OLS	FE OLS	FE OLS	FE OLS	FE OLS
ln(realGDP)	0.0037***	0.0083***	0.0047	0.0049	0.0048	0.0046	0.0045
	(0.0009)	(0.0028)	(0.0039)	(0.0039)	(0.0036)	(0.0037)	(0.0037)
Recession#ln(realGDP)							-0.0000
							(0.0000)
Age	0.0000	-0.0001	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
	(0.0000)	(0.0001)	(0.0001)	(0.0001)	(0.0002)	(0.0002)	(0.0001)
ln(realincome)	-0.0002***	-0.0002***	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001
	(0.0000)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Education = 1, Some Elementary Education	0.0005***	0.0025*	0.0024*	0.0024*	0.0024*	0.0023*	0.0023*
	(0.0001)	(0.0013)	(0.0013)	(0.0013)	(0.0013)	(0.0013)	(0.0013)
Education = 2, Some Middle School Education	0.0031***	0.0047	0.0045	0.0045	0.0045	0.0044	0.0045
	(0.0007)	(0.0030)	(0.0030)	(0.0030)	(0.0030)	(0.0030)	(0.0030)
Education = 3, Some High School Education	0.0015***	0.0020***	0.0019***	0.0019***	0.0019***	0.0018***	0.0019***
	(0.0002)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)
Education = 4, Some College Education	0.0011***	0.0017***	0.0017***	0.0017***	0.0017***	0.0016***	0.0017***
	(0.0001)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)
Poverty = 1, In Poverty	-0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001
	(0.0002)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Urban = 1, Urban	-0.0001	0.0005	0.0005	0.0005	0.0005	0.0005*	0.0005
	(0.0002)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Constant	-0.0844***	-0.1869***	-0.1085	-0.1112	-0.1095	-0.1048	-0.1033
	(0.0191)	(0.0621)	(0.0855)	(0.0858)	(0.0800)	(0.0809)	(0.0832)
Observations	153,582	153,582	153,582	153,437	153,437	153,582	153,582
R-squared	0.0015	0.0013	0.0016	0.0016	0.0016	0.0018	0.0016
Individual FE	NO	YES	YES	YES	YES	YES	YES
Period FE	NO	NO	YES	YES	YES	YES	YES
Regional FE	NO	NO	NO	YES	YES	NO	NO
Time Trend	NO	NO	NO	NO	YES	NO	NO
Regional Time Trend	NO	NO	NO	NO	NO	YES	NO
Number of ID		12,028	12,028	12,025	12,025	12,028	12,028

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 16. The Effect of Real GDP on Health Behaviors

VARIABLES	Obesity FE OLS	Vigorous Exercise FE OLS	Light Exercise FE OLS	Alcohol Consumption FE OLS	Read Nutrition Information FE OLS	Read Ingredient Information FE OLS
ln(realGDP)	0.2078**	-2.4835***	-1.8343***	1.4469***	0.3714***	0.3215**
	(0.0890)	(0.4773)	(0.5096)	(0.5610)	(0.1203)	(0.1349)
Age	0.0059***	0.0304***	0.0038	0.0025	-0.0010	-0.0003
	(0.0020)	(0.0101)	(0.0108)	(0.0078)	(0.0025)	(0.0029)
ln(realincome)	0.0009	-0.0106	-0.0062	0.0380***	0.0007	-0.0006
	(0.0028)	(0.0137)	(0.0155)	(0.0116)	(0.0034)	(0.0038)
Education = 1, Some Elementary Education	-0.0009	0.2496	0.0309	0.2566	-0.0491	-0.0965*
	(0.0585)	(0.3457)	(0.2655)	(0.2074)	(0.0682)	(0.0547)
Education = 2, Some Middle School Education	-0.0038	-0.0265	-0.2230	0.2539**	-0.0535	-0.0322
	(0.0274)	(0.1502)	(0.1483)	(0.1203)	(0.0346)	(0.0351)
Education = 3, Some High School Education	-0.0307*	-0.0359	-0.1157	0.0577	0.0012	-0.0085
	(0.0161)	(0.0700)	(0.0747)	(0.0592)	(0.0195)	(0.0219)
Education = 4, Some College Education	-0.0338**	-0.0064	-0.0598	0.0335	-0.0082	0.0028
	(0.0143)	(0.0601)	(0.0657)	(0.0534)	(0.0174)	(0.0196)
Poverty = 1, In Poverty	-0.0048	0.0979*	0.1067*	-0.0668	-0.0123	-0.0036
	(0.0096)	(0.0548)	(0.0564)	(0.0464)	(0.0125)	(0.0131)
Urban = 1, Urban	0.0086	0.0305	-0.0338	0.0528**	0.0144*	0.0060
	(0.0068)	(0.0334)	(0.0343)	(0.0260)	(0.0081)	(0.0091)
Constant	-4.7354**	57.8117***	43.8743***	-32.9678**	-7.9968***	-6.9106**
	(2.0130)	(10.8356)	(11.5688)	(12.8590)	(2.7340)	(3.0646)
Observations	36,274	24,349	25,566	18,130	35,918	35,921
Number of ID	7,652	6,819	7,059	5,524	7,630	7,631
R-squared	0.0149	0.0082	0.0142	0.0164	0.0131	0.0132
Individual FE	YES	YES	YES	YES	YES	YES
Period FE	YES	YES	YES	YES	YES	YES
Regional FE	YES	YES	YES	YES	YES	YES
Time-Trend FE	NO	NO	NO	NO	NO	NO
Regional Time-Trend FE	NO	NO	NO	NO	NO	NO

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1