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Dear Readers,

Welcome to the 2015 edition of the Journal for Undergraduate Research Opportunities (JURO). Founded as a broadly inter-disciplinary publication in 2001, JURO seeks to showcase the considerable research talent of undergraduates at the University of Georgia, from a variety of fields. As always, the authors included in this publication have proven very easy to showcase— their talent speaks for itself.

Although the topics covered by this year’s authors are diverse, a reader who takes the time to peruse the pieces will quickly find some commonalities. Chief among these is the obvious attention to detail and nuance that characterizes all of the authors. This publication represents some of the best work of undergraduate researchers at the University of Georgia.

While the authors’ topics and methods vary widely, their results are all underpinned by their respective commitments to excellence. There is something excellent in this publication for every reader, and we hope you’ll take the time to enjoy it.

Sincerely,

Megan Ernst     Allison Koch
Executive Editor    Operations Manager

Martin Rogers, Ph.D.     Matthew Jordan
Co-Editor in Chief    Co-Editor in Chief
CIVIC POLICY
Cutting Carbon in the Empire State of the South  
A Policy Proposition for Putting Georgia Ahead of the Curve

Jonah Driggers and Jennifer Rice, Ph.D., Geography

ABSRACT. In the 2013 report of the United Nations’ Intergovernmental Panel on Climate Change (IPCC), the world’s leading Earth scientists found that “[w]arming of the climate system is unequivocal” (Stocker, D. Qin, Plattner, Tignor, Allen, Boschung, Nauels, Xia, Bex, & Midgley, 2013, p. 4). In spite of responses elsewhere in the nation and the international community to the increasing threats of climate change, Georgia has taken no significant action to address the issue. This inaction exposes the state to significant risks. This paper argues that Georgia should establish itself as a leader in energy innovation and sustainability for both economic and social benefits. To this end, a literature review and subsequent cost-benefit analysis were conducted to evaluate the status quo and three policy alternatives: a revenue-neutral carbon tax shift in Atlanta; introduction of net-metering technology statewide; and energy labeling and comparison of energy consumption. Based on this evaluation, this paper advocates the implementation of a revenue-neutral carbon tax shift in Atlanta as the most effective tool to mitigate greenhouse gas emissions and place Georgia in a strategic position in years to come.

Introduction

Climate change is already having, and will continue to have, profound implications around the world. These impacts include intensification of tropical storms and hurricanes, increased global temperatures, rising sea levels (U.S. Environmental Protection Agency, 2011), and drought-induced water shortages in both the residential and agricultural sectors (Ingram, Dow, Carter, & Anderson, 2013). These physical changes will in turn impact social and economic systems. Industries associated with a significant amount of physical labor, such as construction, utilities, and mining, will be adversely affected as rising temperatures cause increased occurrences of heat stroke and heat exhaustion (Kopp, 2014, p. 55). Industries involved in food production may experience profound impacts on productivity as a result of temperature increase and water shortages (Kopp, 2014, p. 43). Temperature increases will coincide with significantly increased demand on electricity providers (Kopp, 2014, p. 80). Health services will encounter new challenges as precipitation and temperature changes alter the geographic extent and prevalence of animal-borne diseases, such as Lyme disease and West Nile virus (Kopp, 2014, p. 61).

Despite these significant threats, the state of Georgia remains reluctant to address the issue of climate change. A recent report by Columbia Law School’s Center for Climate Change Law showed that Georgia was one of eighteen states that showed no discussion or inaccurate discussion of climate change in their State Hazard Mitigation plans, which are required to receive disaster mitigation funding from the Federal Emergency Management Agency (Babcock, 2013). This lack of preparedness in Georgia is reflective of a general trend in the state; there are no formal plans to offset or mitigate carbon dioxide emissions in the energy sector or elsewhere. By failing to act early on climate change, Georgia is putting both its citizens and its reputation as a national leader at risk.
Georgia is often thought of as the “Empire State of the South,” and is the economic and cultural capital of the Southeast. Atlanta was in 2012 ranked as an “alpha-minus city” by the Globalization and World Cities research network. Alpha-minus cities are “very important world cities that link major economic regions and states into the world economy” (GaWC, 2012). The prominence of Georgia and Atlanta in the southeastern United States and their growing recognition on the national stage means that many are looking to see how Georgia will address the real and growing threats posed by climate change.

Georgia has two options: refuse to act on climate change and bear the consequences, or act early and dramatically to reduce carbon emissions. The former option requires no significant investment in the short-term, but may have economic consequences in the coming years; transitioning to a less carbon-intensive energy portfolio will be extremely costly if it must be done in a short time period to meet new government regulations, and in the mean time the state will continue to bear the negative effects of reliance on fossil-fuels. Acting early will be costly as well, but these costs can be distributed over a number of years, and will be paired with concurrent benefits from infrastructure investments, job creation, and increased technological innovation. Many countries around the world are already reaping these benefits, taking political action in the midst of unprecedented public pressure.

**Climate Change: Putting Georgia in the Global Context**

Political and social response to the current and potential impacts of climate change is growing in the United States and beyond. In September 2014, protesters marched in 162 countries, demanding action to combat climate change. In New York City, an estimated 400,000 people filled the streets, making headlines around the world (People's Climate March, 2014). A major divestment movement is sweeping the globe; by September 2014, more than $50 billion had been withdrawn from fossil-fuel reliant companies by 181 institutions and 656 high net-worth individuals. The Bank of England is considering similar measures, and Germany’s second-largest utility company has announced a complete transition away from fossil-fuels (Morales, 2014). An environmental renaissance is underway, mandated by absolute necessity.

In light of these social responses to climate change, countries around the world are prioritizing action on the issue. In a 2014 report, for example, the Global Legislators Organization found that in 2013, of the 66 countries examined — together accounting for 88% of global anthropogenic greenhouse gas emissions (Nachmany, Fankhauser, Townshend, Collins, Landesman, Matthews, Pavese, Rietig, Schlepper, & Setzer, 2014, p. 1) — eight made “substantive legislative progress,” and another 19 made positive legislative advances (Nachmany et al., 2014, p. 4). The report finds that “61 out of 66 countries have passed laws to promote domestic, clean sources of energy and 54 have legislated to increase energy efficiency” (Nachmany et al., 2014, p. xi).

In the United States, the U.S. Court of Appeals for the District of Columbia has upheld the EPA’s authority to regulate GHG emissions. When a decision allowing the EPA to require permits for new or modified sources of greenhouse gas emissions beyond a certain threshold was appealed to the Supreme Court, the court set significant precedent; while stating that requiring permitting strictly for GHG emissions was beyond the EPA’s authority under the Clean Air Act, the court ruled that the EPA could require permitting for any source of GHG emissions beyond a certain threshold, provided a permit would be required anyway for
concurrent emissions of other pollutants. This ensured the EPA’s legal authority to regulate 83% of stationary source GHG emissions (Jennings, Schatz, & Campbell, 2014), and will allow it to pursue its goal of reducing the GHG emissions of the energy industry to 30% below 2005 levels by 2030 (White House Office of the Press Secretary, 2014).

In 2012, the Obama Administration introduced stringent fuel economy standards mandating that cars and light-trucks achieve an average of 54.5 miles per gallon by 2025 (White House Office of the Press Secretary, 2012). In a 2014 agreement with China that is non-binding but indicative nonetheless of changing national policy in both countries, the administration set a target to reduce GHG emissions by 26-28% below 2005 levels by 2025. China committed to a GHG emissions peak and an energy portfolio that is 20% fossil-fuel-free by 2030 (White House Office of the Press Secretary, 2014). Some have argued that these changes suggest the United States is positioning itself to be a leader in the 2015 UN Climate Change Conference in Paris. As national and international action on climate change progresses, Georgia has opportunities to take action as well.

The Political Context for (In)Action in Georgia

There are several reasons that Georgia has undertaken no policy measures to address climate change in spite of the disproportionate consequences of inaction.

Influence of the Fossil Fuel Industry

The fossil fuel industry has an extensive history of influence on governments in the Unites States, at both the national and state levels. In 2014, Republican members of Congress received a total of $31 million from the fossil fuel lobby. In comparison, Democrats received a total of $4.5 million. Speaker of the House of Representatives John Boehner received nearly $650,000, and Senate Majority leader Mitch McConnell received more than $610,000 (Center for Responsive Politics, 2014). Fossil fuel interests have aligned themselves with the Republican Party, and has since pursued its interests with huge injections of capital and support of powerful issue groups. Without addressing this influence, it will be difficult to confront climate change at the needed level.

Georgia’s largest electricity provider, Georgia Power, is state-backed, allowed to operate as a regulated natural monopoly. The company is owned by Koch Industries, which in turn owned by the Koch family, which is heavily involved in Republican politics.

Partisanship and “Belief” in Climate Change

Climate change has become a partisan issue. Where in the past there was bipartisan support of environmental legislation, now there is very little. This change in support is due to a number of reasons. The first is that addressing climate change through government action at any level will be expensive, and the money will have to come from somewhere. This high cost could very well mean higher taxes for corporations and individuals. Conservatives are traditionally strongly opposed to increasing taxation. Increasing taxes too much can turn heads even in the Democratic Party. Conservative’s wariness of taxation is coupled with a dislike of government interference in the free market.

These reasons could explain inaction on the issue. However, they do not explain lack of belief in anthropogenic climate change. The majority - 54 percent - of Republicans do not believe that there is solid evidence that the Earth is warming (Pew Research Center, 2014). In theory, this disbelief doesn’t make sense; there is a 97 percent consensus among scientists that climate change is human-caused and accelerating. Every national scientific agency of
the G8 +5 countries has agreed with this verdict.

Why is this issue so polarized? Put quite simply, climate change is no longer an issue of science, but of worldview on issues like economics and social responsibility. Beliefs about climate change are often linked with other issues, including gun rights, abortion, and the Affordable Care Act. The issue is not science any longer, but a struggle between different political ideologies.

Lack of Public Understanding

Much of the American public does not understand the science on climate change, or are not aware of the scientific consensus. Many believe that climate change is not a significant problem. The American media, which is focused on a “balanced debate,” has portrayed climate change as an issue on which the scientific community is still divided — but other scholars have shown this is not the case and the vast majority of peer-reviewed science supports the claim that human activities are changing the climate (Oreskes, 2004). Powerful issue groups like the Heartland Institute, Americans For Prosperity, and the Competitive Enterprise Institute are supporting and spreading false science, seeding doubt in the public (Union of Concerned Scientists, 2008) — they are “merchants of doubt” (Oreskes & Conway, 2011).

Climate change is no longer a threat that looms on the distant horizon. Its effects are already being felt around the world, and will have significant impacts within the next thirty to forty years, if not sooner. As the “Empire State of the South” Georgia is a national leader, but climate change threatens this status. Continued inaction on climate change in Georgia will have profound repercussions.

Understanding What’s at Stake

Unreliable Energy Portfolio

In a 2014 report titled Global Cities, Present and Future, international consulting firm A.T. Kearney ranked Atlanta 36th in its Global Cities Index, a measure of global engagement across the categories of business activity, human capital, information exchange, cultural experience, and political engagement (Hale, Peterson, Andres, & Gott, 2014). Georgia was ranked first in site selection for major corporations in Area Development Magazine’s 2014 “Top States for Doing Business” Survey, having passed last years top state, Texas, with strong showings in business environment, labor climate, and overall infrastructure and global access (Area Development, 2014). CNBC in 2014 called Georgia “the cream of the crop,” placing Georgia at number 1 on its “Top States for Business” list (CNBC, 2014). These rankings show that Georgia is an integral node in the global economy, and as such is attractive to both domestic and foreign investment. However, this position as an economic leader is made vulnerable by the state’s energy portfolio, which is heavily dominated by fossil-fuels.

In 2013, with low-cost natural gas becoming increasingly available, natural gas and coal each accounted for just over one-third of the Georgia’s net electricity generation. The state’s two nuclear plants, Plant Hatch in Waynesboro and Plant Vogtle in Baxley, together provide another one-fourth of its net generation (Georgia Power, 2013). This energy portfolio is highly vulnerable to regulatory changes. Should new federal rules emerge that seek to further reduce dependency on carbon-intensive fuels like coal and natural gas, Georgia will be forced to absorb the cost of quickly altering its energy portfolio or face potentially steep penalties. At the same time, there is concern that a changing climate can impact energy production in other ways.

Georgia’s energy portfolio suggests some potential vulnerabilities in a changing climate. Energy production in thermoelectric (nuclear and fossil fuel) power plants is put at
risk by increasing occurrences and severity of drought, which makes the water necessary for cooling facilities at these plants scarce (Van Vliet, 2012). This loss of water for cooling could possibly lead to major blackouts, profoundly altering day to day activity throughout the state. This pressure will rise further when two new nuclear reactors, currently under construction at Plant Vogtle, are brought online.

It is true that inexpensive energy attracts industrial investment. However, energy that grows increasingly — and perhaps prohibitively — expensive with the onset of new regulation and is put at risk by natural disasters will likely prove a powerful deterrent to industrial investment and economic development in the coming years. Georgia’s ability to foster economic growth and attract investment is at risk, and in turn so are the livelihoods of its citizens.

Workforce competitiveness and climate change

Young professionals are increasingly gravitating towards cities with strong environmental records. Largely liberal and college-educated, these men and women are attracted by strong transportation infrastructure, green buildings, outdoor culture, green industry, and clean energy. This is evidenced by the correlation of the growth in the number of young people with a four-year college degree and a city’s environmental legacy: the number of 25 to 34 years olds with a college education in Atlanta increased by 2.8% (Cortright, 2014, p. 14). Notably, Atlanta found itself far behind Seattle and Denver third and fourth among American cities, respectively. Atlanta was placed 16th among the 22 populous U.S. metropolitan areas on the index (Sumner & Barchfield, 2011, p. 10). Although Portland and Austin were excluded from the index because they did not meet the population criteria for evaluation, Portland was featured as a city that “provides many examples of best-practice leadership” (Sumner & Barchfield, 2011, p. 27), and Austin’s municipal energy utility has committed to an energy portfolio that is 35% renewable by 2020 (Walsh, 2012).

In the 1990s, Georgia was a hotspot of growth. Its rapidly increasing, well-educated workforce helped to attract innovative companies in the technology and service sectors and further cemented Georgia’s status as an economic powerhouse. However, young professionals no longer flock to the state, evidenced by Atlanta’s much slower increase in its young, well-educated workforce. To restart the rapid growth of Atlanta, and of the state as a whole, Georgia should invest in its environmental legacy.

Cost of Hurried Compliance to National Mandates

Recent studies are showing acting earlier, rather than later, on climate change can have significant economic benefits. A recent Whitehouse report found that delaying mitigation of GHG’s for 10 years results in an average increase in net mitigation costs of 39%. For every additional decade of delay, the cost is estimated to rise by another 37% (Executive Office of the President of the U.S., 2014, p. 16). While these studies were conducted with worldwide mitigation in mind, the results hold true at the state level as well; the longer Georgia waits to begin addressing its GHG emissions, the more expensive it will become.

Continued Pollution from Coal

Carbon dioxide emissions from coal
made up 24.5% of all of 2012 United States greenhouse gas emissions (Center for Climate and Energy Solutions [CCES], 2012). Alongside these carbon emissions, coal-fired energy production facilities release a great deal of harmful particulate pollution, like sulfur dioxide, nitrogen oxides, particulate matter, and mercury (CCES, 2012). These pollutants have harmful effects on human health, causing respiratory irritation, chronic respiratory and heart disease, lung cancer, acute respiratory infections in children, and chronic bronchitis in adults, as well as aggravating existing conditions such as heart or lung disease or asthma (Kopp, 2014, p. 67). Without beginning a transition to cleaner energy sources, this particulate pollution will continue unabated, along with the subsequent health problems.

Stakeholders in Georgia’s Climate Politics

Energy Industry

Koch Brothers-owned Southern Company and its subsidiaries dominate the energy industry in the Southeastern US. Georgia Power is the largest of these subsidiaries. One of the world’s largest carbon dioxide emitters, the vast majority of the Southern Company’s energy portfolio is made up of fossil fuels. In fact, Georgia Power-operated Plant Scherer is the world’s largest coal-burning power plant and is one of the three largest emitters of carbon pollution in the United States. Georgia Power’s Plant Bowen is another member of this carbon-emitting trio (Center for Global Development, 2009). It would not make economic sense for the Southern Company to begin to change its energy portfolio any faster than it has to, as its primary goals are to provide low-cost, reliable energy to its customers and the highest possible profits to its share holders (Southern Company, 2015).

The energy industry in the Southeast has historically been a powerful opponent of policy intended to address climate change. The Koch brothers are the majority-stake owners of America’s second-largest, privately-held corporation, and are major sources of funding for multiple conservative political organizations. One of these conservative political organizations, Americans for Prosperity, was found in 2013 to have persuaded 411 federal office holders to sign the “No Climate Tax” pledge, committing them to vote against any climate change legislation unless it is paired with equivalent tax cuts. Signatories at the time included the entire Republican leadership in the House of Representatives and a third of the House as a whole, as well as a quarter of all United States senators (Mayer, 2013). If the Koch Brothers have any say in the matter of addressing climate change, no meaningful legislation will be passed in the American Southeast.

Other Industries

Although the energy industry is certainly one of the most influential stakeholders in this issue, it is important to note the significance of other industries as well. Many have notable interests in the outcome of policy action intended to combat climate change and reduce the emissions of greenhouse gases, and will be adversely affected by climate change. The agricultural sector contributes more than $65 billion (about 14 percent of total state GDP) annually to the state’s economy and provides roughly 1.4 million jobs to Georgia citizens (University of Georgia Extension, 2012), but is severely threatened by temperature increases: both livestock and crops will be adversely affected by temperature increases and drought. Georgia’s 2007 drought cost the state’s agricultural industry $339 million in forgone yields, and “a 2.2°F increase in temperature would likely reduce overall productivity for corn, soybeans, rice, cotton, and peanuts across the South,” in spite of possible crop benefits from rising carbon dioxide levels (Carter, Jones,
Forestry — Georgia’s second-largest industry (Georgia Forestry Commission, 2011) — is threatened by pest outbreaks that will grow both more frequent and more severe with rising temperatures, as well as increased incidence of wildfires, greater success of invasive species, and a shift in the range of the pine species that make Georgia forests so commercially valuable (Georgia Forestry Commission, 2010, p. 65, 66).

In a recent speech given at a conference on Georgia’s tourism industry, Governor Nathan Deal stated that the state’s tourism industry in 2013 had an economic impact of $53.6 billion (Martin, 2014), representing about 12.6 percent of Georgia’s total GDP in the same year (Woodruff, Rodriguez, & Aversa, 2014). However, this success is threatened by weather disasters that are expected to increase in frequency and severity as sea-levels rise and temperatures warm; after Hurricane Katrina “Louisiana experienced a 24% drop in visitor spending from 2004 to 2006 … and the number of visitors to New Orleans did not return to pre-Katrina levels until 2013” (Kopp, 2014, p. 143).

These industries have an undeniable interest in averting the consequences of climate change, but these interests must be balanced against a need for policy solutions that are cost-effective and do not negatively impact their bottom lines. By implementing policy early, Georgia can allow for gradual adaptation by industries, resulting in far fewer of the negative costs that would be associated with quick compliance with federal mandates.

State Government

Georgia’s state government has a significant stake in any policy action to combat climate change. Early action on this issue will benefit its constituency, putting Georgia at a strategic advantage in the decades to come and helping to avert the potential costs of inaction. In addition, early action will allow the state government increased agency; rather than complying with federal mandates, the state government can participate in the design of policy that is tailored uniquely to Georgia.

In spite of these benefits, the state government is generally opposed to action on climate change. Georgia’s governor, Nathan Deal, is a signer of the Americans for Prosperity “No Climate Tax Pledge,” and in 2003 was assigned a 5% rating on environmental issues by the League of Conservation Voters (On the Issues, 2011). The Deal Administration is not likely to cooperate with the creation of policy to address climate change.

Local Governments

Local governments throughout the Southeast will be hard pressed to deal with the potential consequences of climate change. Adaptation, especially in a short period of time, can be extremely costly. Without assistance at the state or federal levels, local governments cannot quickly undertake significant preparation plans. Even more concerning, local governments will be hard pressed to respond to catastrophe when it occurs. Hurricane Sandy, which made landfall on October 29, 2012, impacted 24 states and cost more than 50 billion dollars (U.S. Department of Commerce, 2013).

Local governments will be concerned with the economic costs of action on climate change. However, it is also true that many will be interested in the economic benefits of early action in Georgia. A growing renewable energy industry will bring with it thousands of jobs, as well as infrastructure investment across the state. Local governments will strongly support policy that benefits their constituency.

While it would seem that faced with bearing the cost of climate change alone and the potential economic benefits of early action, many local governments would be in support of
climate policy, this may not be the case. While many local governments would appreciate the opportunity to mitigate greenhouse gas emissions and address other drivers of climate change within their borders, they may oppose top-down mandates that are not tailored to their communities and constituents. Care should be taken to work with local authorities and citizens to implement policy that is properly attuned to their specific needs. These are stakeholders that should be persuaded if at all possible; local governments, especially those of major cities, can be powerful allies.

Citizens

The Southeast is extraordinarily vulnerable to climate change. Sea level rise, extreme heat events, hurricanes, and decreased water availability pose particularly dire threats (Carter et al., 2014, p. 397), and have the potential to disrupt the lives of millions of people throughout the region. Only three feet of sea-level rise puts $2.5 billion in Georgia property at risk, including 12,500 homes, 350 miles of road, 2 schools, 8 houses of worship, and 46 EPA-listed hazardous waste sites (Strauss, Tebaldi, Kulp, Cutter, Emrich, Rizza, & Yawitz, 2014, p. 15). Under high sea-level rise scenarios, expected losses due to hurricanes and sea-level rise on the Gulf Coast of Texas, Mississippi, and Alabama are projected to reach $350 billion by 2030. That same amount “could be used to re-build the entire asset base in New Orleans approximately six times over” (America's Wetland Foundation, America's Energy Coast, & Entergy, 2010, p. 7). Resulting infrastructure damage and displaced persons will contribute to other issues like food and water shortage and increased spread of disease (Kopp, 2014, p. 69). Health risks will rise, stemming from increasing pollution and further exposure to temperature extremes. Taxes may become increasingly expensive, as costly government intervention is necessitated by more frequent natural disasters.

Georgia citizens have obvious reason to reject the status quo. In addition, their economic fortunes will rise and fall with those of the state; success of businesses will contribute to higher wages and lower unemployment. Action to combat climate change will lead to growth in the renewable energy industry, resulting in the creation of thousands of jobs for Georgia citizens.

However, benefits to Georgians must be weighed against the shorter-term costs of higher electricity bills and partisanship amongst the populace. Although the potential repercussions would seem to point towards strong public will for action on climate change, citizens may not be so easily convinced. Many are still skeptical as to the scientific reality of anthropogenic climate change. Whether they choose to support or oppose action to combat climate change, citizens are in a powerful position; it is their votes that put policymakers in office.

Policy Analysis

Now that suitable background has been established, policy alternatives to combat the problem will be discussed. It seems logical to begin a discussion of policy alternatives with the structure by which they are to be evaluated. The criteria used for the evaluation of proposed policy options is laid out in the following paragraphs.

Political Feasibility: What is the likelihood of implementation of this policy in the current political climate? Are citizens supportive of its implementation?

In Georgia’s case, political feasibility is the most important goal for the development of policy on climate change. The state’s current political landscape is unreceptive, and some would argue hostile, towards action on this issue. Policy cannot be effective if it is never transferred into action because of political barriers. Policy designed to combat climate
change must be able to be implemented in the current political climate, and in turn must be appealing to local citizens, who will provide much of the needed political support. Implementation of policy actions that are politically feasible may provide the political breakthrough needed for further action on climate change not only in Georgia, but also throughout the Southeast.

Cost-Effectiveness: How much will the policy cost to implement relative to the benefits it produces? Will it save money in the short-run or long-run? Cost-effectiveness is the second-most important goal. It ties directly into political feasibility, as there is little chance of implementation of a solution that imposes high costs on taxpayers in a Republican-dominated state such as Georgia. It is crucial to take account not only of short-run costs and benefits, but also those in the long-run. Action on climate change will become significantly more costly as time goes on. Cost-effectiveness in this paper will be measured though cost of implementation of the policy relative to its benefits.

Effectiveness: Does the policy drive Georgia towards leadership in sustainability and incentivize energy innovation by reducing emissions of greenhouse gases and energy consumption?

This paper posits that effectiveness, though undeniably important, is not at this time as important as successful implementation of policy. Significant action on climate change in Georgia requires a change in the political landscape; a breakthrough is needed. However, this is not to say that policy should be ineffective. Strong policy action will place Georgia at a strategic advantage, not only averting the long-term costs of inaction on climate change, but also resulting in significant benefits to the state. Effectiveness will be judged in this paper by annual reduction of greenhouse gas emissions, measured in metric tons of carbon dioxide or carbon-dioxide-equivalent, and by reduction in average annual per-capita energy consumption.

Policy Alternatives

Policy Alternative One: Start with Atlanta

Historically, the passage of sweeping legislation to put a cost on the emissions of greenhouse gases has proven difficult. Policy has consistently run into significant political opposition. However, long known as a democratic stronghold, the city of Atlanta may be an exception. The city holds tremendous influence not only in the state, but also regionally, nationally, and internationally, and passage of such legislation would pave the way for similar initiatives elsewhere in the state and the region.

Beginning the pursuit of such legislation in Atlanta would help not only to overcome the issue of political feasibility throughout the state, but also that of Georgia Power’s natural monopoly. Were the city to push strongly for change, Georgia Power would be forced to comply; approximately 50 percent of the company’s customers reside in the Atlanta metropolitan area (Georgia Power, 2013).

The city of Atlanta should pursue the implementation of a carbon tax shift on all energy consumed within the city limits. A carbon tax shift differs from a traditional carbon tax in that revenues from the tax revenues are not used on sustainability-focused efforts like alternative energy research or infrastructure improvements, but merely shifted, reducing other costs to citizens. A carbon tax shift is strictly a tool by which to shift back demand for fossil-fuel-sourced energy. In Atlanta’s case, revenue from the tax on electricity would be returned to consumers through a tiered dividend system. Each category of consumer — residential, commercial, and industrial — would twice per year be divided into quartiles based on
energy consumption levels. Consumers in each quartile would then receive biannual rebates, of an equal share of tax revenue from their respective quartile’s energy consumption. The bottom quartile of residential consumers would not be taxed, providing protection for low-income households. Revenue from the tax on gasoline would be evenly distributed among car-owners whose residences lie within the city limits. The tax would be scaled up gradually, starting at a low tax per metric ton of carbon dioxide or carbon-dioxide equivalent, and increasing at intervals to a much higher final cost per metric ton. This price would be determined through the combined efforts of academics, state regulatory agencies, and utility providers.

Policy Alternative Two: Introduce Net Metering

In spite of qualms with Georgia Power’s energy production, its position as a state-backed natural monopoly is understandable. Energy production is an incredibly expensive business, and requires billions of dollars of upfront infrastructure in order to provide the needed power on a large scale. Because of these upfront costs, it is difficult to get businesses to enter the market at a scale that ensures reliable, inexpensive power throughout a large market like the state of Georgia. To combat this, the state ensures a marketplace — by guaranteeing a market with no competition, Georgia ensures that in the long run Georgia Power can make a profit. However, solutions that push Georgia Power towards a cleaner energy portfolio don’t have to threaten their market control, nor must they require the company to outlay major sums of money.

Net metering allows consumer-generated energy to be fed back into the grid and delivered to local energy distribution facilities, offsetting the cost of electric energy purchased by the consumer from the energy provider during the same time period. If more energy is produced by the consumer than they take from the energy provider, the energy provider pays for the surplus, which is then redistributed throughout the grid.

For example, consider a consumer named Bill who consumes 1000 KWh of electricity in a month. Bill wants to reduce his energy cost and his environmental footprint, so he installs solar panels on his roof that produce 500 KWh of electricity per month. By using this energy in his home, he effectively halves his monthly bill. After a few months with this new, lower bill, Bill decides to drastically cut his energy usage. He stops using his air-conditioning, hang-dries his clothing, and installs energy-efficient appliances. These actions reduce his monthly electricity usage to 475 KWh per month. Now Bill has a surplus of 25 KWh per month. By implementing net annualized metering, the energy utility can keep track of Bill’s energy surplus and redistribute it throughout the grid, paying him for the surplus energy. Bill is now making a profit as an energy producer.

This system, along with associated loans and tax exemptions on the state and federal level, would incentivize the installation of solar and wind technology on viable private property. After initial modifications to the electric grid to accommodate distributed generation, the financial burden would be undertaken by the consumer — not Georgia Power — with assistance from the government. Initial infrastructure cost to the consumer is outweighed by long-run potential for energy savings or profit. This long-run potential is suitable for residential and business-owned properties, as they typically are purchased with traditional, long-run bank financing. This form of financing means that purchasers are effectively locked into regular payment on their property for years (usually decades, as in the case of traditional 30-year mortgages). At
present, consumer-level solar infrastructure costs thousands of dollars, making it a perfect candidate for long-run financing and long-run payoff over the course of paying for a home or property.

Georgia should pass regulation that requires Net Annualized Metering, together with low-interest loan programs and tax exemptions that make the installation of consumer renewable energy systems more accessible.

Policy Alternative Three: Prepare the Ground with Smaller Regulatory Changes - “Energy Labeling” and Comparison of Energy Consumption

Most would agree that Georgia is not ready for state-wide climate change legislation such as a carbon tax or a cap-and-trade system. The political support is not present, and opposition is fierce. However, a number of smaller changes could have some effect, and cumulatively add up to a policy package that makes a real difference. These smaller changes would also serve to prepare the public for more sweeping legislation, putting citizens in an “environmental mindset.”

“Energy labeling” is a low-cost, politically feasible initiative that has already seen results at a large scale. Created by the U.S. Environmental Protection Agency in 1992, the Energy Star Program has extremely successful. In 2013, the EPA estimated that consumers had saved $30 billion by using Energy Star-labeled products, preventing the release of more than 277 million metric tons of greenhouse gas emissions in that year alone (U.S. Environmental Protection Agency [USEPA], 2014, p. 1). Energy Star certifications are available for appliances and electronics of all kinds, homes, and businesses. There are a total of 1.5 million Energy Star-certified homes in the U.S. Families living in these homes are shown to have saved more than $500 million in 2013 alone (USEPA, 2014, p. 2). Georgia should pass legislation mandating all new single-family homes be Energy Star-certified.

Georgia Power already pursues a number of initiatives to increase consumer energy savings. These initiatives include programs to better insulate Georgia homes and provide free Winter energy checks by Georgia Power Employees. These programs can be leveraged to get Georgia Power to acknowledge the issue of climate-change, and to pursue the implementation of other new, inexpensive programs. One program has already seen implementation among other utility providers: municipal water-sewer companies across the U.S. show the average water usage of neighbors on each individual consumer’s monthly statement. Knowing the water usage of neighbors allows the consumer to get an idea of whether their usage is too high, and if so, may incentivize changes in energy use and in the efficiency of appliances, HVAC systems, and the home itself (insulation). Georgia Power should show the median energy expenditure in the local area on individual consumer’s energy statements.

Policy Evaluation

Policy Alternative One: Start with Atlanta

A carbon tax shift in Atlanta would be an effective way to begin reducing Georgia’s greenhouse gas emissions. Many economists advocate similar carbon mitigation policies as the least governmentally invasive way to limit carbon emissions, including many environmentally minded conservatives, such as former Secretary of the Treasury Henry Paulson.

British Columbia, although much larger in land area, is similar in composition to the state of Georgia. It has a dense, metropolitan urban center surrounded by a largely rural state. British Columbia has a population of about 4.5 million compared to Georgia’s roughly 10 million people, and the Vancouver metropolitan
area is home to about 2.3 million people compared to Atlanta’s 5.5 million. Georgia’s makeup is similar enough to that of British Columbia that a comparison is valid. It is also worth noting that the potential for renewable energy sources is significantly higher in Georgia. British Columbia reduced carbon emissions by 10 percent from 2008 to 2012 with the implementation of a revenue-neutral carbon tax (Elgie & McClay, 2013, p. 3). Atlanta would likely see similar effects.

Per-capita consumption in British Columbia fell considerably upon implementation of the carbon tax - about 19 percent compared to the rest of Canada (Elgie & McClay, 2013, p. 1). Atlanta is likely to see similar effects with implementation of a carbon tax.

This policy will be designed to be revenue-neutral to county authorities. It is technically not a tax, but a tax shift; revenues are not used, but simply moved elsewhere. This policy is effectively zero-cost to the average consumer and business. This cost level is ensured no matter the income level via built in controls for low-income families and individuals such as energy subsidies in conjunction with ongoing government programs such as SNAP and Medicaid. However, it is important to note that decreased quantity demand as a result of the price increase will cause a loss of revenue by energy companies.

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<tr>
<th>Goals</th>
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<th>Policy Alternatives</th>
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<td>Goal 1: Political Feasibility</td>
<td>Citizen support</td>
<td>Depends on political affiliation and exposure to risk</td>
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<td>Likelihood of implementation of the policy in the current political climate</td>
<td>High</td>
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<td>Goal 2: Cost-effectiveness</td>
<td>Cost</td>
<td>Free</td>
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<td>Goal 3: Effectiveness</td>
<td>Reduction in greenhouse gas emissions, measured in metric tons of carbon dioxide or carbon dioxide-equivalent</td>
<td>No impact</td>
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<td></td>
<td>Reduction in per-capita energy consumption</td>
<td>No impact</td>
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This policy is likely to enjoy broad support in Atlanta, which has traditionally been a Democratic stronghold. This support will be reinforced by the effects of climate change that are already being felt in the city, like higher pollen counts and heat-induced health issues. Possible qualms with such a policy, such as lack of consideration for low-income individuals, will be accommodated for through benefit programs.

Georgia is heavily Republican: in the 2012 presidential election, the voters in 126 of the state’s 159 counties picked Mitt Romney (NBC News, 2012). Of the 236 seats in the Georgia General Assembly, 157 are held by Conservatives. This Republican majority is an obstacle for the passage of effective climate change legislation in an increasingly polarized political landscape.

However, in the 2012 election Atlanta’s more liberal voters picked Barack Obama, who in Fulton County earned 64 percent of the vote (NBC News, 2012). Of the 14 Atlanta seats in the Georgia State House of Representatives, 12 are held by Democrats (Georgia House of Representatives, 2014). Similarly, five of Atlanta’s seven seats in the Georgia State Senate are held by Democrats (Georgia State Senate, 2014). This majority for Democratic candidates indicates that it may in fact be possible for broad-based climate change legislation such as a carbon tax or a cap-and-trade system to be passed in Atlanta.

Policy Alternative Two: Introduce Net Annualized Metering

In 2011, Georgia’s coal-fired power plants generated 60 million metric tons of carbon dioxide (U.S. Energy Information Administration, 2012), and accounted for 62% of Georgia’s energy portfolio. A 2010 report estimated that 31% of Georgia’s energy needs could be filled by rooftop solar technology alone (Farrell & Morris, 2010, p. 12). Through Net Metering, solar power could cut the use of coal and its subsequent emissions by half. This system, along with current loans and tax exemptions on the state and federal level, would incentivize the installation of solar and wind technology on viable private property.

This policy would probably not affect per-capita consumption of energy, unless costs to the energy utility went up, increasing energy prices and decreasing demand.

The financial burden for the installation of distributed-generation technology would be undertaken by the consumer with assistance from the government. Initial infrastructure cost to the consumer is outweighed by long-run potential for energy savings or profit. This long-run potential is suitable for residential and business-owned properties. It is important to note that with a transition towards distributed-generation renewables such as solar energy, revenues for electric utilities will fall. However, this loss of revenue will be accompanied by an increase in revenue to companies that specialize in the installation and management of distributed-generation energy systems. Costs will also be incurred by utility companies and the state government as they upgrade the grid so that it can handle distributed generation at a large scale. Utility companies will bear the costs of switching to net metering tracking systems.

Citizens across the political spectrum are likely to be largely in favor of this policy, in spite of potential objections to increased government subsidies. It is in line with environmental concerns, as it incentivizes a shift to renewable energy sources. This in turn reduces emissions of greenhouse gas. This policy also allows fiscal freedom, opening the market for consumers to act as small-scale energy producers. Lastly, it furthers the goal of establishing American energy independence.

This policy should be extremely feasible. It is one of the few environmentally minded
solutions that caters to interests on both sides of the party lines. However, electrical utilities will lobby hard to stop its implementation. This opposition could be a significant obstacle to change in legislation.

Policy Alternative Three: Prepare the Ground with Smaller Regulatory Changes - “Energy Labeling” and Comparison of Energy Consumption

Created by the U.S. Environmental Protection Agency in 1992, the Energy Star Program has extremely successful. Since the start of the Energy Star Home Certification Program, “American homeowners have saved over $4 billion on their energy bills and reduced GHG emissions by more than 46 billion pounds” (USEPA, 2014, p. 2). There are a total of 1.5 million Energy Star-certified homes in the U.S. Families living in these homes are shown to have saved more than $500 million in 2013 alone (USEPA, 2014, p. 2). Were 1% of Georgia’s 4.1 million housing units to transfer to Energy Star Standards per year, the reduction in energy consumption per-capita would be enormous.

Comparison of energy usage has proven highly effective across the country. In an experiment conducted in the Sacramento Municipal Utility District, comparison of energy consumption prevented the release of an estimated 80,000 tons of greenhouse gas emissions (Ayres, Raseman, & Shih, 2009, p. 10). This policy would be easily applicable in Georgia.

Energy Star homes use 15-30 percent less energy per month than typical homes (USEPA, 2014, p. 2), significantly reducing energy usage per capita. In the study of Sacramento Municipal Utility District, monthly statements reporting average energy usage of neighbors to customers reduced average household energy usage by 2.1% (Ayres et al., 2009, p. 8), also bringing decreases in per-capita energy usage.

This regulatory package is highly cost-effective. Comparison of energy consumption is inexpensive, but in previous implementations has seen significant benefits: the Sacramento study showed projected energy savings by consumers of $15.2 million annually (Ayres et al., 2009, p. 10). Energy utilities will see a slight loss of revenue as demand drops. Similarly, a mandate that houses be Energy-Star certified is a relatively inexpensive regulation. It would require the hiring of supervisory personnel to conduct checks on new homes. However, savings here are vast: Energy Star certified homes saved more than $500 million in 2013 (USEPA, 2014, p. 2).

This package would enjoy mixed support. Citizens are likely to be frustrated by a mandate that requires all new homes to be Energy Star certified, but would probably support comparison of energy usage.

Most would agree that Georgia is not ready for state-wide climate change legislation such as a carbon tax or a cap-and-trade system. The political support is not present, and opposition is fierce. However, a number of smaller changes could have some effect, and cumulatively add up to a policy package that makes a real difference. These smaller changes would also serve to prepare the public for more sweeping legislation, putting citizens in an “environmental mindset.” “Energy labeling” is a low-cost, politically feasible initiative that has already seen results at a large scale. These regulatory policies would not be not difficult to implement, as they require little action by the state legislature. Although it should be noted that a mandate that all new homes be Energy Star certified will face considerable opposition, perhaps even from Democrats.

Policy Recommendations

Although all of these alternatives have the potential to be highly effective policy tools,
this paper will advocate one as the best candidate for implementation. Based on analysis of each alternative, this paper will advocate the implementation of a carbon tax shift in the city of Atlanta as the most effective tool to mitigate carbon emissions and address the growing issue of climate change. Implementation of this policy will set a precedent for communities throughout the state, region, and nation, and ensure Atlanta’s — and in turn, Georgia’s — leadership in sustainability and renewable energy in the years to come.

Implementation

Development of a carbon tax shift would require the leadership of the Atlanta city government. Atlanta should work to establish a revenue-neutral carbon tax, otherwise known as a carbon tax shift. The nature and inner workings of such a policy should be made clear to citizens around the community, through public meetings and information sessions. Relevant stakeholders should be involved in the development of this policy. Along with citizens, businesses must also be included. They hold significant influence in the community and will be affected by such a policy alongside the general population. Efforts should be made to reach out to utility companies specifically, especially Georgia Power. If receptive, it would be extremely beneficial to involve these energy providers in the policy process. Their support would both remove major opposition and provide further momentum to policy development.

This policy must be truly zero-cost for as many people as possible. This will be accomplished through rebates to city residents. To ensure that the tax does not fall disproportionately on low-income populations, the lowest quartile of electricity consumption will not be taxed.

Challenges

There are a number of obstacles that could make implementation of a carbon tax shift in Atlanta difficult. If the support of utility providers such as Georgia Power is not gained, their opposition will significantly decrease the political momentum behind this policy. In order for this policy to receive citizen support, the general public must understand how it works. It is imperative that this process is open, transparent, and understandable to the citizens of Atlanta. Lastly, policymakers must be careful that the burden of this policy does not fall disproportionately on any single group, whether businesses, high-income or low-income individuals, or even those who have long commutes. This policy must be effectively zero-cost for the majority of the parties involved, or it will not garner the necessary political support.

Conclusion

Georgia risks its reputation as a national leader by not taking action to address climate change. In spite of this, little has been done in the state to address this extraordinarily consequential issue. There are no formal plans to offset or mitigate carbon dioxide emissions in the energy sector or elsewhere. Alternatives proposed in this paper include a carbon tax shift in the city of Atlanta, the introduction of net metering throughout the state, and the implementation of new regulatory measures including energy certification of new homes and comparison of consumer energy usage. This report advocates the implementation of a revenue-neutral carbon tax shift in the city of Atlanta. This policy would bring about a substantial decrease in greenhouse gas emissions in Atlanta and provide precedent for similar policy actions throughout the state, region, and nation, in turn ensuring Georgia’s leadership in this area in the years to come. To succeed, this policy will require the leadership of the Atlanta city government, in cooperation with major stakeholders, as well as education and involvement of citizens.
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Improving Access to Screening and Treatment for Post-traumatic Stress Disorder in American Veterans

Meili Swanson and Neale Chumbler, Ph.D., Health Policy and Management

ABSTRACT. The prevalence of post-traumatic stress disorder (PTSD) in Operation Enduring Freedom and Operation Iraqi Freedom veterans poses a challenge to veterans’ integration back into society. PTSD in veterans has been linked to suicide, unemployment, substance abuse, homelessness, as well as domestic violence. The current policy is failing to identify and screen many of the veterans who need treatment for post-traumatic stress disorder. This paper examines policy alternatives and evaluates them based on effectiveness, cost, and political feasibility. From the research conducted, telemedical healthcare is a way to increase veteran access to PTSD screening and further treatment. Telemedical healthcare utilizes a Skype-like platform to connect patient to doctor face-to-face online. Telemedical healthcare is also a cost efficient and a politically feasible alternative to the current policy. Incorporating telemedical healthcare could increase access to screening and treatment services to veterans who face geographical, scheduling, and psychological barriers to receiving services. By implementing telemedical healthcare in all VA medical centers, more veterans would be able access screening and further treatment for post-traumatic stress disorder.

Introduction

The rate of post-traumatic stress disorder (PTSD) has been increasing in American veterans since the Vietnam War. It is conservatively estimated that 11% of veterans from the Afghanistan war and 20% of veterans from the Iraq war have developed or will develop PTSD. More than 600,000 veterans from Iraq and Afghanistan are projected to develop PTSD at some point in their lifetime. Negative consequences of veterans with PTSD include homelessness, unemployment, substance abuse, and suicide. On average, 18 veterans commit suicide a day. The current policies in place fail to identify veterans with PTSD, disabling veterans from receiving the medical care they need. In 2006, the Post Deployment Health Assessment (PDHA/PDHRA) identified 42,506 mental health issues, yet still 71,036 veterans sought mental health care on their own. Furthermore, only 60% of those referred to get treatment actually seek treatment. Continuing to fail to

2 Ibid.
identify those veterans who need medical attention has negative implications for both veterans and society as a whole. In order to combat these negative consequences of PTSD, those with PTSD must first be correctly identified through proper screening. This paper explores potential policy solutions to increase American veteran access to screening services for post-traumatic stress disorder.

**Background**

The American Psychiatric Association officially recognized post-traumatic Stress Disorder as a mental disorder in 1980. 

Symptoms of PTSD can be broken down into three main categories: re-experiencing, avoidance, and arousal symptoms. Re-experiencing symptoms include flashbacks, nightmares, and upsetting memories. Avoidance symptoms relate to the avoidance of triggers associated with trauma, such as avoiding people and places, feelings of numbness, perceptions of a short future, and memory loss. Arousal symptoms relate to the anxiety and fear trauma creates, which can develop into feelings of irritability and anger, difficulty focusing on tasks, and hypervigilance. All of these symptoms can severely interfere with a person's quality of life by making it hard to communicate with others, focus on work, and complete day-to-day tasks.

**Consequences**

The consequences of PTSD in veterans can be classified under four major categories: health, social, institutional, and economic.

**Health**

Substance abuse is the harmful abuse of substances including drugs and alcohol. By 2009, 7,400 soldiers from the Iraq and Afghanistan wars had already been treated in Veteran Affairs (VA) medical centers for drug addictions. The VA reports that more than two out of ten veterans with PTSD also suffer from a Substance Use Disorder. The current policy in place to screen veterans for potential health issues only referred .2% of Operation Enduring Freedom and Operation Iraqi Freedom (OEF/OIF) veterans to seek help for substance abuse. Yet, 12% of OEF/OIF veterans indicated on the self-reported assessment that they had abused alcohol in the past. Recent studies have found a significant increase in mortality rate for veterans with PTSD and substance abuse problems. Around 22% of OEF/OIF veterans commit suicide compared to the 12.4% national average.

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Ibid.

Ibid.

Ibid.

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Mullhal, Invisible, 9

Mullhal, Invisible, 9

disorders (SUDs) have substantial negative consequences on Veterans' mental and physical health, work performance, housing status, and social functioning.\(^{18}\)

**Physical Health**

Veterans with PTSD are more vulnerable to diabetes and cardiovascular disease as they age.\(^{19}\) Studies have shown veterans with PTSD are twice as likely to develop dementia as those without PTSD\(^{20}\) and are also twice as likely to be diagnosed with a disease five years after deployment.\(^{21}\) PTSD is found to be associated with the increased risk for heart disease, bronchitis, asthma, liver, and peripheral arterial disease.\(^{22}\) Not only does this contribute to the estimated $4-$6 trillion medical care for veterans from the OEF/OIF, but it also poses huge economic and social costs to veterans and their families.

**Social Symptoms**

Veterans with PTSD face challenges to employment due to both real and perceived stigmatization. One in three veterans was denied a job that they were qualified for because of a psychiatric disorder label.\(^{23}\) Research has also shown that veterans with PTSD are 19% less likely to be employed.\(^{24}\) The study attributed this to avoidance symptoms associated with PTSD, such as avoiding going out in public.\(^{25}\) Other studies cite the stigma attached to PTSD as a major barrier to employment.\(^{26}\) In the short term, unemployment can contribute to the difficulties many veterans face when trying to reintegrate back into civilian society. Lack of employment may spiral into negative consequences like homelessness.\(^{27}\)

On average, 18 veterans commit suicide a day.\(^{28}\) The VA also reported that the National Veteran suicide hotline receives about 17,000


\(^{19}\) Wood, Iraq

\(^{20}\) Ibid.


\(^{22}\) Ibid.

\(^{23}\) Mullhal, Invisible, 12


\(^{25}\) Ibid.


calls a day. Moreover, 30% of OEF/OIF veterans have mulled suicide, according to one survey. Many of those respondents do not seek the medical attention they need from the fear of it "ruining their career." Former secretary of the Department of Veteran Affairs, Eric Shinseki commented that two out of three veterans who commit suicide are not enrolled in the VA medical system, pointing towards the failure of current policies to screen and provide treatment for veterans with PTSD.

The Obama administration is currently working hard to alleviate the problem of homelessness among veterans with the goal to eliminate homelessness among veterans by 2015. There are currently about 60,000 homeless veterans in the United States, which has decreased by 17.2% from January 2009 to January 2012. Veterans currently constitute between 20%-25% of the homeless population. About 63%-77% of homeless veterans have PTSD and/or a mood disorder. In these cases, it is hard for homeless veterans to receive the medical care they need. While President Obama is currently addressing veteran homelessness by dispensing vouchers to veterans for public housing, this policy fails to address the root causes of veteran homelessness. Additionally, due to the recent government spending cuts, many local authorities refuse to honor these vouchers for public housing. Homelessness, unemployment, and substance abuse are three interrelated and persistent problems that are correlated with untreated PTSD.

Domestic violence is also associated with untreated PTSD among OEF/OIF veterans. Professor Campbell from Johns Hopkins who served as a member of the Pentagon task force explains the association, "The more trauma out there, the more likely domestic violence is." Reoccurring deployments have been linked to increase in PTSD that can turn into an increase in domestic violence. According to the VA, male veterans with PTSD are two to three times more likely to engage in domestic violence than those veterans without PTSD. Another finding indicates that

29 Wood, Iraq
31 Ibid.
32 Wood, Iraq
35 Ibid.
36 Vogel, Donovan
40 Ibid.
81% of spouses who are married to a veteran with PTSD have been physically abused.\(^{42}\) Because the divorce rate is high among veterans with PTSD, many children are affected by the interpersonal problems PTSD creates.\(^{43}\) In this way, the continuation of violence related to untreated PTSD can be debilitating to societal relationships.

**Institutional**

Studies conducted by the Vietnam Veterans of America and the Veterans Services Clinic at Yale Law School show that the DOD wrongfully discharged veterans under a personality disorders instead of medical discharge to avoid paying retirement benefits to those with PTSD. PTSD is a medical discharge, while personality disorders fall under the category of a preexisting condition.\(^{44}\) Since the Iraq war, personality discharges have increased by 40% in the army.\(^{45}\) Discharges for "misconduct" increased by 20%, and discharges for drug abuse doubled. Misconduct and drug abuse are both potential symptoms of PTSD.\(^{46}\) Many of the veterans discharged with a personality disorder actually suffer from PTSD but are now unable to receive the healthcare benefits they probably need. While this might save economic costs for the VA in the short term, it is destructive to the veterans suffering from PTSD and their families.

**Economic**

Since the beginning of the wars, healthcare treatment for OEF/OIF veterans with PTSD has cost the VA $2 billion.\(^{47}\) However, this is far less than the projected $4-$6 trillion that OEF/OIF veteran healthcare and disability expenses are estimated to cost over the veterans’ lifetimes.\(^{48}\) Economist Bilmes, PhD, and author of the book, *The Three Trillion Dollar War: The True Cost of the Iraq Conflict*, states, "The cost of caring for war veterans continues [and] typically rises for several decades and peaks in 30 to 40 years or more after a conflict. The costs rise over time as veterans get older and their medical needs grow.”\(^{49}\) While this projection is not alone caused by PTSD directly, veterans with PTSD use non-mental health services 71%-170% more than veterans without PTSD. This is in part due to the increase risk for other diseases from PTSD.\(^{50}\) Ultimately, there is nothing that can be done to eliminate these high costs apart from immediately investing in higher quality care.

**Causes of the problem**

**Combat**

\(^{46}\) Ibid.


\(^{48}\) U.S. Medicine The Voice of Federal Medicine, Lifetime

\(^{49}\) Ibid.

\(^{50}\) Ibid.
Operation Enduring Freedom and Operation Iraqi Freedom have been the longest American military operations since the Vietnam War. The use of Improvised Explosive Devices (IEDs) was the most common form of combat encountered in OEF/OIF. Death from IED explosions accounted for 80% of the casualties between 2001 and 2005. Since PTSD is triggered by trauma, the shock caused by IEDs is linked to the high rates of PTSD among OEF/OIF veterans. Many studies have also found a significant correlation between developing PTSD and the number of times a veteran was deployed. Due to the length of operations in Iraq and Afghanistan, many personnel were deployed on multiple tours.

Stigma of PTSD
Actual and perceived discrimination against veterans with PTSD can deter veterans from seeking medical care. Studies have shown that a mental illness label creates barriers to work, housing, and health care opportunities. One in three veterans was denied from a job they were qualified for because of a psychiatric label. There is a widely held concern by veterans that the public would blame them for their own illness since they were willingly signed up for the military. The fear mental illness will have a negative impact on one's career is a major barrier preventing veterans from reaching out for help.

Lack of Support
Removal from existing, social support systems created in combat when returning to civilian life results in loss of identity and purpose in many veterans. "The military shapes kids in ways they wouldn't otherwise have been shaped," says Stephen Xenakis, a retired brigadier general and clinical psychiatrist who serves as medical adviser to the Joint Chiefs of Staff. "All of a sudden that experience, that support group, that entire identity is ripped out of them. How are they going to handle that?" The loss in the social system created through the military makes the transition from the military to civilian life significantly more challenging.

Current Policy
The current Post Deployment Health Assessment forms are impersonal and fail to accurately screen veterans for PTSD. Since March 2005, the PDHA/PDHRA has been used to screen veterans returning from service for mental health issues. The current form (Sept.

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53 Ibid.
54 Ibid.
57 Capehart, Where Soldiers
58 Mullhal, Invisible, 14
59 Mittal, Stigma
60 Briggs, 30 Percent
2012) must be completed online instead of previous paper forms. This requires veterans to have access to a computer to fill out these forms. The forms are then reviewed by health care providers, who proceed to contact the veterans if they have any medical recommendations.

The Department of Defense (DOD) requires troops to fill out Post-Deployment Health Assessment/Post-Deployment Health Reassessment (PDHA/PDHRA) forms right after return from service and again six months later as a psychological screening process. Healthcare providers rather than mental health experts, review the forms. Healthcare providers might lack the qualifications for adequately determining whether or not veterans should be referred to further screening or treatment.

In 2006, the PDHA identified 42,506 mental health issues, but 71,036 veterans sought mental health care on their own. This current policy, which relies on self-reporting, fails to accurately identify veterans with PTSD. In 2006, 19% of Iraq veterans reported a mental health issue, but a year later 35% sought out medical attention themselves. Another study suggests that 74% of OEF/OIF veterans who sought medical attention were not identified by the PDHA/PDHRA.

Furthermore, veterans deployed prior to 2005, when the policy was implemented, may not have filled out the PDHA/PDHRA. Many veterans will not seek out medical care on their own partially due to the stigma surrounding mental treatment. One study found that 59% of the veterans who were PTSD positive refrained from reporting symptoms on the PDHA/PDHRA because they feared their release from active duty would be delayed. Also, PTSD can develop months or years after a traumatic incident, not necessarily immediately after deployment or six months later. Only screening veterans immediately and again six months later for PTSD, fails to identify those who develop PTSD more than six months later from being deployed. The Copenhagen's Bispebjerg Hospital reported that one in every four cases of PTSD had developed more than six months after the traumatic experience occurred. If the current policy persists, American veterans with PTSD and other related mental issues will continue to fall through the cracks of the current system.

Policy Alternatives
Policy Alternative I:
The Department of Veteran Affairs (VA) is required to implement telemedical healthcare systems in VA medical centers and Community Based Outpatient Clinics (CBOC) to offer

http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2804656/

Ibid.

Ibid.

Ibid.

Mullhal, Invisible, 13

Ibid.


http://cphpost.dk/national/PTSD-compensation-not-enough-veterans-say

* A Community Based Outpatient Clinic (CBOC) is a VA-operated clinic or a VA-funded or reimbursed health care facility or site that is
Telemental health care utilizes a Skype-like platform to connect patient and doctor in a face-to-face counseling session over the Internet. The San Diego medical center used a program called Jabber.\textsuperscript{72} Telemental health care would involve both screening and treatment. Veterans could get screened for PTSD by a telemedical session, and the psychiatrist conducting the screening could suggest further recommendations and treatments. Veterans would then have the option to pursue treatment either traditionally, or continue with the telemedical treatment. Once a week counseling sessions for PTSD proved to be as effective as face to face counseling over the course of six months according to a large scale study directed by the San Diego VA medical center.\textsuperscript{73} For veterans like Ruben Garcia who suffered from PTSD and had difficulty accessing a VA medical center, telemental health care proved to be life saving. Not only does telemental healthcare work to increase the access of screening and treatment, but also delivers higher quality care. VA Under Secretary, Petzel, accounts the story of one veteran who had to sit through 45 minutes of traffic to get to his therapy. Once that veteran started using telehealth therapy sessions, he reportedly gets “infinitely” more out of his therapy sessions because he is in the comfort of his home and no longer distressed about the traffic.\textsuperscript{74} Both quantitative and qualitative accounts have suggested that telehealth works to improve the quality of healthcare delivered to veterans. Though the initial investment in equipment might cost thousands of dollars, more money could be saved in the long run while more veterans would have access to the system. Implementing telemental healthcare would initially cost $1,300 for each VA medical center.\textsuperscript{75} To implement in 152 VA medical centers would cost $197,600 based off this estimate.

Policy Alternative II:
VA centers are required to offer weekly peer and family based support groups, located at the VA medical centers, to encourage veterans to talk about their problems and seek medical care, decrease self-stigmatization, and provide a solid support group for veterans returning from combat.

All 152 VA medical centers would be required to hold once a week support group meetings for veterans and their families. While this policy would not directly increase screening, it might encourage veterans to talk about their experiences and seek help. These VA medical centers could potentially offer PTSD screening after the meetings to make in-person screenings more convenient to access. This policy alternative would basically work to replace similar support group that veterans lose


\textsuperscript{75} S. Williams (GA Partnership of Telehealth, Nov 7, 2013)
when they return from combat. Many veterans feel as though other veterans are the only ones who understand them because they went through similar experiences. Studies have also suggested that family involvement and communication is also important in the healing process. Veterans like Brandon, explain that sometimes it's hard to communicate to family members what veterans with PTSD are dealing with. Families and veterans would participate in a discussion-based support group led by a therapist that is specialized in PTSD among veterans. This policy alternative aims to foster the communication between veteran and families and families and veterans while also encouraging veterans who need help to seek help.

Policy Alternative III:
In order to screen for veterans with PTSD, the DOD requires mandatory, in-person health assessments for all military personnel returning from combat.

The biggest challenge to correctly identifying veterans with PTSD correctly is properly screening all the veterans. Relying on online self-reporting is a passive system when the goal is to screen every veteran for PTSD. Due to the debilitating nature of PTSD and the stigma surrounding a mental illness label, many veterans with PTSD are reluctant to self-report the problem. If the DOD required mandatory, in-person screenings, the DOD would be able to addresses the issue of veterans with PTSD directly. Studies have found that the most effective way to diagnose PTSD is through a face-to-face assessment. To implement this policy, Congress would have to approve budgeting for the DOD and VA to provide mental health experts to conduct these post-combat screening interviews. Training for these individuals could take a while in order to interview every returning veteran.

Multi-Goal Analysis
Goal 1: Effectiveness
Effectiveness refers to an increase from the current policy in number of veterans who get screened for PTSD. Effectiveness is the most important goal because it is a measure of the number and extent to which veterans are impacted by the policy alternative. Effectiveness is important when the ultimate goal is to accurately screen every veteran for PTSD to ensure that they receive proper, quality treatment. While effective screening does not directly ensure quality treatment, it is the first step to addressing the problem. If the number of veterans with PTSD is known, VA facilities can expand their capabilities to meet the growing need of veterans with PTSD.

Impact Category 1:
Impact Category 1 measures the percentage of OEF/OIF veterans that are screened for PTSD. The percentage of veterans that would be screened for with each policy is important to take into account because it is the best way to measure veteran access to PTSD screening.

Impact Category 2:
Impact Category 2 refers to the projected number of veterans screened positively for PTSD by implementing this policy. This impact category takes the percentage of those projected to be screened multiplied by the total number of OIF/OEF veterans. That number is then multiplied by the percentage of veterans that are

76 Mittal, Stigma
77 Veterans Healthcare Administration, Understanding
78 Veterans MTC. (2011 Nov 11). Coming home was tough until he got support. Retrieved from http://www.youtube.com/watch?v=Yu4Fgdaq1Z4
79 Mittal, Stigma
estimated PTSD positive. This is important when determining the cost of treatment by enumerating the scope of the problem.

**Goal 2: Cost-Effectiveness**

Cost-effectiveness refers to the degree to which the benefits of the policy outweigh the economic costs. Cost-effectiveness is important when determining what policy would be the best to implement in the long term. While a policy might be expensive upon implementation, over time it can be cost effective if it can save more money than it initially costs. Aside from effectively screening veterans, this is the second most important goal to take into account when analyzing which policy alternative is the best. The cost effectiveness also influences how

<table>
<thead>
<tr>
<th>Goals</th>
<th>Impact Category</th>
<th>Policy I - Current policy: The DOD should continue requiring returning personnel to fill out PDHA/PDRHA forms.</th>
<th>Policy II - The VA provides telemedical healthcare for veterans in all VA centers.</th>
<th>Policy III - VA medical centers required to offer peer and family based support groups.</th>
<th>Policy IV - The DOD requires an in person PTSD interview/assessment of all returning veterans.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effectiveness: All veterans returning from combat are screened for PTSD.</td>
<td>% Of Iraq and Afghanistan veterans that are effectively screened for PTSD</td>
<td>19% get referred based on the Post Deployment Health Assessment forms.</td>
<td>41%</td>
<td>N/A Group support helps veterans seek self-help and have private screening available after meetings.</td>
<td>100% - granted the DOD mandates an in person PTSD screening with a professional upon return from combat and six months later.</td>
</tr>
<tr>
<td>Projected increase in number of OEF/OIF veterans screened positive for PTSD</td>
<td>168,000 In 2007, the PDHA system failed to identify at least 168,000 veterans for PTSD.</td>
<td>196,800 based off projections that 41% of veterans live in rural areas and 35% go undiagnosed.</td>
<td>&lt;168,000 if 35% still seek medical attention on own if 20% of veterans actually have PTSD. While it might encourage veterans to seek medical attention, hard to project exact number.</td>
<td>480,000 Based on the projection of 20% with PTSD</td>
<td></td>
</tr>
<tr>
<td>Cost-effectiveness: The benefits of the policy outweigh the costs of continuing with the current policy.</td>
<td>The annual cost of the policy measured in USD.</td>
<td>$5,548,000 2012 actual funding for the PDHA/PDRHA</td>
<td>$180,231,408+$197,600 = $180,429,008 Total for the projected increase in those screened positive and initial cost</td>
<td>$1,976,000 On the basis that all 152 VA medical centers hold a once a week support group meeting.</td>
<td>&gt;$1,200,000,000 Based on two $250 in person PTSD screening evaluations.</td>
</tr>
<tr>
<td>The long-term costs the policy incurs measured in USD.</td>
<td>$3-$6 trillion Long term costs of negative health consequences incurred from PTSD.</td>
<td>-$24,289,056 saved from conducting telemedical interviews instead of face to face interviews</td>
<td>Over 50 years this might cost around $98,485,000 potentially saving costs if it is effective in getting help to veterans with PTSD.</td>
<td>$1-$2 trillion 1/3 people with PTSD have a negative prognosis based on this projection = 160,000 still have PTSD</td>
<td></td>
</tr>
<tr>
<td>Political feasibility: A national policy regarding PTSD is implemented.</td>
<td>The policy has a fair chance of being implemented on the national level.</td>
<td>N/A</td>
<td>3 Added expenditures to existing expenses</td>
<td>3 Wide-spread support for relatively low costs</td>
<td>1 High costs would deter any actor from supporting</td>
</tr>
</tbody>
</table>
politically feasible a policy alternative is, which is the next goal.

**Impact Category 1:**
Impact Category 1 measures the annual cost of the policy in USD.

**Impact Category 2:**
Impact Category 2 measures the long-term cost/savings of the policy measured in USD. The long-term costs and benefits are important to consider when deciding which policy alternative is the best to implement.

**Goal 3: Political feasibility**
Political feasibility refers to the likelihood stakeholders would support the proposed policy. Political feasibility is extremely important when analyzing the policy alternatives. Even if a policy could effectively screen every veteran for PTSD, if it is not politically feasible at the time then it would not be rational to advocate for the policy's implementation. Alternatively, if a policy alternative is politically feasible, there is a window of opportunity for implementation.

**Impact Category:**
Political feasibility is measured on a zero to-five scale, zero being the least likely to be implemented and five being the most likely to be implemented. There are five potential stakeholders included in this analysis. The stakeholders are veterans and their families, the Executive Branch, The DOD, the VA, and Senator Isakson. For each actor likely to support the policy, one point is allocated to the political feasibility.

**Goal 1, Impact Category 1:** Percentage of projected increase in veterans screened for PTSD

**Current policy:** Veterans are required to complete the online PDHA/PDHRA upon return from service. In 2006, the PDHA/PHHRA identified 19% of veterans with a mental health disorder, yet failed to identify the 35% that sought medical care the following year.81

**Policy Alternative I:** If all rural veterans were able to have a telemental healthcare screening for PTSD and continue counseling sessions through telemental care, then 41% of veterans should be able to have better access to screening because transportation and travel/schedule/wait time barriers to access would be removed from the process.82

**Policy Alternative II:** While impossible to project exactly what percentage of veterans will actually seek help after attending support group meetings, research suggests that talking about PTSD with other veterans encourages veterans to seek help. Expressing concerns about PTSD decrease the likelihood that veterans will internalize both real and perceived stigma regarding PTSD.83 Research has also indicated that family support and communication is essential to the recovery process.84 Having a formal forum to facilitate communication, with a therapist to help lead the discussion, could foster proper support and communication between families and veterans, veterans and families, and veterans and veterans. Problems with equity will persist, as rural veterans will still face geographic barriers.

**Policy Alternative III:** All veterans are required

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81 Mullah, Invisible, 13
83 Mittal, Stigma
to undergo mandatory screenings with a professional psychiatrist. This policy would ensure that 100% of veterans should be screened for, ensuring equity for PTSD screening among veterans.

**Goal 1, Impact Category 2:** The number of veterans projected to be diagnosed with PTSD based on the projected percentage screened by implementing policy

**Current policy:** In 2007 alone, the PDHA/PDHRA failed to identify 71,031 soldiers with a mental illness that sought out medical attention themselves. If the current system lets 35% of mental illnesses go unrecognized, than the accounts of unidentified PTSD in veterans could be around 168,000 of the 2.4 million OIF/OEF veterans.

**Policy Alternative I:** If 20% (conservative estimate) of veterans from the Iraq and Afghanistan war (2.4 million) have PTSD, and 41% of veterans live in rural or highly rural areas, than it can be projected that 196,800 veterans from rural areas with PTSD would have increased access (reduced transportation and time commitment) to PTSD screenings and further counseling.

**Policy Alternative II:** In 2007, 35% of veterans sought medical attention on their own. Using 35% as a baseline, if at least 35% of the 20% of veterans with PTSD were encouraged to seek medical attention by attending support group meetings, then 168,000 veterans might either seek treatment faster than if no group existed.

**Policy Alternative III:** If all Iraq and Afghanistan veterans were screened by a professional, then by the conservative 20% estimate, 480,000 of the 2,400,000 OEF/OIF veterans would be diagnosed positively with PTSD.

**Goal 2, Impact Category 1:** The direct annual cost of the policy measured in USD

**Current policy:** According to the DOD’s budget, in 2013 the DOD spent $5,548,000 on the PDHA/PDHRA system.

**Policy Alternative I:** If 196,800 veterans are diagnosed with PTSD and a year of telemental counseling costs $915.81, then the annual costs of providing telemental health care would increase by $180,231,408. In the long run, the cost of this policy might decrease as infrastructure is provided for after the initial start-up.

**Policy Alternative II:** It might cost about $2 million annually to run weekly mandatory peer and family support groups at each VA medical facility, pricing each group meeting at $250. The cost could be reduced to $1 million if meetings were only held once a week. This figure assumes $150 for expert conducting this one-hour discussion, $50 for the room, and $50 for other costs.

**Policy Alternative III:** If two in-person evaluations, one immediately after return from deployment and one six months later, are conducted, priced at $250 an appointment, then this policy would cost $1,200,000,000. It is important to have a follow up evaluation since most symptoms of PTSD develop three months after the trauma occurs. This policy would

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88 Agha, Update
89 Agha, Update
therefore fail to help those veterans who develop PTSD years after they return from combat.91

**Goal 2, Impact Category 2:** Long term costs and benefits of policy

*Current policy:* It has been projected that the direct costs and indirect costs for lifetime benefits and healthcare for OIF/OEF veterans will cost anywhere from $3-$6 trillion according to economists, almost as much as the wars themselves.92 If veterans with PTSD can be identified and treated sooner, the lifetime healthcare costs would decrease. Veterans would have a lower chance of developing diseases that increase in risk for when the veteran has PTSD. By addressing the root problem, PTSD, directly, expensive externalities of PTSD like suicide, homelessness, and substance abuse would be alleviated.

*Policy Alternative I:* If face to face counseling sessions are priced at $1,039.23 annually, then telemental counseling would save over $24,289,056 annually. Annually, the VA might save $24,289,056 from conducting in person treatments, so the real cost of providing telemental screening and treatment for veterans with PTSD would be closer to $155,942,352 annually, annual expected costs minus annual expected savings.93

*Policy Alternative II:* Over 50 years, this policy would cost $98,485,000. However, the amount of money it could save in the future would be substantial if the policy is effective in both encouraging veterans to seek help faster and aiding in recovery. PTSD tends to have a better prognosis if addressed earlier, like many diseases.94 Having PTSD also has been found to increase the chance of risk for 'heart disease, RA, bronchitis, asthma, liver, and peripheral arterial disease.'95 Treating PTSD could offset the lifetime costs of treating these associated diseases faster. In the first five years after returning from deployment, veterans with PTSD are 20% more likely to be diagnosed with a disease.96

*Policy Alternative III:* Over the lifetime of veterans from the Iraq and Afghanistan wars, this could potentially save $2-$4 trillion. This assumes that every veteran is accurately screened for PTSD and the prognosis of 66% fully recover with treatment is accurate, one-third reported still having PTSD after ten years of treatment. Over a 50 or more year period, this policy could save trillions of dollars in PTSD-related healthcare costs along with the costs associated with the many other symptoms of PTSD such as suicide, homelessness, and domestic abuse.

**Goal 3, Impact Category:** Likelihood political stakeholders will support the policy alternative

*Current policy:* N/A, the policy is already implemented.

*Policy Alternative I:* All VA medical centers and Community Based Outpatient Clinics offer telemedical PTSD screening and treatment to veterans. The Obama administration has outlined initiatives including, expanding healthcare initiatives for rural veterans and improving care and benefits for PTSD.97 Barack and Michelle Obama and Joe Biden have

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91 Ibid.
92 U.S. Medicine The Voice of Federal Medicine, Lifetime
93 Agha, Update
95 U.S. Medicine The Voice of Federal Medicine, Lifetime
96 Ibid.
97 Veteran Owned Businesses, First
supported improving veteran affairs on their policy agendas. The VA desires to improve access to health care for all veterans, especially rural. Recently, the VA submitted a budget request for $460 million for telemental health care, up $19 million from 2013, for the 2014 fiscal year. Adding about $180 million more for telemental health care might be too high for support, especially with the recent sequester. For similar budgetary reasons, the DOD might not want to increase spending by that amount. Veterans and their families would support this policy because transportation, work schedules, and waiting times can act as a barrier to veterans receiving the healthcare they need.

Senator Isakson would most likely vote in favor additional funding to the VA because he voted for legislation expanding medical service to rural veterans. On the 1-5 scale, this policy receives a 3, which is considered medium for political feasibility.

*Policy Alternative II:* The political feasibility of this policy alternative is medium, 3 out of 5. Again, the Obama administration aims to expand healthcare initiatives for rural veterans and improving care and benefits for PTSD. Both Barack and Michelle Obama and Joe Biden have supported improving veteran affairs on their policy agendas. The VA might also support this policy alternative because former Head of the VA, Shinseki reiterated in his address to the Mental Health Summit in September 2013, stressed the importance of early intervention, family support and community involvement. However, current VA Secretary McDonald may not support the same strategies as the former Secretary for assisting the reintegration of veterans and their families to civilian life. Thus, the current VA administration might not support this policy. The DOD would remain neutral on this issue because it is outside the realm of their responsibilities. Veterans and their families would support this policy because it would give them a forum to communicate. A facilitated discussion between veterans and families may help veterans and families communicate their concerns to one another since veterans and families often cite misunderstanding as a major interpersonal problem. Senator Isakson would probably approve funding for this policy because he supported a program that trains veterans and their families to reintegrate back to civilian life. A member of the Committee on Veterans’ Affairs, Senator Isakson’s opinion is influential in Congress on veteran healthcare policy.

*Policy Alternative III:* The DOD requiring all returning veterans to partake in an in-person screening for PTSD scored very low for political feasibility. Due to the high costs at $1.2 billion, the only stakeholder that might support this policy would be veterans and their families. In the long run this policy would save the most amount of money and have the largest impact, but right now, it is politically infeasible. This policy is the only way to ensure each and every one of the returning veterans gets screened for PTSD. Several studies have cited this policy as

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100 Mento, Telehealth

101 Veteran Owned Businesses, First Lady

102 The United States Government, Joining

103 United States Department of Veteran Affairs, Remarks

104 Veterans Healthcare Administration, Understanding

105 Senate Government, Issues and Legislation
the best way to actually reduce PTSD in veterans, yet the expense renders it infeasible.\textsuperscript{106}

**Justification and Limitations**

Based on the projections in the policy matrix, requiring VA medical centers and community-based outpatient clinics (CBOCs) to provide telemedical PTSD screenings to would be the most effective policy in terms of increasing access while being cost-effective. Since the VA has already started providing more telemedicine over the past few years, requiring VA medical centers to offer screenings for PTSD through telemedicine and receiving the necessary funding is politically feasible.\textsuperscript{107}

The VA estimates that 41\% of OIF/OEF veterans live in rural or highly rural areas, which can pose significant barriers to receiving health care.\textsuperscript{108} Many veterans simply do not have the time with busy schedules to find transportation and endure waiting time to see a doctor.\textsuperscript{109} Through a telemedicine program, veterans can schedule appointments and access their screening in the privacy and convenience of their own homes. Many veterans with PTSD face difficulty leaving their homes due to hypervigilance and other psychiatric symptoms caused by PTSD. Jennifer Haefner, an army veteran, considered it a "good month" if she left her house once to go to the grocery store.\textsuperscript{110}

Symptoms associated with PTSD, like flashbacks, irritability, and hypervigilance, can make it too demanding or too stressful to leave one's home or function normally in society. By providing in online, home screening, veterans who have PTSD can avoid traveling to a clinic, yet still receive proper screening and treatment for PTSD. By removing some of the negative stigma associated with receiving mental healthcare, veterans would be encouraged to seek care through the privacy of their homes.

Some challenges in providing telemedical care include physician engagement, infrastructure, sustainability, and access. Some physicians may be reluctant to incorporate telemedicine into their practice due to concerns about training and technological difficulties. However, telemedical has the capability to remarkably increase access to patients who could not otherwise receive care. It also has the ability to boost profits since input costs are lower for telemedical healthcare than in person treatment. Having the adequate infrastructure to support telemedicine is another potential challenge to this policy. A strong Internet connection is vital to the viability of telemedicine. Chief information officer, Ross Hurd, recommends test-runs to ensure hospital staff are comfortable using the technology and to reduce infrastructure errors.\textsuperscript{111} The overall sustainability of telemedicine is contingent upon whether or not veterans chose to use it. Once the telemedical system is implemented, the sustainability of the program could be

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\textsuperscript{106} Mullhal, Invisible


\textsuperscript{108} Heisler, Healthcare

\textsuperscript{109} Mento, Telehealth


compromised if the VA deems it ineffective. However, the Veterans Health Administration found a 93% satisfaction rate among veterans who used telemedicine in 2012. Also, the younger generation of veterans might actually prefer this technologically innovative method of receiving healthcare to traditional hospital visits. Unfortunately, this policy is limited to veterans with Internet access. Homeless veterans would have great difficulty accessing telemedical services. However, screening veterans for PTSD through telemedicine aims to identify those with PTSD and recommend and provide treatment to veterans as a long-term approach.

Overall, investing in the infrastructure to provide proper screening for PTSD will take time, but the benefits far outweigh the costs. Implementing telemedical healthcare will decrease costs in the long run associated with face to face screening while increasing care to veterans who may face barriers to accessing physical VA medical facilities. With the expansion of technology, medical professionals and hospital staff members already possess the skills necessary, such as video chatting, to provide telemedicine. Overtime, the telemedicine will improve the quality of telemedicine and technological difficulties will become less of a challenge.

Another major challenge to implementation is the shortage of professional psychiatrists in VAMCs. It is recommended that an additional 250 professional staff members be added to the VAMCs, costing around $18 million to $20 million. To address this need, VAMCs either need to hire more professional staff or expand care to CBOCs. Implementing telehealth in CBOCs could alleviate some of the capacity issues VAMCs face with the significant increase in veterans who require screening and treatment for PTSD. In 2013, the VA met its goal to hire 1,600 mental additional health professionals to alleviate staffing shortages in VAMCs. The challenge remaining is meeting the needs of those veterans who live in rural areas and providing quality care. The implementation of telehealth applications can address both issues.

Implementation

Advocacy is necessary in order to bring attention to the growing need for reforming the PTSD screening process among veterans. Veteran advocacy groups such as the Iraq and Afghanistan Veterans of America (IAVA), Veterans’ Families United Foundation, and the Wounded Warriors Project would need to mobilize groups to lobby Congress to approve the $200 million budgetary increase needed to implement telemedical healthcare for veterans. Advocacy groups would need to lobby, write letters to Congress, and receive media attention to spread awareness. Representatives in Congress would be pressured to allocate federal funds towards telemedicine for veterans if

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112 Petzel, Telemental
113 Roney, Overcoming Challenges
constituency pressure was present. Last year, Obama proposed to increase the VA's budget by 10%, $152.7 billion, in order to speed up the process of disability claims.\textsuperscript{117} Increasing the VA's budget by $180,231,408, in 2015, to provide telemental screening for PTSD in veterans is realistic. Annually, the VA might save $24,289,056 from conducting in person treatments, so the real cost of providing telemental screening and treatment for veterans with PTSD would be closer to $155,942,352 annually.\textsuperscript{118}

All 152 VA medical centers and 800 community-based outpatient clinics (CBOCs) would then integrate telemedicine into their services. This would include training psychiatrists to use the technology, hiring technicians, and creating the service to conduct the screening and treatment. The budget increase for the VA approved by Congress and Obama would be allocated to the VA medical centers and CBOCs in order to offer the telemental services available to veterans. The VA and veteran advocacy groups would then advertise the telemedical screening for PTSD to veterans who may be interested in using the services.

Conclusion

As an estimated 480,000 veterans from OE/OIF return home, the rise of a mental health epidemic emerges for years to come, particularly with PTSD. Untreated PTSD can lead to homelessness, unemployment, substance abuse, suicide, and domestic violence. The current screening mechanism, the PDHA/PDHRA, a passive process relying on self-reporting, causes thousands of veterans who need help to fall through the cracks of the system. Policy alternatives include: providing telemental screenings and treatment through the VA medical centers and CBOCs, establishing peer and family based support groups at all VA medical centers, and requiring in-person screenings for PTSD to all military personnel upon return from duty. After evaluating the three policy alternatives against the current policy, requiring VA medical centers and CBOCs to offer telemental screenings and treatment would be the most feasible and effective to implement. Currently, the VA is already starting to incorporate telemedical treatment for PTSD in some facilities. Increasing the VA's budget to implement universal telemental healthcare by less than $200 million would give the VA the capacity to meet the administrative and technological costs of incorporating telemedicine in order to fulfill the growing needs of veterans. America made a promise to veterans embodied in President Lincoln's vow, "To care for him who shall have borne the battle and for his widow and his orphan."\textsuperscript{119} By continuing to improve care for veterans, America can uphold the promise and commitment made to its veterans.

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\textsuperscript{118} Agha, Update


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Veterans MTC. (2011 Nov 11). Coming home was tough until he got support. Retrieved from http://www.youtube.com/watch?v=Yu4Fgdaq1Z4


ABSRACT. National youth unemployment is unacceptably high at 14.3%. This causes an enormous amount of costs to all parts of society, including but not limited to, $4,100 per year per youth in lost taxes and increased social safety net expenditures, increased disparity between youth employment between races, increased prison and medical costs in the future, and lack of qualified workers. This problem was made much worse by the Great Recession, but has been prolonged by lack of qualifications and information for youth; the Federal government has done almost nothing to address this problem. In order to address this problem the policies of creating a nationwide youth apprenticeship program, hiring more high school counselors and retraining current ones, and raising the minimum wage for all but youth were evaluated for effectiveness, cost-per-unit, equity, and feasibility. Based on these criteria, it was decided that a drastic expansion of the Office of Apprenticeship should be immediately implemented. This policy is feasible, affordable, effective, equitable, and should keep youth unemployment at an acceptable level for the foreseeable future; the other policies differed in that they were not as effective or as feasible. The largest potential challenge will come from accessing adequate funds for this project. It will take this pressure from the business community as well as from youth, minorities, and average citizens to implement this policy, but because it is in everyone’s best interests, it should succeed.

Introduction

With the youth unemployment rate – defined as the number of unemployed, noninstitutionalized citizens between the ages of 16 and 24 - at 14.3%, a figure over double the overall national rate, there is a youth unemployment crisis in America that has profound and long-term implications for all of society if it is not addressed quickly and effectively (“Employment Status of the Civilian Noninstitutional Population” 2014). Far from affecting society equally, this problem has hurt minority youth and youth with only a high school degree the most, with black youth almost twice as likely to become unemployed as white youth and youth with only a high school degree three times as likely to be unemployed (“Employment Status of the Civilian Noninstitutional Population,” Greene 2). This threatens to permanently relegate these people to the lowest rungs of society where legal, health, and financial issues are constant and positive production for society is negligible. Society pays the cost of this burden as well with each unemployed youth costing the Federal and his or her respective state government over $4,000 a year. This loss in tax revenue due to youth unemployment has led to Georgia losing an estimated $82 million a year (O’Sullivan 40).

The most immediately obvious cause of this problem was the Great Recession. From December 2007 to January 2010, the youth unemployment rate rose 7.4% (Borges-Mendez 2). However, with the economy on its way to recovery and youth unemployment still at a national average of 14.3%, there are other mechanisms perpetuating the problem (“Employment Status of the Civilian Noninstitutional Population” 2014). Rory O’Sullivan -the CEO of Young Invicibles, a nonprofit committed to addressing the youth unemployment crisis - contends that one of these causes is the lack of guidance counselors in America’s public schools. Experts advise that
there should be at most 1 counselor for every 250 students, yet the country is currently operating at an average ratio of 1:500 (Greene 10). Therefore, students are not able to receive sufficient reliable information regarding their options after graduation, which may lead them to make poor decisions, such as terminating their education after secondary school because of lack of knowledge of the accessibility of nontraditional (i.e. not a four-year Bachelor’s program) postsecondary options. Additionally, even though the country’s college graduation rates have barely changed during the last forty years, jobs are now requiring more education on average; although it is estimated that by 2018, 64% of all new jobs will require a Bachelor’s degree or equivalent training, today’s youth are not receiving any more education than their parents did (Schleicher 2, Manyika 5, Schleicher 3). Therefore, a higher percentage of new jobs require advanced education, but the percentage of graduates with those credentials is not rising to match the demand. The result is an unacceptably high youth unemployment rate that is decreasing at an unacceptably slow pace compared to the rest of the economy. For example, youth unemployment is still at 77% of its peak in 2009 whereas overall unemployment has dropped to 59% of its 2009 peak (“Employment Status of the Civilian Noninstitutional Population” 2014).

Youth unemployment is a problem that affects all of society, albeit unequally, and it is a problem that will not go away on its own. The Great Recession may have created an understandable spike in youth unemployment, but the slow decline of the youth unemployment rate with respect to the recovery of the rest of the economy hints at deeper institutional causes of the problem. As was already discussed, the lack of appropriate education for the incoming workforce due threatens to create a generation of vastly under qualified workers. Such an outcome would spell disaster for the country as a whole, not just those directly affected by unemployment. If more jobs requiring advanced education or training are created while graduation rates and levels of educational achievement do not rise to meet this new demand, the entire economy and country will be left hurting as tax revenues plummet, social safety net spending jumps, and overall productivity stalls. Therefore, it is in the best interest of every faction of society to address the roots of this problem quickly and effectively.

The purpose of this paper is to explore the background of this problem in an attempt to propose, analyze, compare, and eventually choose a policy alternative to implement. Three potential alternatives are analyzed: the creation of a national youth apprenticeship program designed to give youth at risk of being unemployed accessible and meaningful on the job training and education, the hiring of more counselors for America’s public schools and retraining those already employed in an effort to more fully permeate the student body with reliable information regarding the wisest choices for their futures, and an increase in the minimum wage for all workers 25 years old and over, i.e. for all workers that are not youth.

**Background**

In order to properly understand the most effective way to address a problem, it is first essential to understand the background and context within which the problem formed and operates. Therefore, a thorough exploration into the symptoms, causes, and stakeholders of the problem is an important step to being able to effectively address a policy failure.

**Short-Term Symptoms**

**Lost Revenue and Increased Spending**

One of the most important and costly outcomes of the high youth unemployment rate is the direct financial cost that it has on the Federal and state governments. It is estimated
that every unemployed youth under the age of 24 costs the Federal and state governments $4,100 per year due to lost tax revenue and increased use of social safety net funds (O’Sullivan 7). This number jumps to nearly $10,000 for young adults ages 25 to 35; this may not seem relevant at first, but youth who have been consistently unemployed will find it extremely difficult, if not impossible, to enter the labor market without receiving training or education, thus making it more likely that they will cost the government money for years to come (7). Contrary to what might be expected, 93% of this financial cost is due to lost tax revenue; increased reliance on social safety net spending only constitutes 7% of the money lost by the governments (7). This is a direct symptom of the youth unemployment problem. It is necessarily causally linked. Not only do unemployed youth not pay income taxes, but they also have less discretionary money to spend, so states lose out on sales taxes, vehicle registration taxes, etc. This issue hits Georgia particularly hard; with an annual loss of $82.6 million, it is currently losing the third largest amount of any state due to youth unemployment (40).

Increase in Disconnected Youth

The ultimate fear surrounding youth unemployment and even this discussion on race is that youth who are chronically unemployed will become disconnected, which they are neither employed nor in school and have no postsecondary diploma. In the United States right now, there are 5.8 million disconnected youth (“Disconnected Youth” 1). The increase in youth disconnection is correlated with the rise of youth unemployment, which hints that the low-income youth who cannot afford postsecondary education are the most affected by these problems. These are the youth who cannot find work because they cannot afford an education and they cannot afford an education because they cannot find work, forcing them into a vicious cycle. However, it is recognized that this is only a general correlation. It is entirely possible that these youth became disconnected for other reasons. There are hosts of societal, familial, and personal reasons that would cause a person could become disconnected. Regardless, it is apparent is that addressing youth unemployment will also help remedy youth disconnection because every youth not in school who goes from unemployed to employed is no longer disconnected. Therefore, while there is not necessarily a causal link between these two states, addressing unemployment will certainly put a dent in disconnection as well.

Loss of Worker Quality

The effects of having a large number of disconnected or unemployed youth is a loss in the quantity of qualified workers to replace and support the retiring baby boomers. Despite high levels of youth unemployment, there are a significant amount of jobs that remain unfilled because employers cannot find candidates with the proper skills, training, or education. In fact, in a survey of 2,000 businesses conducted in 2011 by the McKinsey Institute, 64% of businesses reported problems finding qualified workers to fill positions (Manyika 5). This problem will only worsen, as there will be a projected shortage of 1.5 million workers with a Bachelor’s degrees or equivalent training by 2020 (5). While there are many institutional issues that contribute to this problem, youth unemployment is certainly on the list. Youth who are unemployed are less likely to receive the training or education necessary to fill these job openings. There is an incredible disconnect present in which there are not enough qualified workers to fill the available jobs but there are still plenty of workers in need of employment. Addressing youth unemployment will help solve this problem by giving those who may not have
the funds or desire to finish a post-secondary degree the opportunity to access higher education or equivalent training. Presently, both parties are stuck in are stuck in limbo; the youth need jobs and employers want to employ them, but the unemployed lack the necessary qualifications.

**Long-Term Symptoms**

### Increased Prison and Medical Costs

It is easy to understand that someone who has been unemployed for a long period of time will be at a disadvantage for years to come. However, apart from the financial issues that long-term unemployment brings, there are many issues related to health and wellbeing that will plague these individuals throughout their lives. For instance, unemployed youth are more likely to have serious health problems later in life and actually have a shorter life expectancy than youth who were not unemployed for a long period of time (Borges-Mendez 5). Additionally, they are more likely to commit suicide, be incarcerated, or have other issues with the justice system (4). All of these can cost the governments significant amounts of money; prison and court time is expensive, as are medical costs, especially when one considers that a significant amount of people who have been unemployed for significant periods of time will be on Medicaid. While it is likely that there is some demographic overlap of the people who are likely to experience these problems and those likely to be unemployed as a young person, the current state of the nation’s youth employment certainly does not help, and it is evident that long term youth unemployment can have this effect on a person.

### Decreased Future Productivity

The serious lifelong disadvantages that arise from being a long-term unemployed youth are innumerable. A significant number of these adolescents will go on to have repressed earnings, poor early career building opportunities, and/or work jobs below their educational achievement (Allegretto 1). If nothing is done to address these problems soon, a significant portion of the youth of today will have a lifetime of employment and earnings issues that will adversely affect them and all of society. For instance, if all of the youth who are currently disconnected were to remain so for their entire lives, they would cost the Federal and their respective state governments over $1.6 trillion (“Disconnected Youth” 5). Additionally, youth who are chronically unemployed cost their governments more money as they age; an unemployed 20 year-old represents an annual loss of around $4,100 whereas an unemployed 25 year-old represents a loss of almost $10,000 (O’Sullivan 7). Even if these youth were to become employed in the next few years, they will have missed out on essential early career building experience. Missing this early career development correlates with depressed wages throughout one’s lifetime and increased costs to the state and Federal governments through decreased consumption and income taxes. Therefore, effective and timely intervention is key if society is to mitigate the costs that will eventually arise from a large number of unemployed youth.

### Racial Inequity

What these numbers alone do not show is the enormous inequity of this problem between races. For white youth ages 16 to 19 and 20 to 24, the unemployment rates are 20.3% and 10.9%, respectively (“Employment Status of the Civilian Noninstitutional Population” 2014). For African Americans of the same ages the unemployment rates are 38.8% and 22.8%, respectively (“Employment Status of the Civilian Noninstitutional Population”). This extremely unequal distribution of youth unemployment is particularly troublesome when coupled with the projection that by 2050, minorities will comprise the majority of
America’s population, an increase of some 47 million people (Ortman 10). Allowing this problem to continue unchecked at this rate will result in an enormous increase in the amount of people born into poverty, which has the potential to broaden racial achievement disparities and further relegate minorities on the socioeconomic scale. While a host of factors have certainly contributed to this disparity, this inequity remains an issue of youth unemployment. While addressing the institutional problems that have no doubt exacerbated the differences is beyond the scope of this analysis, the difference itself is both possible and important to address. Therefore, focusing policy alternatives on improving the situation of minority youth is essential as they have the highest unemployment rates and will eventually comprise a majority of this nation.

**Causes of the Problem**

**Great Recession**

The most immediately evident cause for the high youth unemployment rate is the Great Recession. From December 2007 to January 2010, the youth unemployment rate rose 7.4% - a greater increase than was seen in any recession in the last 35 years - and peaked at 19.2%, which is higher than the rate has been since 1948 (Borges-Mendez 2). Two main reasons that youth unemployment rose so much are that businesses were laying people off instead of hiring them - especially in construction, which has traditionally employed youth or those without a postsecondary degree - and many of the people that were laid off were experienced adults with college degrees who were subsequently forced to take jobs for which they were overqualified, therefore taking these jobs from the youth who would have otherwise filled them. However, even as the economy has recovered, youth unemployment is still more than twice the national average at 14.3%, which hints at other possible causes of the problem ("Employment Status of the Civilian Noninstitutional Population" 2014).

**Lack of Reliable Information for Students**

In order to determine what some of these additional causes could be, it is important to look at the institution that is responsible for training youth to become competitive and qualified workers, for it is possible that this problem stems from a failure of education rather than fluctuations in the business cycle. In public schools in America, there is, on average, 1 guidance counselor for every 500 students, despite the minimum ratio recommended being 1:250. O’Sullivan argues that this leads to students not having enough contact with guidance counselors, so they are improperly or insufficiently advised. While this may not be an issue for youth planning on attending traditional four-year universities, it can be quite problematic for those who do not plan on taking that path. Oftentimes these students are not given enough information regarding postsecondary options other than four-year universities, which can cause them to end their education with a high school diploma; this cessation of education makes them three times more likely to be unemployed than a person with a postsecondary degree (Greene 2). Having quality advising sessions continually over one’s high school career, would increase the amount of reliable information that students are exposed to, making them more likely to recognize the viability of technical or vocational education if a university is not an option.

**Lack of Qualified Workers**

According to a 2011 report by the McKinsey Institute, the United States is facing a shortage of at least 1.5 million workers with a bachelor’s degree or equivalent training by 2020. They projected that by 2020, only 34% of the labor force will have a postsecondary degree, yet, according to the Organization for Economic Cooperation and Development
(OECD), by 2018, 64% of new jobs will require such a degree (Manyika 5, Schleicher 3). Furthermore, the United States is the only country in the 34-state OECD whose younger generation is not more educated than its older generation, perhaps because postsecondary education in the US is by far the most expensive in the OECD (6). Therefore, in the United States, the majority of new jobs require postsecondary degrees, but college graduation rates have not risen at the same level as the demand for college-educated workers has. It is no wonder that McKinsey found that 65% of surveyed businesses had trouble finding qualified workers (Manyika 5). In this current situation, neither employers nor employees are in a good position.

Stakeholders

Youth

Youth, or people ages 16 to 24, and in particular, minority youth, young males, and youth not attending college, are by far the most affected stakeholders. Although they are perhaps not the most powerful actors, they have the most direct reason for desiring a reduced unemployment rate. It is likely that America’s youth would be in support of a policy that would be designed to reduce the youth unemployment rate. In Germany, for example, the robust program in place to address youth unemployment has so many youth applicants that thousands have to be turned away each year (Westervelt 27). Ideally, a policy alternative could be proposed in the US that would be met with the same enthusiasm by youth. The United States does have a Registered Apprenticeship Program similar to Germany’s apprenticeship program. However, it is extremely limited in size, with only 44,000 apprentices graduating last year using an annual budget of $28 million (“FY 2014 Budget in Brief” 33). To put this in perspective, it would take about 1 million jobs for youth to bring youth unemployment back to 10%, so any program that will have a significant national impact must be able to reach a comparable number of youth.

Minorities

Minorities are also a key group of stakeholders in the fight against youth unemployment. Since minorities are steadily becoming a greater percentage of society, any cyclical disadvantage that they are put in now will have only have greater effects as their demographic grows. If unemployment rates stay the same, but the overall number of people grows, society will be dealing with a problem of a much greater magnitude. Because African American and Latino youth are facing the highest youth unemployment rates, they are directly invested in the success of any policy alternative (Borges-Mendez 5). These demographics would desire a greatly reduced youth unemployment rate and ideally a rate that is at least in the same ballpark as their white peers.

It is highly likely that minorities will be inclined to support a policy that would attempt to help them financially and socially. Previous programs that have addressed youth unemployment such as the Youth Opportunity Grant (YOG) and the Youth Jobs Act (YJA) were intended to target predominantly minority areas. While the YJA never made it out of committee, the YOG provided training for nearly 50,000 minority and low-income youth and placed 46,000 in jobs over a timespan of five years before being defunded by Congress (O’Sullivan 11). Should there be a possibility of a policy with similar effects, their support would be crucial as the support of those most directly impacted by a policy gives that alternative some legitimacy.

Federal and State Governments

Other than demographics that are being directly threatened by youth unemployment, the Federal and State governments are the most
affected by youth unemployment. While these are two distinct stakeholders, their plight is so similar and fundamentally linked that they can be discussed as one. Both the Federal and state governments are bleeding money because of this youth unemployment crisis; they spend a projected $4,100 per worker per year in lost taxes and increased social safety net expenditures with Georgia’s share of the loss coming out to about $82 million in taxes annually (O’Sullivan 40). Additionally, the loss in funding of the Youth Opportunity Grant and the failure of the Youth Jobs Act lost the Federal government billions of dollars in potential returns on long-term investments. Therefore, both levels of the government have monetary as well as moral incentives to reduce the youth unemployment rate.

While the support of these two stakeholders may be the toughest to gain, their support is the most important to the success of any policy in this realm. They have a responsibility to their constituents, who may not want their government spending the large sums of money required to address this problem properly. This investment would eventually be returned, but in today’s political landscape such a large upfront expenditure would undoubtedly bring controversy. Judging from the past decade of legislation that has addressed youth unemployment, government support will be difficult to achieve and fickle if it is ever obtained. The Youth Opportunity Grant, for example, was defunded after only five years in effect, despite its early signs of success (O’Sullivan 11). However, the fact remains that government support at either or both levels would be extremely powerful; similarly though, government resistance could completely stop any initiative.

Private Sector

It is important to remember that employers are also stakeholders in this issue because these unemployed youth are potential future employees. Being unemployed for a long period of time early in one’s career development makes a person a much less qualified and experienced employee. Therefore, employers are directly invested in the reduction of the youth unemployment rate because the quality and quantity of their future workforce depends on the number of young workers participating in the labor force in a positive and productive way.

It is likely that employers would support a policy designed to help their future employees since it would ultimately benefit their companies. The support of the private sector could be instrumental in the success of such a policy because it has significant political clout and could be used to persuade a potentially hesitant government. For instance, Germany’s apprenticeship program only succeeds because Germany’s industries are staunch supporters of it (Westervelt 22). This level of support is encouraging because it illustrates that it is possible for employers to be adamant supporters of an alternative that addresses youth unemployment.

Average Citizens

While average citizens may not be hugely impacted by youth unemployment, it is their taxes that are being spent to cover the costs of youth unemployment; therefore any taxpayer is stakeholder as well. Society pays for these unemployed and disconnected young adults in lost productivity, tax revenue, and the increased use of the welfare system. Lost taxes make up 93% of the cost borne by society, which comes out to around $171 per taxpayer per year (O’Sullivan 7). Therefore, $171 of each taxpayer’s tax payment is covering the cost of these unemployed youth instead of being used for more productive purposes (7). While this is not nearly as much money as the other stakeholders are losing, this still creates a personal incentive for each taxpayer to support a
policy aimed at addressing this issue. Since most of the cost for the taxpayers comes in lost taxes rather than social safety net expenditures the most important thing for the taxpayers should be to increase tax revenue rather than get people off of welfare and unemployment benefits.

The majority of society is only impacted in a minimal and indirect way, so many people may not see the benefit of pouring resources into solving a problem they do not see on a day-to-day basis, even if those resources will eventually be returned. However, if society can realize that this personally affects every person in the United States then perhaps a policy intended to address this issue will be able to garner significant popular support.

**Policy Alternatives**

**Policy Alternative 1: Youth Apprenticeship Program**

For this policy, the Federal government should drastically expand its Office of Apprenticeship in order to provide apprenticeships to enough youth at risk of unemployment to reduce youth unemployment in a significant manner. This program would entail youth at-risk of chronic unemployment (defined as not attending post-secondary school) being matched with a local firm, ideally in STEM fields, that would provide the apprentice with a combination of education and on-the-job training as well as a reduced salary. The government would offer the firm tax credits in return for taking on apprentices. Additionally, the employers would have the unique opportunity to tailor make highly skilled and qualified employees for their specific industry. Therefore, by providing employers with tax incentives and a chance to increase the general quality of their workers, this policy benefits employers in addition to their youth apprentices.

Rather than creating a new program, this would be an expansion and shift in direction of the current Registered Apprenticeship program. The Office of Apprenticeship in the Department of Labor operates the Registered Apprenticeship program. In 2013, using the same model described above, the Office graduated 44,348 apprentices with an 87% rate of employment following the program, all at an annual cost of $28 million, or $725 per job (Department of Labor 2014, Employment and Training Administration 2014). Therefore, the Office has proven that it has an effective and affordable model; however, it is simply not large enough. This program would be expanded so that it could make a significant dent in youth unemployment (it would take about 1 million jobs for youth for the rate to drop from 14.3% to 10%) and the priorities of the program would shift such that apprentices would be first drawn from the pool of at-risk youth (“Employment Status of the Civilian Noninstitutional Population” 2014). In this way, the time-tested model of the Office of Apprenticeship would be expanded and made more robust nationwide so that it can jump from an effective side project of the government to a thriving nationwide program that facilitates the employment and career building of hundreds of thousands of at-risk youth.

**Policy Alternative 2: Hire More Counselors and Retrain Current Ones**

In this policy, the state governments would hire more guidance counselors for schools with few counselors and high rates of student unemployment and retrain all existing counselors to more effectively promote existing job programs, such as Registered Apprenticeships, to students. This policy is designed to specifically address the lack of reliable information for students regarding nontraditional future options because of an inadequate supply of quality counselors, which was previously described in detail as one of the causes of the problem.
A traditional four-year college is not for everyone, and there is tremendous room for employment in health, technology, and many science sectors and many of these jobs do not require a bachelor’s degree. If the public school system has enough well-trained counselors to impress this idea on students then it is likely that youth unemployment will steadily fall as more students expand their education in an affordable, accessible, and intelligent way rather than becoming discouraged at the prospect of not attending a 4-year university and dropping out of high school or ending their education with a diploma. Since a person without a college degree is three times more likely to be unemployed than a person with a college degree, this should have profound and lasting effects on youth unemployment. However, because it is a rather indirect way of dealing with youth unemployment due to there being several steps between hiring new counselors and a decrease in youth unemployment, it will take several years before this policy will have a significant effect. While time is of the essence when dealing with this problem, this policy addresses a root cause of the problem in an effective way and may lead to a necessary institutional transformation that would make the other policies superfluous once achieved. Accordingly, even though this policy operates on a longer time scale than the other policies, its ability to fundamentally change the institution that has failed youth up to this point makes it an important policy to consider.

**Policy Alternative 3: Raise the Minimum Wage for Worker Ages 25 and Up (Non-youth)**

In order to enact this policy, the Federal government should pass legislation to raise the minimum wage for all workers over 24, or all non-youth workers. The idea behind this policy is that by creating an environment where youth are the most desirable employees for minimum wage job simply by virtue of their ages, they will begin to be hired at a greater rate and youth unemployment will be reduced. It works off of the assumption that creating a relatively lower minimum wage for youth will have the opposite result as raising the minimum wage for all of society, which has been shown to increase unemployment among youth (Ragan 133). In essence, it will attempt to provide employers with a strong incentive to hire youth for no other reason than they are youth. Furthermore, because youth already fill about half of all minimum wage jobs, this policy will not have a large effect on unemployment for workers over 24, which is always a concern when increasing the minimum. In this way, this policy will raise the minimum wage for the majority of workers in the labor market in a way that will not only mitigate the effects of the increase in unemployment associated with such legislation, but will also actually decrease unemployment among youth, who are typically the hardest hit by minimum wage increases.

While this does not directly address one of the root causes of the problem and instead tries to address the symptoms, it has potential to be extremely effective at little cost to the government or employers. It would potentially increase unemployment among workers over 24 in minimum wage positions, but since youth already hold more than 50% of all minimum wage positions, this reduction in employment will be less than it would be if the minimum wage were raised equally across the board (“Characteristics of Minimum Wage Workers, 2013” 2014).

**Analysis of Policy Alternatives**

In order to evaluate the three policy alternatives, they will each be judged by four criteria: effectiveness, cost-effectiveness, equity, and feasibility. Effectiveness is defined as a reduction in youth unemployment; this is the most important goal of any policy dealing with youth unemployment because this is ultimately
the problem from which all of the aforementioned symptoms stem. Without a significant reduction in youth unemployment, the policy is doomed to fail and waste significant amount of time, money, and resources.

Cost-effectiveness is defined as the cost per additional job for youth. This may be a monetary cost, or something less tangible, such as transaction costs. A low cost per job is desirable because this suggests that a policy is designed to efficiently use resources to create jobs for youth. Cost-effectiveness was chosen over net cost because these policies vary drastically in their scope and overall costs, but this comparison does not necessarily say much about the relative qualities of the policies. By comparing the cost per additional job for all three policies, these subtle differences may be more wholly illuminated.

Equity is defined as the potential to decrease the percent difference in youth unemployment between races. As discussed earlier, this problem does not equally affect all races, so a policy that may exacerbate these differences should be avoided if an equally effective policy can do something to reduce these differences. In this way, equity provides an important way to distinguish two policies that may score similarly for other criterion.

Feasibility, defined as the likelihood of successful implementation, is an extremely important and often overlooked aspect of a policy. An amazing policy is absolutely worthless if the current social, political, or economic climate does not allow it to be implemented. Because this is a national issue that requires the government to address it, this is an especially important aspect to consider for these policy alternatives.

**Goal 1: Effectiveness**

**Youth Apprenticeships**

Through training, educating, and paying youth, a nationwide at-risk youth apprenticeship program will have a direct impact on youth unemployment. Registered Apprenticeships in the United States have a current job retention rate of 87%, but these do not focus on youth unemployment. Registered Apprenticeships (2014). This policy would involve using a system similar to
the Registered Apprenticeships, but expanding it to graduate more than the 44,000 apprentices that graduate each year currently and changing it so that it focuses on at-risk youth. Since it would take 1 million jobs for youth to drop the youth unemployment rate to 10%, which is high but manageable, 1.15 million apprenticeships would need to be available (assuming a retention rate of 87%).

In order to be as effective as possible, this policy would have to be coupled with intense and widespread marketing of the program. Youth must be told honestly, convincingly, and repeatedly that this is an investment in their future that would have long-lasting and profound benefits for their lives. There is no doubt that a high percentage of youth apprentices would become employed and a significant number of these youth would have been unemployed without this training. In order to measure the impact of this alternative, the youth unemployment rate should be constantly monitored and compared to that of youth who did not complete an apprenticeship. While it is entirely possible that youth who choose to enter into an apprenticeship are systematically different than those who choose not to, the effects of this will be difficult to overcome unless apprenticeships are only randomly assigned throughout the country. However, as the point of this policy is wide scale and immediate effects, it is more important for as many people as possible to be trained than to determine the exact effects on youth unemployment.

**Hiring Counselors**

The hiring of new counselors and the retraining of current counselors is designed to reduce youth unemployment through arming secondary students with reliable and plentiful information regarding their futures. As one counselor stated, reliable information is the best way to help youth because “the truth generates trust, and trust generates performance” (Swoopes 2014). This honest, reliable information and the relationships it forms between students and counselors cannot be effective and widespread without an adequate number of appropriately trained counselors who can intervene on behalf of the student before it is too late. Simply saturating the education system with counselors will not solve this problem; success is contingent on deploying motivated counselors strategically intent on reducing dropout rates and motivating students to critically evaluate their future options and goals.

The effects of this policy on youth unemployment would be difficult to measure. Because there are so many intermediate steps between the hiring of counselors and the reduction of youth unemployment, it may be hard to isolate the direct effects of the policy itself. In order to do so, employment data should be collected at high schools to determine how much the number of counselors affects unemployment. There is no doubt that some schools would hire more new counselors (both in terms of absolute number and percentage), so comparing the youth unemployment of students coming out of these schools before and after the policy should give some indication of the effectiveness of this policy. However, the difficult of accurately measuring the impact of this policy does not detract from the effectiveness of this model.

**Minimum Wage Legislation**

Raising the minimum wage for workers ages 25 and older will reduce youth unemployment by creating an environment in which youth are attractive employees for no other reason than their age. Literature has shown a link between an increased minimum wage and increased youth unemployment. A study of the effects of the increases in the minimum wage from 1966 to 1971, showed that a 28% increase
in the minimum wage caused 3.3% increase in youth unemployment by 1972 (Ragan 133). While there are no doubt large differences between the present labor market and that of 1972, if this study is believed then this policy has the potential to drastically decrease youth unemployment. It is unlikely that employers would not respond to the change in relative minimum wage, so it can be stated with confidence that this policy would reduce youth unemployment. This effect would be magnified because minimum wage jobs virtually never require more education than a high school diploma or equivalent testing; therefore, this policy targets youth who fall into this category and are at the most risk for youth unemployment. Therefore, this alternative would make these youth who were the least likely to be employed some of the most desirable workers in the labor market. This effect would be measured by analyzing the trends in youth employment in minimum wage jobs in addition to overall youth employment, the former should grow and the latter should shrink if this alternative works as it is designed to.

Goal 2: Cost-Effectiveness
Youth Apprenticeships

The Federal Office of Apprenticeship (FOA) only requested $28 million for the 2014 fiscal year, and they completed 44,348 apprentices last year at a job retention rate of 87% (“FY 2014 Budget in Brief” 33, “Registered Apprenticeships” 2014). This is a cost of $725 per job, although it is reasonable to assume that if these apprenticeships were applied solely to youth that costs might rise due to decreased levels of education and experience. The goal would be to have a cost-per-job within 10% of this figure, regardless of how large the program is. If it is possible to secure the level of funding required by the YOG and YJA then the hypothetical cost-per-job would still be expected to be around the current cost. Therefore, while short-term costs could vary drastically depending on the political realities that this policy must face, this should not have a huge effect on the unit cost, which would ultimately be the metric by which this criterion is measured.

Hiring Counselors

The estimated annual cost to the state government of Georgia, in the form of salaries, for hiring enough counselors to make the ratio of counselors to students 1:250 would be between $95 million and $218 million. These numbers were calculated using the ratio of counselors to students in Georgia (1:450) and the highest and lowest possible salaries for counselors, so there would no doubt be significant variations in the annual cost between states. If this method were employed, each state would be expected to pay the salaries for at least half of the counselors needed to bring the ratio down to 1:250 in addition to the costs of training existing counselors in strategies to reduce youth unemployment. This is a cost that would continue as long as these counselors have jobs and would actually increase as more of them move up pay brackets.

While cost-per-job is not as easy to measure as with apprenticeships, using a difference in difference study for youth employment for a school before and after it hired new counselors compared to a school that did not hire counselors could give a good estimate. Additionally, it would be possible to significantly reduce the costs of this policy by only hiring counselors for schools with low employment would reduce costs drastically. By only hiring more counselors for the schools that have the worst employment prospects and training existing counselors in effective ways to motivate and direct students at schools with average to below average employment prospects, costs would be cut and the objective
would still be met.

**Minimum Wage Legislation**

This policy is unique in that it would not create a program or hire professionals in order to reduce youth unemployment, but rather only involves passing a law. Therefore, its primary costs would be solely the transaction costs of passing the legislation. If the minimum wage is raised $3 for non-youth, employers will save $6,000 annually for each youth, rather than adult, hired, which translates into $900 in lost income tax revenue since the income tax bracket of a person working a minimum wage job full-time is 15%. These numbers were calculated under the assumption of a forty-hour workweek and fifty weeks worked per year. However, one must also realize that these “loses” in tax revenue for the governments are not truly loses but rather decreases in the marginal increase of tax revenue that comes with raises wages for all non-youth minimum wage workers. In fact, this policy would actually increase tax revenue from wages because many workers currently working minimum wage jobs will receive more wages than they presently do. These are only loses in the sense that if the minimum wage were raised for all workers, tax revenue would increase to a greater degree. Therefore, most stakeholders other than youth actually gain money for every job created.

**Goal 3: Equity**

**Youth Apprenticeships**

Through providing apprenticeships for youth at risk of unemployment, namely those not attending postsecondary school, this policy will tend to affect minorities more because they have lower college graduation rates nationally. The six-year graduation rate for white students is 62.1% and 39.9% for black students (Casselman 9). Therefore, simply by focusing on youth without a college degree, this policy will automatically address the racial disparities present in youth unemployment. The effects of this will be measured by constantly analyzing the racial breakdown of youth unemployment in addition to analyzing the racial breakdown of apprentices.

**Hiring Counselors**

Since this policy focuses on using counselors to decrease high school dropout rates and increase technical and two-year college graduation rates, it is designed to affect people who would not normally graduate from a four-year college. Since this demographic is disproportionately comprised of minorities (61% of white undergraduates go to four-year universities, compared to 56% of blacks and 46% of Latinos), it will help minorities more than whites (10). If this effect were to be magnified, training and hiring would focus on schools with a student body predominately consisting of minorities. This would deploy scarce resources to areas where the largest gains in youth employment can be created and where the racial gap can be most effectively bridges; this would therefore be more efficient and equitable.

**Minimum Wage Legislation**

Literature has shown that an increase in the minimum wage disproportionally increases youth unemployment for minorities. A 1966 study found that an increase in the minimum wage resulted in an increase of youth unemployment of 2.4% for white youth and 13.8% for non-white youth (Ragan 132). Therefore, if one assumes that this policy of creating a relatively lower minimum wage for youth will have the opposite result as raising the minimum wage for youth, then the logical conclusion is that this policy will necessarily increase employment for minority youth to a greater extent than white youth.

**Goal 4: Feasibility**

**Youth Apprenticeships**

This is a fairly realistic alternative in the sense that it is both somewhat politically and
practically feasible. It benefits employers, youth, the government, and society for a relatively low initial cost that is isolated to the Federal government. This policy will generate wealth for all parties involved in the long-term since the Department of Labor projects that every dollar invested by the Federal government on apprenticeships generates $50 in revenue for the Federal government over a span of many years, (“Registered Apprenticeships” 2014). Additionally, because this policy is more of an expansion and change in direction for a program that is already up and running in the United States, it will not be extraordinarily difficult to actually implement once approval and funding have been attained because a working business model currently exists.

Furthermore, this policy can be framed in a way, which makes it attractive to either ideology in the Federal Government. It can be framed as using government spending as a way to alleviate the costs and stresses youth unemployment has caused for youth and minorities, which would appeal to a typical liberal. Additionally, it can be framed as helping businesses thrive and operate at higher productivity through offering tax incentives, which would appeal to a typical conservative. Because of the recent elections that gave Republicans control of both chambers of Congress, that this policy can be framed in such a way that may appeal to conservatives is an extremely valuable aspect of this alternative.

Hiring Counselors

This policy may be somewhat difficult to implement because it is somewhat expensive and only indirectly lowers youth unemployment. Additionally, the fact that this policy operates at the state level means that if pushed nation-wide, it is somewhat likely that it will be implemented in some places, but very unlikely that it will be implemented in all places. Even though this is the case, small gains are better than no gains. Therefore, if it seems that broad changes at the Federal level are not likely to happen, this alternative is the next best option because there are fifty sites for potential gains rather than a single all-or-nothing campaign. Even if only a handful of states adopt this alternative, it is certainly better than nothing.

Minimum Wage Legislation

This policy will probably be tough to enact. Conservatives will not want the minimum wage raised at all and liberals will want it raised for everyone. It will not make anyone entirely happy, and while this could easily unravel it, there is a possibility that this policy is a ready-made compromise. Minimum wage legislation is always controversial, but because it will appeal slightly to both sides it will be more likely to succeed than typical minimum wage legislation.

Policy Choice

Expanding the Office of Apprenticeship is the best policy to address youth unemployment in a way consistent with the priorities that were set by the criteria. This policy attacks one of the root causes of youth unemployment - the lack of qualifications for youth not attending university - and it does so in a way that is affordable, will keep youth unemployment low for the foreseeable future, is politically feasible, and should effectively address the inequity of youth unemployment.

The main challenges of this policy will probably be its financial cost. It will cost around $725 million to lower the youth unemployment rate to 10% if the model of the Registered Apprenticeships can be extended, and this is a large sum of money, especially in times of budgetary constraints. However, if this reduction in youth unemployment was arbitrarily set as a goal over the course of 5 years then suddenly the numbers begin to be more manageable. $145 million per year for five years is still a lot of money, but it allows the
remainder of the money that will be spent time to sit in bank accounts and gain interest before it is incrementally spent.

However, even with this in mind, it is evident that even the initial benefits (reduced youth unemployment, increased tax revenue, decreased social safety net expenditures, more productive workforce) outweigh these costs and challenges. Once the long-term benefits (decreased medical and prison costs and a 50 to 1 payout for the Federal Government) are included it becomes obvious that this policy is much more beneficial than costly. Not only will the immediate, short-term concerns be addressed in a timely and effective fashion, but also the country’s status in the following decades will be remarkably better if this policy is adopted than if the status quo is allowed to continue unchecked.

**Implementation**

In order for any of these benefits to be collected, it is essential that this policy is successfully implemented in a timely manner. Employers, youth, and average citizens would need to push this in Washington for it to happen. The Federal Government must be the actor to implement this, and while this is a good long-term investment for this actor, it will take convincing for the government to provide the funds for such a high upfront cost. However, because this policy benefits all parts of society, mobilization should not be overly difficult.

If the government proves to provide resistance to this measure, the private sector is the next most important stakeholder to win over. Support from the private sector is absolutely essential for this policy because it will be employers from the private sector who would be responsible for hiring apprentices. However, this policy is designed in such a way that it is certainly in the best interest of the private sector employers. They would receive tax breaks, highly qualified and specialized employees, and production for decreased costs as the apprentices would work basically like any other employee for the majority of the week but would not be paid as much money for their time. Therefore, it seems evident that this program would benefit employers. Accordingly, they should be easier to win over than the Federal government. If this is the case, it will be extraordinarily difficult and contentious for the government to resist action on this initiative. The private sector has enormous influence on the Federal Government and when this influence is added to the combined voices of youth, minorities, and the average citizens who will undoubtedly recognize the wisdom in this course of action, the political pressure will be strong enough throughout society that it would be politically unwise for there to be continued resistance to this measure.

**Conclusion**

National youth unemployment is unacceptably high at 14.3%. This costs society an enormous amount, including but not limited to, $4,100 per year per youth in lost taxes and increased social safety net expenditures, increased disparity between youth employment between races, increased prison and medical costs in the future, and lack of qualified workers. This problem was made much worse by the Great Recession, but has been prolonged by lack of qualifications and information for youth in addition to the inaction of the Federal government. In order to address this problem, three potential solutions were evaluated for effectiveness, cost-per-unit, equity, and feasibility. Based on these criteria, it was decided that there should be a drastic and immediate expansion of the Office of Apprenticeship. This policy is feasible, affordable, effective, equitable, and should keep youth unemployment at an acceptable level for the foreseeable future. The largest potential challenge will arise from accessing adequate
funds for this project; however, if the private sector rallies behind this policy because it is its best interest then the potential benefits of this policy are enormous.

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Cuban Timba: Historical and Social Influences in a Global Context

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ABSTRACT. A subset of the music genre salsa, the Cuban Timba first became popular in the 1980s and peaked around 1997-1998. The style, created largely in response to the Cuban Revolution, arose from musicians who balanced structured training in conservatories with spontaneous street performances. By carefully observing dancers and their responses to certain rhythms and melodies, the original Timba musicians were able to adjust their style to propel the popularity of their music throughout Cuba. Timba allowed young people to express themselves and speak out under the guise of dance music. Unfortunately, the combination of provocative dancing and outspoken lyricism caused clashes with the government that led to the censorship of certain works. Unlike the music heard in the Buena Vista Social Club, a popular music venue that later gained international recognition, Timba displayed explosive and polyrhythmic contemporary themes that strayed from the general structure of salsa. Thus, while Timba served as an outlet for musicians to express their feelings regarding the current social, economic, and political state of Cuba, the complex and controversial genre failed to grab the attention of the global stage and eventually lost its hold in the Havana music scene.

History

During the late ‘60s and early ‘70s, decades before the development of Timba, the singer-songwriter revolution known as “La Nueva Trova Cubana” took the forefront in Cuba’s music scene. Emerging out of the Cuban Revolution, this new genre combined folk music with progressive and socially engaging lyrics (Vaughan 19). Originally, the Cuban government and cultural institutions remained very suspicious of La Nueva Trova Cubana, viewing the musicians as loiterers and poor examples of revolutionary men. In the government’s point of view, these musicians failed to embody the ideal citizen who allocated his time for other, more efficient purposes (Thomas). Because of their non-conformity, these young musicians often suffered “harassment, blacklisting, and even confinement through about 1971.” However, the government’s attitude towards the musicians began to change as they realized the power and influential capabilities of music. Within a few short years, the musicians had received significant exposure through state-controlled media, and many became international symbols of the new socialist culture (Moore 2). Furthermore, the Cuban government also implemented a comprehensive system of conservatories and festivals, teaching younger musicians how to write songs worthy of the Cuban identity (Thomas). The Nueva Trova movement allowed musicians to express their support of socialist remedies for the world’s problems.

Leading this movement stood Silvio Rodriguez and Pablo Milanes, two skilled guitarists who quickly became national heroes by using their musical talents to extoll the virtues of socialism. Rodriguez and Milanes reportedly served as “unofficial emissaries of the Castro Government” and spoke as “voice[s] for new values” (Rohter, Vaughan 19). As Milanes stated, "I am a worker who labors with songs, doing in my own way what I know best, like any other Cuban worker. I am faithful to my reality, to my revolution and the way in which I have been brought up.” These passionate
musicans disseminated their beliefs in more than 100 songs on 20 albums, establishing themselves as important figures in the Cuban social and political arenas (Rohter).

In 1991, the fall of the USSR decimated the Cuban economy. Ultimately, this led to the origins of Timba, which was born from the resulting hardships (Perna 55). Without the Soviet Union to provide assistance, this era, known as the Periodo Especial, or Special Period, brought a sharp decline in the Cuban quality of life, including a shortage of household goods, increased crime rates, and political repression (55-56). Material shortages and lack of food compounded the deterioration of the health of the general populace (Thomas). According to Susan Thomas, Associate Professor of Music and Women’s Studies at the University of Georgia, a shortage of the petroleum necessary to ship green vegetables and other nutritious produce to Cuban cities caused numerous individuals to develop macular degeneration and lose their eyesight.

Thus, during the Special Period, Cuban youth – particularly those studying in universities – found themselves with little to eat or do during a formative period of their lives. Because gasoline was so scarce, transportation proved difficult. Furthermore, no vinyl or tapes existed to make records, forcing musicians to record over old tapes, and obtaining radio airtime became increasingly difficult (Thomas). Unable to subsidize culture and provide musicians with a meaningful salary, the state recording agency temporarily halted operations.

Acting in response to these troubled times, the Cuban people participated in riots (resulting, primarily, in the destruction of state-owned stores) to voice their demands for social change. This period eventually led to the Balseros Crisis in 1994, during which 35,000 Cubans fled the island on makeshift rafts. This exodus prompted younger musicians to turn their critical lens inward, examining problems at home such as lack of housing and opportunity (Perna 56-57). Eventually, groups of younger musicians began to leave the island as well. Thomas reflects that the majority of Havana’s influential musicians left the country, simply because they had no incentives to stay. In response to the increasing rates of emigration during the worst economic hardship of the Special Period, Fidel Castro introduced strict rationing measures and socialistic reforms. The most dramatic economic reform shifted the Cuban economy from sugar cane to tourism, in an effort to attract foreign investment. Unfortunately, the resulting boom in tourism introduced negative effects such as race discrimination, sex tourism, AIDS and crime; however, increased tourism significantly aided the recovery of the economy and, more specifically, revitalized the nocturnal music scene (Perna 57).

**Elements and Influences of Timba**

Most Timba musicians engaging in this revitalized music scene were educated in conservatories under Cuba’s socialistic education system. As a result of this training, their music typically involved much layering, complexity, and virtuosic playing (Dye). The genre also included lyrics focusing on engagement with the common people and emphasized deep reflection on the current socio-economic state (Thomas). In particular, Timba focused on a concept known as *choteo*, a destabilizing humor that indirectly satirizes those in power. For example, the song “Pica Del Soya” exemplifies the concept of choteo with lyrics that make fun of a protein supplement that the government recommended people consume (Thomas).

In addition to choteo, Timba music displays several other unique features. For example, unlike the Cuban *son*, a popular style that included a definite introduction, exposition,
and montuno section, Timba music incorporates much variety into a structure that is generally organized into four basic sections (Roy 245, Vaughan 25). Most pieces begin with a rap or short tease from an estribillo, or chorus. The songs incorporate full ensemble singing until the montuno section, a faster section where a soloist begins to speak with the chorus in a call-and-response pattern (Perna 109-110). The next section is los pedales, an expression of hip-hop/R&B backbeat with strong bass support. Here the tempo recedes and the soloist begins to speak rhythmically, introducing another refrain. Finally, el despelote, ("the breakdown") commences. A rapping chorus answers the soloist, and both dancers and musicians go into a frenzy, “inspired now by the percussive slapping and plucking of the bass guitar” (Vaughan 25). The band then returns to el montuno, los pedales, and so on, adding new refrains and varying the intensity of the performance. Vaughan likens the genre to a “train pulling out from the station (estribillo), riding steadily on a plateau (el montuno), pushing harder at a slower pace to climb a hill, then pausing at its peak (los pedales), and rushing down (el despelote)” (26). Clear influence exists from the music scenes of the Caribbean, Black North America, and Brazil, as well as from Afro-Cuban folk music and other forms of popular Cuban music such as the Cuban jazz band, which emphasize the trombone and saxophone.

Among the most prominent musicians of the Timba movement was Jose Luis Cortes, also known as El Tosco (“coarse one”). Born in 1951 to a poor neighborhood of Santa Clara of central Cuba, he became part of the first generation of Afro Cubans to receive a top-quality conservatory music education as a result of the revolution. In the 1960, while still a student at one of Cuba’s prominent state-run art schools, Escuela Nacional de Arte, he turned away from his classical studies and joined the two most important Cuban bands of the time, Los Van Van and, later, Irakere (Dye). El Tosco embraced much of what he learned with those bands, such as Irakere’s emphasis on Afro-Cuban styles, themes, and dance, while targeting lower-class Afro-Cuban youth (Perna 59). Then, in 1988, El Tosco moved on to help found Nueva Generación La Banda or “NG” La Banda, which laid the foundations of the Timba movement (Dye). NG La Banda departed from traditional structures by combining popular, traditional, and contemporary music while placing emphasis on dance movements. Furthermore, El Tosco started performing while wearing the clothes of a man from el barrio, an aesthetic Vaughan described as a “black guy [that] shows up with a tank top jersey on” (40). This informal attire became a key element of Timba performance.

Another highly influential musical group was Charanga Habanera, which incorporated influences from Afro-Cuban folk music and Black North America. Founded in 1988 as a real charanga, or traditional Cuban orchestra, Charanga Habanera worked seasonally as a house band at the Sporting Club, a musical venue in Monte Carlo. There they performed modernized versions of Cuban classics and shared the stage with international stars such as Stevie Wonder and Whitney Houston. In 1991, violinist and composer David Calzado became the band’s leader and radically altered their sound, “focusing on spectacularity as opposed to virtuosity” (Perna 70). They paid great attention to visual details, including dress, stage presentation, and choreography. Thus, members of Charanga Habanera, like El Tosco, exchanged their traditional Cuban shirts, guayaberas and uniforms for the work clothes of hip black Cubans, such as sneakers, baggy trousers,
designer T-shirts and baseball caps. Furthermore, the group focused on physical attractiveness and dancing skill, rather than the virtuosity of singers, capturing the attention of the younger Havana audience (Perna 70-71, Dye). As NG La Banda and Charanga Habanera continued to gain popularity, they profited greatly through performances at dollar-only clubs as the use of U.S. currency grew in Hispanic countries (Perna 62).

Social Commentary

Because of their increasing financial success and social influence, many Timba musicians, such as El Tosco, took it upon themselves to become social commentators on life in Havana. A frequent topic was the expansion of sex tourism. To highlight this prevalent aspect of Havana nightlife, the El Tosco composed the song “La Bruja.” The song maintained the point of view of a scorned Cuban man, who was left by a bruja, or witch. The offended man describes his lover as a woman with “no feelings” who failed to make time for him because she was too busy exchanging love for “cheap amusements” (Perna 196). The song also references “turitaxis” (dollar-only taxis used by foreigners), but fails to mention prostitutes, jineteras (female sex-workers), or tourists. Furthermore, unlike the lyrics of Western pop and rock, the song contains no explicit misogynistic references. However, the concept of jineterismo, or the exchanging of services goods and/or dollars through “friendship,” became an inextricable component of Timba dance music, which focused on the bodies of women (Fairley). “La Bruja” remains the first time the problem of sex tourism appeared in the public arena. The song quickly gained popularity and presence in the Havana nightlife, eventually becoming one of La Banda’s number one hits (Vaughan 41). The Cuban government, however, never officially recognized the song, nor allowed it permission to be broadcasted by Havana radio stations. Furthermore, the song was met with solemn condemnation of the Federation of Cuban Women, Federación de Mujeres Cubanas, a powerful quasi-government organization. The political and intellectual elite interpreted the song as celebration of pre-revolution Cuban culture, implicitly alluding to the failure of Cuban socialism to wipe out such practices (Perna 195-197). Nonetheless, songs such as “La Bruja” resonated with the general Cuban public and strengthened the popularity of Timba musicians.

As musicians such as Charanga Habanera and NG La Banda gradually gained more influence in social and political arenas, they became the canaries in the coalmine for the Cuban state, which began to reflect on its state of emigration and to repatriate many of its citizens. During this time, Cubans were required to receive permission to leave and were issued a return date. Failure to obey these strictures resulted in immediate passport invalidation. Thus, many Cubans intentionally overstayed their visa and were exiled from their home country. As a result, the government was forced to negotiate repatriation with many influential Cuban musicians. Most of the musicians who returned received government incentives such as invitations to concerts or financial aid from the Ministry of Culture (Thomas).

Global Impacts

Despite the warm reception of Timba music in Cuba, the genre failed to gain a foothold in the global scene for several reasons. One important aspect was its complex rhythm and that it lacked “danceability” (Dye). Timba presents several culturally specific aspects to dancing that remain difficult for non-Cubans to read and learn. For example, Timba displays elements of Cuban son, a very popular and danceable Cuban genre; however, Timba was also influenced by rumba, whose rhythmic
underpinnings supersede the son element. This affects choreography, as more rhythmic breaks exist than are found in salsa, throwing off the inexperienced dancer’s step. Furthermore, Timba incorporates more moments of separation, where partners dance independently and improvise. This frees the dancers from worrying about the movements of their partner, but inexperienced dancers may be reluctant to improvise.

Long durations and lengthy sections of improvisation also accounted for Timba’s failure to enter the global scene. Each piece lasts about twelve minutes and contains multiple choruses. The choruses are call-and-response montuno sections, with several choruses that the musicians shout. From a marketing standpoint, the public often has difficulty naming a song they hear on the radio. For example, when people call the Latin radio station to request a song, they may simply refer to the song by its chorus (Thomas). Thus, marketing difficulties remained a barrier for Timba entering the commercial music scene.

Timba lyrics tend to be very culturally specific, usually concerning life in Havana, which presented another obstacle that prevented Timba’s spread throughout the world. For example, the song “La Bruja” takes on the point of view of a Cuban man who talks about turitaxis (dollar-only taxis used by foreigners). Furthermore, “Picadillo de Soya” laments the hardships of everyday life in Cuba, such as soya rations replacing fish and meat during the Special Period (Perna 196, Thomas, Fairley). These ideas and lifestyles failed to relate to the general public outside of Cuba, resulting in a narrower audience.

Lastly, when Timba musicians emigrated to Miami, they lacked the business skills to navigate the commercial music setting. For a variety of reasons, Cuban musicians favored raw talent and viewed self-promotion as unnecessary. Marketing represented selling out, a concept beneath them. Furthermore, at the time of their arrival in Miami, a vibrant music scene did not yet exist. The Cubans who moved to Miami before the 1994 exodus might have been Timba’s key audience, but they simply did not have the money to attend concerts. Thus, Timba failed to establish a market overseas.

Despite these setbacks, Timba musicians gave one final push to extend the influence of their music. In 1998, seven of the most popular bands and singers in Havana met with Cuban musician Juan Formell and joined forces to form an all-star band called Team Cuba, one of whose key members was Jose Luis Cortes. The Timba music documentary Que Suene La Timba, follows this band and films how the band proactively distinguished Timba from salsa. They hoped to share true contemporary Cuban music with the listeners around world, many of which erroneously associated contemporary music with the traditional music found in the documentary Buena Vista.

The documentary Que Suene La Timba focuses on Timba music and captures its polyrhythmic sound, rich with furious movement. One of the musicians, Jose Loyola, describes the rhythm as, “a little freer with breaks [–] ‘efectos’ as we say.” The musicians hoped Team Cuba would bring recognition and become the music that made the world dance. Unfortunately, Timba failed to make it past the walls of Havana, remaining a music genre of the Special Period of the 1990s.

**Conclusion**

Thus, the disparity between local Havana culture and music practices played an important role in hindering the advancement of Timba music into the global music scene. Key musicians such as El Tosco and La Charanga Habanera paved the way to discarding traditional structures and combining popular, traditional, and contemporary styles while
placing more emphasis on dance movements. They became the critics of the social dynamics of Cuba, using methods such as choteo to discreetly bring up issues such as sex tourism. However, while the genre allowed musicians to express their opinions on the current social, economic, and political state of Cuba, the unique rhythms and aesthetic arrangements combined with the reluctance and inability to strategically market to foreign audiences caused Timba to gradually fade from the vibrant and ever-evolving Havana music scene.

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The Guillotine and the Execution of Louis XVI

Emily Rebecca Francis

ABSTRACT. During the French Revolution, Louis XVI’s execution by guillotine on 21 January 1793 served as a turning point in the iconography of the machine. Before the remarkable event, the guillotine symbolized egalitarianism and democracy, as all people—whether peasant or king—were to be considered equal in death. Afterwards, given the controversial nature of a former monarch’s execution, the guillotine came to symbolize a revolution gone horribly wrong. Nevertheless, revolutionaries believed the execution strengthened their cause. They maintained that monarchical symbolism ended when Louis XVI took the scaffold. On the contrary, those who opposed the revolution faulted revolutionaries and their beloved revolution more than ever. These counter-revolutionaries found strength in numbers overseas where other European monarchs looked upon the revolutionary movement as unprecedented and barbaric. Following Louis XVI’s execution, as the revolutionary event garnered more attention than any before, prints served an important purpose. Both revolutionary and counter-revolutionary prints permeated the Western World, as both sides sought to influence public opinion through widespread propaganda. Not surprisingly, many of these prints depicted the guillotine. As such, the machine either represented progress or destruction, a strengthened revolutionary movement or a faulty one. Paradoxically, when the revolutionary guillotine disposed of Louis XVI, it disposed of its most significant victim yet. While the guillotine meant to ensure equality in death, Parisians and foreigners recognized the importance of Louis XVI’s end.

Introduction

On 21 January 1793, Louis XVI met his fate when he faced the revolutionary guillotine. Dressed in black pants and a white shirt, he seemed unbelievably calm as he made his way to the scaffold located at the Place de la Révolution. Many in attendance were shocked of the King’s demonstration of humility and viewed him, in his last minutes, as martyr- or even Christ-like as he silently walked towards the guillotine, putting the will of the people above his own desires. The execution ceremony started at 10:10 in the morning, and by 10:22, just twelve minutes later, the famous executioner Sanson held a decapitated Louis XVI’s head up in the air for all to see. The significance of the King’s execution and the symbolism of the guillotine together changed the trajectory of the French Revolution. Revolutionaries realized that their beloved Revolution and the presence of a monarch were incompatible, and as a result, called upon the guillotine to dispose with its most significant victim yet. The debate over the significance of Louis XVI’s execution during the French Revolution continues to this day. As one historian claims, “If the setting of the event [of Louis XVI’s execution] must be cloaked in a special solemnity, the death itself and its instrument are ordinary: the head of a king will fall as would the head of anyone else, with the swiftness of lighting,” achievable by none


other than the revolutionary guillotine. The meaning of the King’s execution can be viewed as no more significant than any other Frenchman sentenced to death. The above belief—that all in France were to be considered equal—paralleled revolutionaries’ belief that the guillotine established democracy, egalitarianism, and modernity in France.

Nevertheless, the execution of Louis XVI fostered divisions among Parisians. Upon Louis XVI’s arrest, the Montagnards advocated the king’s immediate death while the Girondins were unsure if they should sentence their king to death. The decision to execute the King—administered on 20 January 1793—changed common perceptions of the guillotine. Certainly, some revolutionaries viewed the guillotine’s work as more admirable than ever since it terminated the symbol of the Old Regime. It intensified their cause when it disposed of Louis XVI and thus destroyed monarchical symbolism. Others, though, started to wonder if the guillotine was too strong. There is no doubt that the idea of the guillotine as being congruent with the ideals of 1789 started to be questioned following Louis XVI’s execution. Thus, its iconography would never be the same.

Following the Louis XVI’s execution, revolutionary prints of the event permeated the Western World. Significantly, prints did not require its audience to be literate, so they were able to cater to a large audience. Likewise, the cheapness of prints allowed more people to be exposed to them. The Enlightenment’s emphasis on reason and knowledge certainly contributed to rising literacy rates in France. Nonetheless, prints of Louis XVI’s execution fostered a growth in positive revolutionary sentiment.印刷品unfavorable to the Revolution also emerged. Loyalists, counter-revolutionaries, and many foreigners who lived (or once lived) under monarchical rule condemned Louis XVI’s death sentence. As a result, anti-revolutionary prints swept across the country with the intention to both foster and create a large counter-revolutionary movement. Anti-revolutionary sentiment led to the formation of negative names and depictions of the guillotine.

Undoubtedly, Louis XVI’s execution sparked controversy in France. Revolutionaries used the guillotine as a means to achieve the destruction of the former symbol of the Old Regime. With the monarch’s death on 21 January 1793, the guillotine took on a new significance. It administered justice to all condemned persons—regardless of privilege—as the execution of Louis XVI helped illustrate. As a result, the execution produced a strengthened Revolution. Following it, the guillotine became an indisputable symbol of equality, evidenced by its swift disposal of all that was wrong with France prior to its revolutionary movement.

The King’s Flight to Varennes

The King’s flight to Varennes on 20 June 1791 undoubtedly contributed to his future death sentence in January of 1793. His decision to alter his appearance in an effort to flee from France caused revolutionaries to distrust their king, which proved impossible for Louis XVI to overcome. His flight to Varennes revealed the King’s estrangement from the Revolution and
its goals; his distance from it was becoming increasingly apparent even to himself. Thus, Louis XVI’s attempt to flee from the Tuileries Palace persuaded the people of his evident disloyalty to French revolutionaries, and more importantly, his disloyalty to the Revolution in general. The above event led to a rapid shift in how the people viewed their King as ideas about where sovereignty rested began to be questioned.

In an effort to reconcile his relationship with his subjects, Louis XVI addressed the French people about his flight from Paris on 21 June 1791. Referring to himself in third person, he boldly declared, “The king does not think it is possible to govern a kingdom of such great extent and importance as France by the means established by the National Assembly, as they currently exist,” justifying the reasons for his decision to flee while simultaneously criticizing the Assembly and its power. Nonetheless, the King’s inability to convince French revolutionaries of his rationale for leaving Paris served as a precursor to his death sentence. To revolutionaries, Louis XVI’s attempted flight helped to prove his alienation from their cause. Thus, the flight to Varennes became a forerunner to the King’s eventual death sentence; in response, revolutionaries started to question more than ever their monarchical government.

**Louis XVI Sentenced to Death**

In response to Louis XVI’s flight to Varennes in 1791, revolutionaries viewed the King with more skepticism than ever. His decision to flee and abandon the revolutionary cause rightfully angered avid revolutionaries. The flight perpetuated “a new crisis of sovereignty and legitimacy,” for revolutionaries were no longer able to trust their king. The goals of the Revolution started to change; the idea of instituting a constitutional monarchy in France began to wane as revolutionaries realized they did not need a monarch to satisfy their goals.

Largely because of the King’s flight to Varennes, the Revolution of 10 August 1792 broke out over what to do with the monarch. The Revolution in August occurred because the Legislative Assembly did not know what to do with the King, the constitution, the ongoing war, or the political uprisings in Paris. Prior to the Revolution of 10 August, radical Parisians issued an ultimatum to the Assembly, threatening an uprising if no action was taken by 9 August. After nothing was done, on the evening of the 9th and continuing on to the 10th as well, a mob of Parisians stormed the Tuileries Palace, demanding immediate action.

A member of the Paris municipality, Pierre-Louis Roederer, provided an account of the chaos. He was summoned by the Queen, Marie Antoinette, to provide advice on how to calm the mob down. He believed that Louis XVI should go to the Legislative Assembly, per the mob’s request. Bewildered, the Queen famously asked, “What, you propose to deliver the King to his enemies [i.e., the King’s enemies are the people]?” In the end, Roederer won

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122 Louis XVI quoted in Mason, Laura and Tracey Rizzo, *The French Revolution: A Document Collection* (Boston: Wadsworth, Cengage Learning, 1999), 152. This quote comes from Louis XVI’s speech, the “Declaration of the King Addressed to All the French About his Flight from Paris” on 21 June 1791.


125 Ibid.

126 Ibid.
the Queen’s trust, and the Royal Family decided to throw themselves at the Legislative Assembly’s mercy.

On 13 August 1792, the King was arrested for treason and about a month later, on 21 September, the National Assembly declared France a republic. Louis XVI was stripped of all his titles, and became known simply as Louis Capet. During the interregnum when Louis XVI’s powers were revoked and tensions between the Montagnards and the Girondins climaxed, questions of and debate over the government’s responsibilities were common. The Montagnards, known as political radicals, advocated for an egalitarian France, free from feudalism and property laws. Even more, they supported the end of absolutism, something their political rivals opposed. The Girondins, on the other hand, were known as political moderates. They supported the Revolution but disagreed with the Montagnards on many important issues, most notably what to do with Louis XVI. The former advocated for Louis Capet’s immediate death, while the latter were partial to keeping the former king under arrest. Ultimately, the Montagnards seized a majority in the National Convention and thus controlled the fate of the former French King.

A newspaper article entitled “Massacre of the French King!” provides an account of the sentencing of Louis Capet to death. The article stated, “The National Convention declares Louis Capet, last King of the French, guilty of a conspiracy against the Liberty of the Nation, and of a crime against the general safety of the State... Louis Capet shall undergo the punishment of DEATH.” Louis Capet was determined guilty and sentenced to death for plotting a conspiracy against the French population. Louis Capet was sentenced to death on 20 January, and the execution was to be completed within twenty-four hours. The King asked for “a delay of three days, in order to enable me to appear in the presence of Almighty G-d.” The Convention denied his request and confirmed that the execution would occur at the Place de la Révolution the following day. The guillotine was called upon, and it was asked to dispose of its most famous victim.

The Execution Scene

Narratives of Louis XVI’s execution provide detailed descriptions of the scene. On 21 January 1793, Louis XVI met his fate at approximately 10:22 in the morning. W. Fores, an Englishman, provided an account of the scene. He noted that the axe weighed nearly 300 pounds, that the King was fastened to a board which reached no higher than his breast, and that he laid on his belly with his head secured through a hole in the two boards. In fact, the King was so securely fastened by the machine that it would be impossible for the sufferer [i.e., Louis Capet] to remove his head in any way. In the crowd during the execution, Philippe Pinel, a Frenchman and an admirer of the king’s serenity in the face of death, described the scene in a letter. On Louis XVI, Pinel wrote:

128 Ibid.
129 Ibid.
132 Ibid.
When he arrived at his destination he looked at the scaffold without flinching. The executioner at once proceeded to perform the customary rite by cutting off the King’s hair which he put in his pocket. Louis then walked up onto the scaffold. The air was filled with the roll of numerous drums, seemingly intended to prevent the people from demanding grace. The drumbeats were hushed for a moment by a gesture from Louis himself, but at a signal from the adjutant of the General of the National Guard, they recommenced with such force that Louis’s voice was drowned and it was only possible to catch a few stray words like ‘I forgive my enemies.’ At the same time he took a few steps round the fatal plank to which he was drawn by a feeling of horror natural to any man on the brink of death or, maybe, he conceived that the people might appeal for grace, for what man does not cling to hope even in his last moments?133

By January of 1793, it was clear that execution scenes had become perfectly routinized. The executioner performed his job to perfection; he directed the King to the scaffold with ease and cut his hair. Likewise, audience involvement became routinized. Music was playing, drums were beating, and the crowd was watching with anticipation. However, Pinel seemed different than others in attendance. For instance, he admired the King’s grace in ascending the scaffold and felt sorry for him. Pinel noted that all of the noise and commotion from the scene drowned out the majority of Louis XVI’s last words. Nonetheless, the King met his fate as the guillotine “cut [his head] off so quickly he could hardly have suffered,”134 suggesting the inherent power of the machine.

Figure 1, a British and arguably royalist print, shows the execution of Louis Capet moments before the blade falls.135 The caption of the print claims the guillotine to be a “modern beheading machine,” suggesting its modernity, technological capability, and systematic-like nature. The former King is clearly fastened to the guillotine, and the executioners are performing their last minute preparations. Soldiers orderly fill the first several rows to ensure the execution runs smoothly. Hunt estimates that eight to nine thousand troops were mobilized to avoid any efforts of rescuing Louis Capet.136 Clearly, all

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134 Ibid.


136 “Execution of Louis XVI, January 21, 1793, 10:22 in the morning,” Exploring the French
the attention is on the late King, who is dressed in a white gown. Unlike other prints of execution scenes that appear chaotic and noisy, Louis Capet’s seems quiet and orderly. All in attendance realize history is about to be made as they stand and watch in silence, as their former King is moments away from facing death. Surely, these revolutionaries remembered when Louis XVI was proclaimed “the restorer of French liberty” only years before, in August of 1789.137

Additionally in Figure 1, both Louis Capet and the guillotine stand at the center of the print. The main subjects of the print—the former King and the guillotine—are centralized in order to assert their importance. Other notable people are depicted in the print as well. The caption asserts that “The Monarch,” “His Confessor” (the priest who is recognizable to the left of the scaffold), “General Santerre,” and “The Mayor of Paris” are in the crowd and labeled on the print.138 The print is clearly a piece of anti-revolutionary propaganda that hoped to derive certain emotions from its viewers.

Prints favorable to the Revolution also proliferated in France. Below, Figure 2, a French portrayal of Louis XVI’s execution, depicts the scene.139 Unlike Figure 1, Figure 2 portrays a large scene with more people in the crowd. Noticeably, an empty plinth dominates the left side of the print. A famous equestrian statue of Louis XV, created by Bouchardon, had formerly occupied the pedestal.140 The former statue’s absence from the print speaks to the symbolic destruction of the Old Regime with the beginning of something new,141 especially considering Louis Capet’s execution moments before. Importantly, the vacancy of the plinth signifies a strengthened revolutionary cause, as a former monarch used to occupy it.

Additionally, the print’s caption attests to the significance of the execution and its fulfillment of the Revolution’s goals, for after the blade fell, cries of “Vive la République” permeated the scene.142 Further, revolutionaries wished to advance their cause by cutting ties to the past, and thus any connection with absolutism. The location of the execution—at the Place de la Révolution where the former statue of Louis XV once stood—also sheds light on a desire for revolutionaries to distance themselves from the past. In a way, the location of the execution served to disrespect, mock, and even torment Louis XVI since the symbolism of 1793: at 10:10 in the morning, the head of Louis Capet was separated from his body, and next shown to the people, instantly, cries of Vive la République was heard from all [in the crowd]. This execution took place at the Place de la Révolution, formerly Place de la Louis XV.

139 Mort de Louis XVI,” Bibliothèque nationale de France, http://gallica.bnf.fr/ark:/12148/btv1b6949655s.r=lo uis+xvi+execution.langEN. Translated in English, the caption reads, “Death of Louis the XVI le 21 janvier 1793: at 10:10 in the morning, the head of Louis Capet was separated from his body, and next shown to the people, instantly, cries of Vive la République was heard from all [in the crowd]. This execution took place at the Place de la Révolution, formerly Place de la Louis XV.
142 “Mort de Louis XVI,” Bibliothèque nationale de France, http://gallica.bnf.fr/ark:/12148/btv1b6949655s.r=lo uis+xvi+execution.langEN.
the empty plinth was surely recognizable to all.

Significant differences exist between Figures 1 and 2. For one, Figure 1 is a royalist, British print, while Figure 2 is a pro-revolutionary, French print. The creator of the former certainly hoped to derive negative emotions of the guillotine, as it was in the interest of the royalist cause. The latter, however, meant to garner revolutionary support. Finally, the prints also depict very different moments of the execution scene. Figure 1 portrays Louis XVI on the scaffold, seconds away from death, and thus it is concerned with the build up of the event [i.e., pre-execution]. In Figure 2, though, Louis XVI’s head has already come off [i.e., post-execution], which served to create particular emotions from its viewers, such as astonishment and shock. The evident differences between the prints are a result of geography and politics, as location (France vs. Britain) and political allegiance (revolutionary vs. anti-revolutionary) played a significant role in how Louis XVI’s execution was portrayed.

Importantly, Louis XVI’s executioner, Sanson, wrote a public letter in which he described the former King as he took the scaffold on 13 February 1793. Finding it important to assert the truth in his words, he wrote:

Here then, as I promised, is the exact truth concerning what happened. As he [Louis Capet] got out of the carriage, he was told to remove his robe; he objected to this and said he could be executed as he was. It being represented to him that this was impossible, he himself helped to remove his robe. He made the same objection when it came to tying his hands, but offered them himself when the person who was with him said that this was a last sacrifice. He then inquired whether the drums would continue to beat. He was told that no one had any idea. And this was true. He mounted the scaffold and wanted to go right to the front as if to speak. But it was made clear to him that this was impossible too. He allowed himself to be led to the place where he was bound, and here he cried very loudly: ‘People, I die innocent.’ Then he turned to us and said: ‘Sirs, I am innocent of everything I am charged with. May my blood cement the happiness of the French people.’ There, citizen, you have his last and actual words.143

In his letter, Sanson found it important to describe the events leading up to Louis XVI’s execution. In detail, he wrote a step-by-step narrative of exactly what happened. Louis XVI appears fragile and scared in Sanson’s narrative, as he is concerned with his hair, his hands, and the music. Certainly, the music was a concern because he wanted one last chance to persuade the people of his innocence. It should be noted that a fuller account of the significance of Louis XVI’s last words will be described in further detail in the next section.

After the execution, a British newspaper article proclaimed that revolutionaries joyously

celebrated in the streets. Upon seeing their former King’s head come off, sans-culottes and Jacobins alike, “waved their hats in the air, exclaiming ‘Vive la National! Vive la Republique!’” signifying the end of the Old Regime and thus a dramatic shift of the Revolution and its objectives. The famous revolutionary anthem “Ça Ira” followed the ceremony, unifying both revolutionaries and their cause. Thus, the British article suggests that the immediate conclusion of Louis XVI’s execution spurred a cheerful, happy scene as revolutionaries were singing in the street. Revolutionaries left the scene stronger than when they first appeared: as their cause undoubtedly strengthened, so did they. Accusations of their bloodthirstiness reached their zenith as they became both obsessed with and paranoid over the trajectory of the Revolution. As one historian declares, the sacrifice of the King, “cannot be better symbolized, in the eyes of all the citizens, than by [a] meeting between the king…and the guillotine, the new machine of republican equality.”

Prior to the King’s execution, the guillotine had generally been praised by revolutionaries for disposing with enemies of the Revolution. The execution of their King, though, would contribute to change perceptions of the machine. Parisians—revolutionaries and loyalists alike—began to realize the destructiveness of the machine, resulting in some to start to turn against it.

Positive Portrayals of Louis XVI

Following Louis XVI’s execution, anti-revolutionary propaganda proliferated in Paris. Prints were widely circulated, as they did not require literacy to be understood. Propagandists capitalized on using prints to preach their beliefs, for certain symbols, people, events, places, and ideas were more easily articulated in the form of a picture than by the written word. Figure 3 shows one anti-revolutionary print of Louis XVI on the scaffold. Rightfully so, Hunt argues that the print “communicates humility” as Louis XVI appears to be looking upward to heaven. The lighting of the print is meant to help an observer develop empathy for the King. Light appears

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145 Ibid.
146 Ibid.
147 Baecque, Antoine de, Glory and Terror: Seven Deaths under the French Revolution (London: Routledge, 2001), 91.
149 Ibid.
directly above Louis XVI—whose presence significantly makes up center stage of the print—while all else around him is dark and gloomy. The various elements of the print—the King’s stance and dress, the lighting, the communication of humility, the empathy meant to be felt towards the former King—all serve to create a sense of moral superiority of Louis XVI as he is moments away from facing death. For instance, “Louis the XVI...calmly wearing a handsome and simple white habit, accepting his sacrifice [i.e., death] with grandeur, suggests this reading to his hagiographers: it is a saint that the Republic is putting to death,” further emphasizing the king’s humility, grace, and martyr-like nature in the face of death. 150 Thus, viewers of this print likely felt sympathetic towards their former king. He is depicted as humble and at ease with the idea of death. As time progressed and the seemingly never-ending Revolution turned more radical, these types of depictions of the execution became more common, ultimately serving to strengthen the counter-revolutionary movement.

Likewise, Figure 4 below, an English print, portrays Louis XVI as martyr-like moments before his execution.151 The focus of the print is solely on the King. While there are people evident in the background, they are blurry and unfocused, contributing to the significance of the Louis XVI’s graceful pose. As Reichardt and Kohle argue, “Cruikshank portrays his Louis as a quasi-redeemer, turned to face G-d and, like Christ on the cross communicating with his heavenly father, forgiving the perpetrators. 152 The humility of Louis XVI in this print serves to perpetuate anti-revolutionary sentiment that was commonly circulating among royalists and foreigners. Further, the caption of the print reads, “I Forgive my Enemies! I Die Innocent!” stressing the King’s famous attempt at a proclamation of his innocence moments before his death. But, the noisy crowd famously drowned out Louis XVI’s last words. At the bottom left of the print, directly above the platform, there are two raised trumpets, which serve as reminders of the loud intervention of the soldiers in the crowd. These soldiers, “tried to prevent the king [from] proclaiming his innocence to

the people,” in an attempt to strengthen the revolutionary cause. In contrast to this print’s declaration of the King’s last words, a more complete version of Louis XVI’s last words exists. He is claimed to have famously declared, “People, I die innocent of the crimes that they [i.e., the Assembly? Revolutionaries?] ascribe to me. I forgive the authors of my death, and I pray to G-d that the blood that you are about to spill will never fall back on France.” Even further, Sanson declared that the King’s last words were actually directed at him and the men aboard the scaffold. He claims his last words to be, “Sirs, I am innocent of everything I am charged with. May my blood cement the happiness of the French people,” in an attempt to plea his way out of death. Clearly, the King attempted to proclaim his innocence right before his death, whether or not the crowd correctly heard him or not. As noted above, many variations of the King’s last words exist. The two listed above are not the only two in circulation. Nonetheless, all point to a common theme: the King proclaimed his innocence to the people and he asked for their forgiveness. In contrast to his kingliness, Louis XVI’s famous last words serve to show the audience his humility. Thus, the King’s purposeful words were supposed to garner a certain reaction: one sympathetic to his dire situation on the scaffold.

Importantly, the two prints above both illustrate the guillotine. In both, Louis XVI’s humility as he is about to meet his fate is juxtaposed with the very sight of the guillotine. The King and the guillotine are in contrast with one another; the former represents the grace of an admirable victim, while the latter represents revolution embodied in object form.

When Louis XVI was about to take the scaffold, a two-minute delay occurred as the King, the executioner, and the other notable men whispered to one another. Revolutionaries and anti-revolutionaries alike were silenced; all wanted to hear what the fuss was about. Minutes later, the procession proceeded, as Sanson and his helpers prepared both the King and the guillotine. The two-minute delay resulted in a tremendous amount of attention, both during and after the execution. Articles and gossip of the delay resulted in a multitude of different opinions, almost all of which lacked evidence to back up their claims, since only the few men surrounding Louis Capet truly knew what happened. In response to an article that appeared in Le Thermomètre du Jour on 13 February 1793, Sanson famously wrote a public letter in response stating what really occurred during the famous delay. He declared:

> The little debate that took place at the foot of the scaffold hinged on his thinking it was not necessary to take off his robe or have his hands tied. He also offered to cut his own hair. And if the truth be told, he bore all this with a calm and perseverance that astonished us all. I am firmly convinced that his perseverance was owed to the religious principles with which he seemed more than anyone impressed and imbued. Be assured, citizen, that this is the simple truth of the matter.

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153 Ibid.
Thus, Sanson clarified the events that truly unfolded near the scaffold. Clearly, he was both amazed and astonished on how the former King presented himself in such a dire situation. Significantly, the executioner was impressed with Louis Capet and how, even on the scaffold, he upheld religious principles and never turned away from his faith. The significance of the executioner of Louis XVI publically stating his interactions with the former King on the scaffold—and how he was impressed with him—speak to a peculiarity of the guillotine. The guillotine individualized death by preforming its duty in the name of justice. It seems that Sanson, the human symbol of the guillotine, started to question the machine in his letter. The fact that he emphasized Louis Capet’s humility, religiosity, and perseverance—even in the face of death—are noticeably significant ways to describe a victim of the machine, especially when considering Sanson and his duty to the Revolution.

Additionally, there were many in Paris who disagreed with Louis XVI’s death sentence. In a letter from Philippe Pinel, he described the scene of Louis XVI’s execution and showed great admiration for the King’s serenity in the face of death. He noted that the King “looked at the scaffold without flinching,” suggesting he had come to peace with the idea of death. The above quote by Pinel parallels Louis XVI’s depiction in Figure 4, evident by his looking away from the guillotine nonchalantly, and by his hand gestures. Nonetheless, moments later, Sanson held the decapitated King’s head up for all to see. Pinel observed that some in the crowd cried “Vive la Nation,” while others could not help but “shed tears in the bosom of their families.” Thus, while Louis XVI was not the first victim of the guillotine, he was undoubtedly significant, as his death marked a turning point in the Revolution.

Radical Revolutionaries and Louis XVI’s Execution
When revolutionaries tried their own King for treason, they accepted at the very least the possibility of sentencing him to death. During the trial, tensions between the Montagnards and Girondins heightened. Generally, the Montagnards condemned the King and his actions [i.e., his flight to Varennes in June of 1791], while the Girondins acknowledged the King’s betrayal, but did not call for his death. Nonetheless, upon

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158 Pinel, Philippe, “Execution of the King,” Exploring the French Revolution, 1793,

159 Ibid.

160 Ibid.

Louis XVI’s sentence, the most radical of revolutionaries—the sans-culottes—sought to glorify and immortalize the execution scene.

Figure 5 is of a plate of china that surfaced in France following the King’s execution. The significance of depicting the execution on a plate speaks to the bloodthirstiness of the sans-culottes. Certainly, the use of the plate suggests revolutionary allegiance and approval of Louis XVI’s death. Owning the plate and consuming food off of it declared, whether publically or privately, a belief in the Revolution. Again, possessing a plate like the one below is also politically suggestive, for only radical revolutionaries would dare purchase one. Therefore, those who owned a plate like the one below knew that Louis XVI’s execution symbolized the end of the Old Regime. Owning this piece of revolutionary china—whether intended as a souvenir of the event or for use—allowed revolutionaries to symbolically declare their allegiance to the Revolution. Thus, consumption of this fantastic piece of revolutionary china praised the King’s execution as an event to be remembered.

Depictions of revolutionaries as obsessively bloodthirsty increased in both descriptions and portrayals of Louis XVI’s execution. Pinel, in the crowd at the King’s execution, noted the barbarism of some French revolutionaries. Inspired by the King’s execution but meant as an account of execution scenes more generally, Pinel wrote:

[a] decapitation could not be performed without spilling blood on the scaffold, many persons hurried to the spot to dip the end of their handkerchief or a piece of paper in it, to have a reminder of this memorable event, for one need not have recourse to odious interpretations of such actions.

The above quote recognizes the revolutionaries who engaged in such an action—dipping their handkerchief in the blood of their former King—as entirely barbaric and bloodthirsty. The Massachusetts Mercury, an American newspaper, also reported on the barbarism of French revolutionaries. For example:

After [Louis XVI’s] death, the nearest spectators divided among them what of his hair had been cut off by the stroke of the guillotine, and several persons were so inhuman as to dip their handkerchiefs in his blood, which they afterwards carried about, crying, Behold the blood of a tyrant!

Clearly, the execution of the French King contributed to the formation of a new type of revolutionary. These new revolutionaries realized what the significance of the death of their former King meant to their cause. But, anti-revolutionary and foreign biases—as evidenced by Pinel and the Massachusetts Mercury—framed the Revolution in a negative, destructive light. Revolutionaries were described as “inhuman” and even absurd: the fact that they resorted to scrambling for a piece of their former King’s hair and dipping his blood on their handkerchiefs as a souvenir of their presence also shed light on their barbarism. Nonetheless, the guillotine became central to realizing radical revolutionary goals, for it alone was responsible for disposing of its most significant enemy.

Alternative names for the Guillotine

Following Louis XVI’s execution on 21 January 1793, an influx of alternative names for the guillotine proliferated the Western World.

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164 Massachusetts Mercury, “Paris, January 22,” (Boston, 29 March 1793).
While revolutionaries tended to refer to the instrument as the “national razor” in an effort to present the patriotic, positive qualities of the guillotine, anti-revolutionaries and foreigners began to steer away from such a euphemism.

After the King’s execution, posters and prints reenacted the scene, for there was no better gossip than that of Louis XVI’s death. Above, the caption of Figure 1 refers to “La Guillotine” as a “Modern French Beheading Machine,” suggesting the machine’s allegiance to both progress and the Revolution. The fact that “modern” was meant to describe the guillotine was a reflection of Enlightenment ideals that influenced the creation of such an instrument. Both after the Enlightenment and during the Revolution, revolutionaries envisioned their cause as congruent with notions of modernity. Their cause, they believed, called for the end of former, barbarous practices [i.e., breaking on the wheel] in favor of progressive, enlightened practices [i.e., the guillotine].

Nevertheless, negative connotations of the guillotine also emerged. The Frenchman Philippe Pinel, for example, claimed the guillotine to be a “murderous instrument,” suggesting both his disappointment with the machine and even his disapproval of its use. Many Englishmen who opposed the so-called radical Revolution also criticized the use and glorification of the guillotine by French revolutionaries. Significantly, political affiliation could be determined by approval or disapproval of the guillotine, as the machine’s supporters tended to identify as Montagnards (or Jacobins), while its opponents were made up of Girondins, counter-revolutionaries, and some foreigners. For example, a magazine in England referred to the machine as an “abominable instrument” that has too negative of an impact in France, proving its discontent with the Revolution. The magazine infers that the French would be better off if they disposed with the guillotine altogether, and asserts that when the “revolutionary frenzy shall cease, this instrument of death will be prohibited amongst the French.”

Importantly, alternative names for the guillotine became more popular following Louis XVI’s execution. The increase in names and euphemisms that referred to the guillotine rose, in part, because it garnered more attention than ever before since it disposed with a former monarch. Since these names could be both pro- or anti-revolutionary, they served many purposes. On the one hand, they glorified the guillotine for strengthening the Revolution, and on the other, they condemned it for bringing too many deaths to France.

**Conclusion**

Louis XVI’s execution contributed to a variety of new interpretations of the guillotine. While revolutionaries praised its use for disposing of their former King and thus the Old Regime, anti-revolutionaries feared its inherently destructive manner. Prints of the execution scene permeated the Western World, as Europeans gasped at the guillotine’s profound capability. Nevertheless, the execution of Louis XVI would vastly change perceptions—especially in European countries surrounding

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168 Ibid.
France—on the guillotine. Negative, alternative names for the guillotine would proliferate in and around France, as people began to fear its influence. Accordingly, the very iconography of the machine impacted revolutionary sentiment. The most radical of revolutionaries viewed the guillotine as congruent with the ideals of 1789. They regarded the guillotine and the Revolution as inseparable; one was not complete without the influence of the other. Additionally, as a result of Louis XVI’s death, factions in Paris remained more divided than ever. So, after 21 January 1793, the trajectory of the Revolution changed. The Montagnards seized power and thus controlled the fate of the Revolution; as such, their reliance on the guillotine significantly shaped how revolutionaries viewed both their goals and the means they would use to achieve “Liberté, Egalité, Fraternité” in France.

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The Forgotten Radical: Southern Women and the New Left Student Protests of the 1960s

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Abstract. The narratives of the 1960s student protests revolve around the major campuses of Berkeley, Columbia and other Northern and West Coast universities and much emphasis is placed on the male-dominated roles of speaking and writing. However, this narrative fails to paint the national picture of college upheavals. The 1960s would not have had the same effect on society if protests were confined to a few liberal campuses. Across the nation, students fought against the Vietnam War, the policy of in loco parentis, and for their right to free speech on campus. While ignored in most histories of the decade, these protests reached the Deep South. Chapters of Students for a Democratic Society, and their Southern equivalent, the Southern Student Organizing Committee, formed on Georgia campuses. Georgia students staged sit-ins and marches and desired to have their voices heard. Yet, even within these so-called ‘radical’ groups, women struggled to be allowed the same opportunities to speak and organize as their male peers. If the Southern radical is overlooked in this historical narrative, the female radical is nearly forgotten, as she had to fight for her voice to be heard within even the New Left movement. However, female involvement and struggle within the 1960s student left led to the Women’s Liberation movement, which brought legal and social changes that resonate today.

Introduction

The main historical narrative of the sixties student left is predominately Northern and male, focusing on anti-war efforts and national organizations such as the Students for a Democratic Society. However, not only does this narrative leave out women and the South, but it fails to stress the widespread importance of the student left. Two of the most lasting impacts of the student left are in university reform and laying the roots for women’s liberation, neither of which can be fully understood without including the Southern and female radical.

Nearly every book on the decade mentions the protests at liberal elite universities like Berkeley and Columbia and the organization Students for a Democratic Society (SDS), but most won’t include the Southern Student Organizing Committee (SSOC), a similar Southern organization. Todd Giltin’s The Sixties: Years of Hope, Days of Rage and Terry H. Anderson’s The Movement and the Sixties are prominent books that fail to mention the SSOC or other Southern events. Melvin Small’s Antiwarriors goes a step further. When discussing Vietnam Moratorium events, he writes they were “observed almost everywhere, except by and large, in the South,” outright denying the fact that Moratorium events, though small, did occur in the South. The best known names are male leaders, such as Mario Savio of the Free Speech Movement and Tom Hayden, SDS leader and drafter of the Port Huron Statement. Emphasis lies on speeches and marches in protest of the war, which were mainly led by men, rather than the community organization which was predominately female.

169 Gitlin’s exclusion is especially striking as he was president of the SDS when they formed a fraternal relationship with the SSOC.
led. In addition, the student left is often synonymous with a single organization, the national SDS, rather than the movements at individual universities. As the SDS was Northern and male dominated, this leads to an easy exclusion of the South and women.

To fully understand the impact of students’ newfound power, one should not focus on just a few liberal universities, but instead understand student unrest as a national phenomenon that touched even the South. The student left would not have had as large an effect if only liberal students at Berkeley or Colombia were protesting. Rather, student unrest and critiques of in loco parentis touched nearly every campus in America, even those in the Deep South. A May 1968 survey of more than 1,200 universities found that of the Southern universities that responded, 36% had experienced some sort of demonstration during the preceding academic year. This is compared to 49% in the Northeast, 44% in the Midwest and 40% in the West, not large enough margins to exclude the South entirely. By April 1969, 78 cites in 13 Southern states had sit-ins.171 What the coordinator of Southwide Mobe said proved to be somewhat true, “We’re going to show the Nixon Administration that there isn’t any place in the country they don’t have to worry about....there’s not a section of the country they can turn their backs on. The South isn’t ‘safe’ any longer.”172

When looking at protests in the South, the University of Georgia (UGA) works as a case study. As the state university of a Deep South state, its reputation as a conservative, apathetic campus makes it all the more striking that protests were occurring. Former governor, Ernest Vandiver, stressed the importance of this university to the state when he said, “Almost every family in Georgia has some connection with the University of Georgia... A father, mother, brother, sister, uncle, aunt, somebody in the family group had attended.” 173 This statewide importance of the university made the protests that much more resonant and noticed outside of Athens.

New Left at the University of Georgia

A UGA chapter of the SDS was officially recognized by the school in 1967, though activist students had been gathering at the Westminster house on campus and attending protests in Atlanta since 1964.174 As a group, one of their first actions was protesting Hubert Humphrey’s speech at the university and later protesting the inauguration of the new University President, Fred Davison. They held weekly meetings at the Westminster house and even published an underground newspaper, featuring articles critical of the war and university policies.175 When the university was holding their military ball, the SDS put on an ‘Anti-Military Ball’ where they crowned a “Miss Anti-Imperialism.” However, student radicalism at UGA extended beyond the SDS.

In 1970, UGA students joined in solidarity with the Nationwide Student Strike after the Kent State massacre. After hearing news of the shooting, students held a candlelight

173 The Red and Black 27 April 1967; Kassinger to Fred Davison, 26 May 1969, Box 55, Fredrick C. Davison Papers, Hargrett Library, University of Georgia, Athens (hereafter referred to as the Davison Papers).
vigil at the chapel. The next day students held parades and marches while wearing black armbands and carrying signs with slogans such as “Please do not shoot me, I am a peaceful dissenter,” “Kent state could happen here,” and “Pull troops out of Vietnam, Cambodia, and Kent State.” The student newspaper, The Red and Black, reported that throughout the day at least 3,000 out of approximately 18,000 students protested the shooting. The protest culminated in 1,500 students, joined by Dean of Men William Tate, holding a sit-in in front of President Davison’s house, waiting for him to respond to their demands that the university be closed. These demands were met and UGA joined universities across the nation in shutting down in protest and sympathy for the four students killed at Kent State.  

On October 15, 1969, UGA joined the nationwide Moratorium to End the War in Vietnam. On this day, people across the country protested the war. The radical Atlanta underground newspaper, The Great Speckled Bird, reported that 50,000 people gathered in Washington and 100,000 in Boston, with several millions participating throughout the nation. In Georgia, 25 campuses participated. The actions at UGA were similar to those across the nation: people gathered to hear speakers and participate in “teach-ins,” where people could discuss and learn about issues about related to the war. At UGA, the Young Democrats, Phi Kappa, and the Georgia Vietnam Moratorium Committee, the sponsors of the event, set up information booths around campus and hosted free lectures throughout the day. Instead of their regular curriculum, some professors taught Vietnam related subjects such as “Ethics and War,” “Origins of American Intervention in Vietnam,” “Vietnam and Black America,” and “Vietnam and the Invasion Complex.” In between classes, students rang the chapel bell, and that night they held a candlelight program in the chapel. An editorial in The Red and Black called it “a break with tradition at the University” and “One of a handful of instances in which University students have taken a part in protesting a national controversy like the war.” However, students did recognize that while their programs were similar to those at other universities, theirs was quite smaller. The newspaper quoted students saying the protests “ended too quickly here” or were less effective because “this is a very conservative school.”

The Moratoriums were supposed to continue every month on the 15th, but at UGA attendance quickly fell. While each had classic 60s elements like guerrilla theatre, dramatic shows of symbolism like paper mache pigs, and conferences featuring well-known radicals, none impacted as many people as the first one. The most notable impact of the later Moratoriums was the inclusion of Women’s Liberation in the discourse. As part of the April 15, 1970 Moratorium, programs such as “Women’s Liberation and the War” and a “Student Revolutions Symposium” discussed male chauvinism within the movement. However, the “New Mobe” which was nationally sponsoring these Moratorium events, suddenly disbanded saying there was “little prospect of immediate change in administration's policy in Vietnam.” This underscores that while anti-war protests drew large crowds and national attention, they

178 Great Speckled Bird 3 Nov 1969.
were not the most significant issues the student left tackled. While unable to change President Nixon’s policy in Vietnam, students pushed for gender equality and changed the very nature of the university.

**Women and the New Left**

The 1964 Free Speech Movement in Berkeley was one of the first protests aimed at university regulations. During the sixties, Universities operated under the policy of *in loco parentis*, meaning the University acted as a parent and could make rules unrelated to a student’s academic life. The students at Berkeley wanted their right to off-campus political speech, and after protests and sit-ins, they earned their constitutional rights to organize and solicit funds for off-campus political action.  

The first major sixties left protest at UGA also had to do with university policies. At UGA, *in loco parentis* policies had a greater effect on women than men. The university regulated dress for both genders, but far more strictly for women. Men were not allowed in university buildings if their shirts weren’t tucked in, but women couldn’t wear shorts or slacks in residence hall lobbies, sorority living rooms, on campus, or even downtown. They could only wear shorts in public when participating in sports or an outdoor activity like a picnic. Even then, when going to and coming from the event they had to wear a skirt over the shorts. While this policy ended in 1967, other restrictions remained in place for women.

Men who wanted to live off campus simply had to register and be approved by the housing office. However, women weren’t allowed to live off campus at all unless they were married, living with their parents, or over 23 years old, later changed to 21. Women students had to sign-out whenever they left the dorm and sign back in when they returned. They could only sign out for events on the social calendar and they couldn’t spend the night away from their dorm when campus was busy, such as during football games or homecoming. Men did not have a curfew, but on Sundays to Thursdays women had to be in by 11:30 PM, with 1 AM curfews on Friday and Saturday. Freshman curfew was an hour earlier.

These rules sparked the first major student left protest on campus. In April 1968, signs appeared around campus reading “Girls! Do you want to be human beings again? If so, join the protest march from Creswell Hall to the administration building” with a phone number for Bob and Bill Clark. While these initial posters listed two men, there appeared to be a strong female presence in the planning and leadership of the march. Another flyer listed the phone and room numbers of three girls from Brumby who could be contacted with more information. The Red and Black reported on one of the meetings and listed Bob and Bill Clark, Maxine Karp (who would later become the SDS secretary), and Diana Wygal as organizers while another female organizer, Katherine Omelanuk, submitted the demands to Davison the day before the march.

The demands were that the curfew laws be abolished, drinking rules be changed to follow Georgia law rather than separate university regulations, all rules for male and

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183 The Red and Black 20 April 1967.
185 The Red and Black 5 March 1968.
186 The Red and Black 2 April 1968; 9 April 1968.
female students be made equal, the Women Student Government Association (WSGA) be transferred to Student Government Association (SGA), and no disciplinary action be taken against the demonstrators.

The University approved the march and provided a police escort. When the students reached the administration building, Katherine Omelanuk leapt onto the steps and read out the demands, reminiscent of a southern, female Mario Savio. However, Davison was not there to hear their demands, so the students entered the building and sat down, saying they weren’t going to leave until they could talk to Davison. They spent the night, playing card games and instruments, and singing “We Shall not be Moved” and “We Shall Overcome.” Dean Tate and Vice President Parthemos walked among the crowd, asking them to leave a few times, but they never did. In a parallel to the Vietnam protestors gathered around the country, when Parthemos told them to leave, a few chanted “Hell no, we won’t go.” All the women participating were breaking curfew. When Davison still didn’t meet with them, they sat in the next night as well. The Red and Black reported 230 students stayed for the sit-in and that 88 women and 142 men signed a petition saying they were there and believed in the cause. The smaller number of women signers is probably because they were all breaking curfew and more at risk. Internal documents show that thirty-three women were called in for a conference for being in the Academic building both nights. A later estimate of participants came when the administration sent out officials letters of reprimand to 350 students who signed petitions saying they participated, 150 issued to women students and 200 to men. An editorial cites a student who said “It’s the kind of thing that happens somewhere else, certainly not here!”

But, the South was joining the rest of the country in using direct action to enact real change at their universities. The next quarter, the curfew rules were changed. Alcohol consumption just had to follow Georgia law, rather than different University rules. There were no restrictions on visiting men’s apartments, no sign-out rules, and, with parental permission, sophomores and juniors could be exempt from curfew, with seniors automatically exempt. The Administration claimed these rules had been in the works, and perhaps they had, but to the students it felt like an instance where their direct action could actually lead to change in the University. While the University said students should go through the proper channels and attend SGA meetings, many students felt these channels were inadequate and created only the illusion of democracy. The flyers for the march themselves highlighted the futility of going through the proper channels, one reading “Well you could sit around and hope that the rules will be changed, but the Dean of Women is not known for her sensitivity to student opinion (except when she agrees with it...)” Many protesters cited a former WSGA president who said every proposal the WSGA came up with was turned down.

This sit-in story went national. Newspapers such as Chicago Sun Times and LA Times reported on it. However, many newspapers misconstrued the story to be about women students wanting to drink alcohol or to

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188 The Red and Black 11 April 1968.
189 Internal Memo, Mcbee Papers.
190 The Red and Black 31 July 1968; 18 April 1968.
191 The Red and Black 1 Oct 1968; 27 Sept 1968; Louise McBee to parents of female students, Box 40, Tate Papers.
192 Protest flyer, Box 5, Mcbee Papers.
193 Atlanta Constitution 14 April 1968.
stay out all night. The students themselves stressed the “equality” angle, one flyer advertising the march read “We seek not to protest women’s rules but to affirm coed equality”194, but some newspapers barely touched on that angle. The Miami Herald headline read “Coeds Hold Sit-in for Drinking Rights” and included the quote “Why do they attend school? If drinking is so important they can do that anywhere.”195 However, women often were quoted in the articles and listed as spokespeople. Susan Carroll was quoted as framing the debate as fighting for rights, while Flinn Dallis appeared on TV 5 WAGA giving the ‘statement’ for the march, saying “All we are requesting is the rights and responsibility to run our own lives.”196 While these newspapers, The Red and Black, and the movement itself listed predominately women as the organizers, the UGA Administration failed to hold these women responsible for their power and instead sought the harsher penalties against men. While it is encouraging that the steering committee that met with Tate to discuss the desired changes had three women and two men, the two students who were suspended and the one put on probation were all male.197 One of those suspended was David Simpson, president of UGA’s SDS. Just as Judith and Stewart Albert write that the 1970 Chicago Conspiracy Trial created a “closed circle of white male radical celebrities,” the arrest made these three men the ‘face’ of the movement.198 Even before the arrest, newspapers often ran pictures of David Simpson clutching a megaphone and giving him credit for a march he didn’t actually organize. In fact, David Simpson admitted the SDS tabled a motion to support a women’s march, using the excuse the national SDS regularly used- that there were bigger issues that needed to be settled.199

The responses to the sit-in and curfew changes show why women were underrepresented in radical movements. These rules themselves confine women to a private sphere, creating a situation where they must be protected and uphold ‘morality’ while the men can drink and come and go as they please. “Lord, help our society,” one letter to Davison began, “if the time ever comes when women are permitted to do as they choose, with no restraints whatsoever.”200 One student wrote into The Red and Black, “I ask you, what coed with any self-respect wants to enhance her reputation by being permitted to remain out of her dorm all hours of the night...Is it asking a girl too much to restrain from drinking or to be morally wholesome?” He then questions who would want to marry girls who behaved like this or wants them as mothers of their children, clearly illustrating how these curfew rules were grooming female students to be ladylike wives and mothers. Other letters to Davison centered on these ideas of ‘morality’ or ‘wholesomeness.’ One woman called the protesters “immature and indecent girls” while another remarked, “No wonder boys [have] little respect for girls these days. They don’t deserve it!” Another letter read, “Young girls, particularly, needs rules and regulations until they’re married. I realize times are changing but moral values should not.” 201

194 March Flyer, Box 5, McBee Papers.
195 undated Miami Herald, Box 55, Davison Papers.
196 LA Times 12 April 1968; Atlanta Constitution 12 April 1968; WAGA April 18, 1969 transcript, Box 55, Davison Papers.
199 Atlanta Constitution 14 April 1968.
200 Letter to Davison, Box 55 Davison papers.
201 The Red and Black 18 April 1968; Letter to Davison, Box 55 Davison Papers.
women’s self-worth was still wrapped up in being a wife and mother, and when women have sit-ins, speak, or protest, they risk that status.

Other aspects of society and university life were sexist and may have discouraged women from upholding radical ideas. Articles about beauty pageants filled The Red and Black. These pageants emphasized female beauty and made women feel it is more important to be beautiful than anything else. The Red and Black printed articles about a “Mrs. University of Georgia” for married students or wives of students, judged on poise, personality, modeling, and cooking of a desert. There were articles about the “Cotton Queen” beauty pageant, the “Glamour Mag Top 10 College Girls Contest” that emphasized “fashion and grooming” and a “Poultry Princess” contest containing bathing suit and evening gown categories. The student newspaper even ran a “Girl of the Week” feature with a picture of a female student and a caption discussing her beauty, her hobbies and, on at least one instance, her measurements.202 Even women seeking higher education, found much of their lives centered on their looks. In fact, a story on the UGA sit-in shared the front page of the Marietta Daily News with an article about the “Miss Cobb” beauty pageant.203 It is no surprise that the first national protest in the name of Women’s Liberation was held at a Miss America pageant. Debra Michaels writes that the women who protested Miss America saw how girls “learned to internalize messages linking female social value with the individual’s approximation to the Miss America idea of beauty and congeniality.” 204 Men did not participate in beauty pageants or have similar focus on their looks. They could find their social value in different aspects of their life.

In addition, The Red and Black’s women’s section ran articles on how to be a ‘lady.’ An article about being a “Southern Belle” stated, “You probably won’t hear her, since she always speaks in a low voice and never shouts across campus” or that a Southern Belle “makes a man think he is the one who has come up with a brilliant idea, even though she has carefully planted the seeds.” Another woman wrote similar advice in an article on “coed charm” where she wrote, “At parties a woman should never try to be the center of attention, unless she wants the title of showoff.”205 However, newspapers also printed articles on the “Changing Woman” and articles about women often becoming the ‘breadwinner.’ The Women’s Student Government Association planned an event to talk about this idea of the “Changing Woman,” and the Associated Women Students group planned programs exploring “a woman’s role, getting the most out of college and job opportunities after graduation.”206 However, the concept of the “New Woman” was still new, and much of society adhered to the old ideas.

The life of the female student at UGA in the sixties was a mix of newfound empowerment with the prevailing idea that women are to be pretty, quiet and good wives and mothers. These sorts of women wouldn’t dare stand on top of a police car with a bullhorn or speak up in SDS meetings. In his book, and the Countercultural Politics of the Self." In Imagine Nation: The American Conterculture of the 1960's and 70's. (New York: Routledge, 2001), 41.

204 Debra Michals. "From "Consciousness Expansion" to "Consciousness Raising": Feminism...
Campus Wars, Kenneth J. Heinman studied demographics of radical student groups at Michigan State, Penn State, Kent State, and SUNY-Buffalo. In the anti-war SDS and even pro-war and conservative Young Americans for Freedom groups, women made up only around 20% of the membership.207 A memo from Dean Tate to President Davison listed the major speakers and participants at UGA’s April Vietnam Moratorium, all of which were men. The ‘hardcore radicals’ mentioned in a memo about the Kent State protest were also all male.208 Surely the emphasis on motherhood, beauty, and morality placed on women had an impact on low numbers of women joining radical groups.

But while societal pressures could discourage a woman from being a ‘radical,’ even women in radical groups faced sexism. What is disturbing about this sexism is that neither the men nor women really recognized it was occurring. Many women, when looking in retrospect, realize they were being treated unfairly but at the time simply couldn’t understand it. Sue Jhirad of the SDS said, “All my anger and frustration about my situation was stuff that I never articulated politically because I had no framework for it.”209 Women in the movement recounted being talked over or ignored. Barbara Haber learned that if she wanted to say something in SDS meetings she would say it, and then have her husband repeat it so people would actually listen.210 Todd Gitlin, a former SDS President noted in retrospect that when a man interrupted a woman it was normal, a woman interrupting a man “violated case.” Ambition in men was considered “ball busting in women,” and what seen as aggressiveness in men was seen as being a “bitch” in women.211 Men dominated the SDS leadership; there were only two female national officers in the entire decade, and the executive committee was always at least 75% men, often more.212 Throughout the decade, never more than 10% of the SDS literature was written by women.213

Sara Evans makes a disturbing point in her book Personal Politics. She writes that Casey Hayden, Judith Cowan, Therea de Pazo, Mary Varela, and Sharon Jeffrey played roles in drafting the Port Huron statement. Yet, when Evans later interviewed SDS members for her book, she found that many men could not recall the women who were there.214

The Port Huron statement served as the manifesto for the SDS and centered on the ideals of participatory democracy, yet SDS men excluded women from the decision making processes and often spoke over them in meetings. Women were instead relegated to cooking and cleaning rather than speaking and writing. It fully underscores the extent of female oppression that a group who penned the Port Huron statement and often participated in the Civil Rights Movement could not even link the

208 Moratorium activities Memo, May 6 Moratorium Memo, Box 55, Davison Papers.
210 Ibid 167.
212 Rebecca Klatch, A Generation Divided, 165. The percentages of women on executive committee were 14.3% in 1961, 23% in 1962, 26% in 1963 and 6% in 1964.
214 Ibid 113.
oppression of African Americans with that of women. Mary King and Casey Hayden were the first to bring the issue of women in the SDS out into the open, with their “A Kind of Memo.”

They first wrote an unsigned ‘position paper’ when they were with the Student Nonviolent Coordinating Committee (SNCC), but their SDS memo received more attention. They wrote about the “many parallels that can be drawn between treatment of Negros and treatment of women in our society as a whole” and how the “caste system” dictates rules to women in the movement, making them clean the ‘freedom house’ and do secretarial work while men are spokesmen and leaders. One of the most powerful lines in “A Kind of Memo” is “If the question is raised [men in the movement] respond with ‘That’s the way it’s supposed to be. There are biological differences.’ Or with other statements which recall a white segregationist confronted with integration.” With that line, not only is female oppression linked with black oppression, but those who oppose or dismiss women’s equality are linked with the racists the SDS prided themselves on fighting.215

After reading this memo, women started talking to each other about their oppression in what was called ‘consciousness raising.’ They learned languages of oppression through their work for Black Liberation and were now applying these ideas to themselves.216 Men in the SDS did not react well to this. Many people, even some women, thought there were greater issues to focus on. Perhaps men who prided themselves on being radical and democratic were upset and angry at being called out on their own oppressive behavior. Perhaps sexism was so ingrained in every aspect of society and pervaded intimate spaces like sex, relationships, and families that it was hard to grasp on the same level as the overt lynchings and legal discrimination facing African Americans. Either way, men in the movement were taken aback by these talks of Women’s Liberation. SDS veteran Marilyn Salzman Webb tried to talk about a woman’s platform at the 1969 National Mobilization Committee and was met with shouts from the crowd like “take her off the stage and fuck her,” “take her down a dark alley,” and “take it off.”217 The organization she was a part of included “we oppose the depersonalization that reduces human beings to the status of things” in the Port Huron statement, but men involved in the movement were doing just that to her.218

Women’s Liberation groups began to form as a result of women’s involvement in the movement and their realization of their place in the movement. At UGA, the chairwoman of Women’s Oppression Must End Now (W.O.M.E.N) said “I started off in the peace movement, which gave a huge thrust to the feminist movement. It just riled me up the way the men acted towards the women, even though we had the same concerns.”219 Unlike anti-war protests or the ideological debates of the later SDS, Women’s Liberation had a long lasting effect on society. The fight for gender equality arose in this time period and people began recognizing and combatting sexism. Statements and assumptions about women and women’s roles that were once commonplace and uncontroversial were attacked. At UGA, the chapter of W.O.M.E.N, while small, sent

216 Debra Michals, "From "Consciousness Expansion" to "Consciousness Raising," 41-69; Sale, SDS, 9.
members to the National Women’s March for Legalized Abortion in Washington D.C. and the National League of Women Voters meeting on women’s rights, and also sponsored talks from the Georgia Women’s Abortion Coalition. Women’s Liberation led to gains in these areas, with legal protection for abortion, increased numbers of women in political office and the workplace, and laws against discrimination. These gains came from women recognizing their oppression and using speeches, writing, and organization to communicate their oppression—techniques many women learned and perfected through their time in student left groups. In 1971, *The Red and Black* referred to the 1968 sit-in as “the first instance of a modern women’s rights movement on the University campus.” Narratives that leave out the struggles of the female radical or ignore her existence altogether ignore the roots of a movement with long lasting legal, political, and social implications.

**The South and the New Left**

When Sara Evans writes about Mary King and Casey Hayden’s influential memo, she says “it makes sense they were from the South.” In an interview, Casey Hayden said that “a lot of roots of the feminist movement are in [Freedom] Summer” because students came back radicalized. These students “never quite [saw the world] again strictly from the superior point of view....they had a glimpse of what it was like from underneath.” In fact, the entire student left has roots in the South. When students at UGA sat in at the Academic Building to protest, they were not copying tactics used at Berkeley four years earlier, but using the tactics from a lunch counter in North Carolina. Berkeley's protest for free speech and for the university to stop regulating off campus activity was a blow to in loco parentis and inspired other students to use similar tactics in their universities, but it can’t fully be attributed as the beginnings of student protest in the decade. Students were inspired when, on February 1, 1960, four African American college students sat at a Woolworth's lunch counter in Greensboro, North Carolina. They used the direct action mode of the sit-in to protest the diner that refused to serve them. By April, 50,000 people had participated in sympathy sit-ins in 100 cities, creating a wave of using sit-ins as political action. Casey Hayden said, “I am thankful for the sit-ins for no other reason [than] that they provided me with an opportunity for making a decision into an action.” This tactic hadn’t been widespread since the labor movements of the 1930s, yet soon became a hallmark of the 1960s.

Many members of the SDS and Free Speech Movement cut their teeth in the South during the Freedom Summer project, where students would spend their summer helping register African Americans to vote. Anyone who is surprised that student protests occurred on Southern campuses and on the streets of Southern cities need only look to the Free Speech Movement’s Jack Weinberg going limp when he is arrested and hauled into a police car. That is a tactic learned from nonviolent protests in the Civil Rights Movement. Gitlin writes in his history of the sixties that Jack Weinberg and Free Speech Movement leader, Mario Savio, came back from Freedom Summer with “a

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220 The Red and Black 3 December 1971.
221 Sara Evans, Personal Politics, 53.
222 Interview with Casey Hayden, conducted by Blackside, Inc. on May 15, 1986, for Eyes on the Prize: America's Civil Rights Years (1954-1965). Washington University Libraries, Film and Media Archive, Henry Hampton Collection.
224 Sara Evans, Personal Politics, 107.
respect for the power of civil disobedience... a
distaste for bureaucratic high-handedness and
euphemism, a taste for relentless talk at intense
mass meetings on the way towards consensus.”

If the Northern white students took these tactics to their campuses, it would
make sense that the Southern students would as well.

Of course, the Freedom Summer
movement was predominately black southerners
and white northerners. Only 11% of Freedom
Summer applicants were Southern college
students, half of them black. In fact, like
women, southerners were often discouraged in
subtle ways from being radical. Southerners
who participated in the Civil Rights Movement
or worked with SNCC often found themselves
ostracized from their families and communities.
White women especially felt isolated because of
the stigma of the “black rapist” and the
emphasis on the preservation of “white
womanhood.” Many had to rectify their dual
identities of anti-racist and southerner. The
University of Georgia clung to relics of the Civil
War as they played Dixie at football games,
called their marching band the “Dixie Redcoat
band,” and even allowed a fraternity on campus
to display the rebel flag and wear confederate
uniforms during their parades.

Students at Northern or West Coast universities did not
have to grapple with these “traditions” that
enforced a racist past. Also, Southern campuses
were often more conservative or apathetic, and
left-leaning students couldn’t find an outlet for
their radicalism. Sue Thrasher, a founding
member of the Southern Student Organizing
Committee wanted to meet others and needed to
prove “that she was not a freak, that there were
other southerners who shared her anguish and
her vision.” Ed Hanlett, a campus traveller, said
many Southern students he met were afraid of
“reprisal from fellow students, friends, relatives,
and parents for betraying one’s race and
breaking cultural taboos.”

This small number of radical white
southerners formed the Southern Student Organizing Committee (SSOC). As the SNCC
became more radical and kicked white people
out, the Northern whites could simply go home
while Southern whites had to band together just
to find someone else who understood. The
SSOC was formed in Nashville in 1964, where
45 students from 15 campuses met, including
Nelson Blackstock from UGA.

An SSOC member wrote after the conference “I was
pleased by the number of students there...I guess
that everyone was somewhat surprised to find
the ‘isolated Southern student’ was a reality.”

The group planned to connect the
isolated Southern radicals and create
movements in the South, acting fraternally with
the SDS, who described the SSOC goal as
trying to “reach into isolated Southern campuses
and guide liberal students into the mainstream
of the student movement.” Their fraternal
relationship meant that the SSOC could use
SDS literature, that the SDS would pay for half
the salaries of two SSOC campus travelers and
include them in conferences, and that they
would let large Southern chapters have proxy
votes and even hold a conference in the South.

225 Todd Gitlin, The Sixties, 163.
226 Jeffrey A. Turner, Sitting in and Speaking Out,
171.
227 Sara Evans, Personal Politics, 44.
229 Bryant Simon, “Southern Student Organizing
Committee: A New Rebel Yell in Dixie,” (Honors
Essay: University of North Carolina, 1983), 9, 45.
230 Bryant Simon, “A New Rebel Yell in Dixie,” 8-
9.; Gregg L Michel, Struggle for a Better South, 34.
231 Students for Democratic Society Papers, 1958-
1970 (Glen Rock, N.J.: Microfilm Corporation of
America, 1977), Series 2A, No. 115 (Referred
hereafter to as SDS Papers).
The SDS agreed that the SSOC “can be useful in reaching groups of students who are frightened by the militancy of SNCC or SDS.”

The SSOC also focused on “Southern Consciousness,” recognizing that the South was different from the rest of the country and adding a different dimension to Southern history other than slavery and racism. By focusing on labor movements, populism, and Communists of the 1930s the SSOC highlighted a history of Southern radicalism, making 1960s radicalism seem less out of place and more a natural progression. However, these attempts to celebrate Southern history could have problematic elements. Although UGA’s Black Student Union and SDS opposed the displaying of a Confederate flag by the fraternity KA, the SSOC’s logo was a white and black hand shaking in front of the Confederate flag. Iconography like this led to northerners seeing the “Southern Consciousness” concept as racist and added to the disapproval of the focus on white students.

The SSOC was short lived and is left out of most books on the sixties, but it is notable as it represented the presence of an organized Southern radical movement. It is also important to recognize the SSOC, not just the SDS, as a vehicle for protest, as the SSOC was less oppressive to women. While men always outnumbered women, women held positions on the continuations and executive committees and were often, according to Evans, visible and important. An SSOC member and later feminist activist, Charlotte Bunch said “I didn’t feel them to be quite as oppressive or as egotistical as I experienced a lot of SDS leaders to be” attributing this to that fact that Southern radical men were isolated enough by just being Southerners, and couldn’t afford to ignore their fellow Southern radical females. However, the organization still had its share of sexism. Sue Thrasher described the situation as “[Women] were sometimes in leadership positions and sometimes in equal positions, on the other hand it was a very sexist movement and there were just a lot of sexual issues...so it was a difficult time for women.”

Many women found the SSOC more welcoming than the SDS. While men always outnumbered women, women held positions on the continuations and executive committees and were often, according to Evans, visible and important. An SSOC member and later feminist activist, Charlotte Bunch said “I didn’t feel them to be quite as oppressive or as egotistical as I experienced a lot of SDS leaders to be” attributing this to that fact that Southern radical men were isolated enough by just being Southerners, and couldn’t afford to ignore their fellow Southern radical females. However, the organization still had its share of sexism. Sue Thrasher described the situation as “[Women] were sometimes in leadership positions and sometimes in equal positions, on the other hand it was a very sexist movement and there were just a lot of sexual issues...so it was a difficult time for women.”

In 1968 the SSOC women began organizing ‘consciousness raising’ groups, like their sisters in the SDS. Maggie Heggan sent a letter to 800 women at 50 Southern campuses inviting them to a Women’s Liberation conference in the South. Historian Christina Greene remarked that “perhaps SSOC’s most

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232 Ibid.
233 Gregg L. Michel, Struggle for a Better South, 44.
234 Greene, Christina, ”‘We’ll Take Our Stand’: Race, Class and Gender in the Southern Student Organizing Committee 1964-1969,” in Hidden Histories of Women in the New South, ed. Virginia Bernhard (Columbia, Missouri: University of Missouri Press, 1994), 176; Sarah Evans, Personal Politics, 35.
235 Greene, Christina, ”‘We’ll Take Our Stand,’” 192; Gregg L. Michel, Struggle for a Better South, 64-65.
236 Sara Evans, Personal Politics, 113; The Great Speckled Bird 28 April 1969.
237 Sara Evans, Personal Politics 190-193.
enduring legacy rests in the women’s liberation movement.” An exclusion of the South and the SSOC then, excludes important female radicals as well as important roots of the women’s liberation movement in the South.

Campus Activism Outside of the Students for a Democratic Society

However, in regards to activity on the campus level, the national SDS or SSOC might provide literature or ideas, but mainly had little effect on the campus. The SDS may have provided the framework for student protest, but the major protests on UGA’s campus and the major changes enacted often came from passions and people within the university. In 1967, the SDS had 6,371 national members, but when National Office members toured campuses they found 30,000 Americans who considered themselves members of SDS chapters. Someone working for the National Office remarked “hardly a week goes by that the National Office doesn’t discover an active SDS chapter somewhere that no one knew existed.” It appears that students were taking the SDS name because it was well known and represented radicalism as a whole, rather than becoming official members of any chapter. In fact, a lot student protest, such as the Free Speech Movement, acted outside the SDS. The major protests at UGA took place near the end of the decade, as the SDS was collapsing, and were sponsored by other organizations such as Georgia Students for Human Rights, the Committee of Social Issues and the Student Mobilization Committee.

While emphasis is placed on the National SDS Office (made up mainly of non-students), their national conferences mainly connected people and led to the discussion of issues and passions rather than formulating actual plans. Chapters acted autonomously, taking cues from other schools. When writing about the sit-in in the annual report, the Dean of Women wrote “undoubtedly, student unrest nation-wide had an effect.” At the same time, administrations used the SDS as a scapegoat for student protest. After the sit-in sponsored by the Movement for Coed Equality, UGA SDS members were the ones arrested, and Dean of Students O. Suthern Sims replied to parents’ letters by calling the protest “allegedly sponsored by the SDS.” However, the UGA SDS had minimal, if any involvement. While the UGA SSOC-SDS connected radical students and gave them a voice through protests and newsletters, many changes on campus or large protests were enacted using the national SDS model, though not the national SDS name.

Students across the country were finding their power during this decade because their numbers were growing. There were more people under 25 than ever before in America. In 1960, there were 27.2 million people between the ages of 14 and 24, 15% of the population. In 1970, there were 40 million, 20% of the population. While only 10% of college aged people were in college in the 1950s that number rose to 20% in 1960. For the first time in history, a nation had more students than farmers as enrollment went from 3,780,000 in 1960, up to 7,852,000 in 1970.

As more students entered college, students themselves became a national force,

238 Greene, Christina, “‘We’ll Take Our Stand,’” 195-201.
239 Kirkpatrick Sale, SDS, 317-404.
241 Dean of Women report 1967-1968, Box 1, Edith L. Stallings and Louise McBee Papers, Hargrett Library, University of Georgia, Athens (hereafter referred to as the Stallings and McBee Papers).
242 Letter from O. Suthern Sims to parents, Box 5, McBee Papers.
and began to recognize the impact they could have. The UGA SSOC-SDS hung up flyers that read, “UGA SSOC-SDS: The Old Get Older and the Young Get Stronger” and circulated a letter titled “Student Power and You.” Another flyer passed out at orientation said the organization was “working towards effective student voice” and boasted of 42 official members with twice that at weekly meetings.

**Student Rights and University Reform**

While anti-war protests were a major hallmark of student left protest, the scope and impact of the student left is seen more in the realm of university reform and student rights. The campus in 1964 is vastly different from the campus in 1974, and the campus in 1964 in no way resembles the campus today. Fights for university reform and constitutional rights were occurring at universities across the nation, often influenced by hearing about protests at other universities. These protests were especially important in the South, because according to the SDS, “*in loco parentis* is extremely restrictive on Southern campus.”

Students began criticizing *in loco parentis*. One letter to The Red and Black read “This institution is supposed to educate, not indoctrinate. This institution is supposed to provide freedom to think, it is not supposed to provide forced morality.” In the 1965-1966 annual report, the Dean of Women wrote “student knowledge of and resistance to the concept of *in loco parentis* and expression of their rights for due process are more in evidence this year.” After the sit-in, an alumnus wrote President Davison a rare positive letter on student protest, writing that that when he was a student “the key word was ‘conformity’” and he welcomes “freethinking students” who question rules.

The student protests against *in loco parentis* and other university policies had a lasting effect on universities. Gregg Michel writes that on some Southern campuses, university reform overshadowed even Vietnam and Civil Rights. Many of the protests centered on the right to free speech. After the 1968 sit-in at UGA, protesters received an injunction that limited their ability to protest. Students planned a free speech march where they had a silent band “play,” symbolizing how they were being silenced by the University. They also carried a coffin with “Free Speech” written on one side and “Free Assembly” written on the other. They marched through campus and dropped the coffin in front of the Administration building. Students at the University of Alabama turned an anti-war protest into a protest for free speech when the administration threatened to ban anyone who spoke. Two students at the University of Florida were suspended for distributing an unauthorized newsletter, but when students protested, the school changed their rules and gave students the right to picket, protest and distribute literature. At UGA, the SDS published a newsletter in violation of a similar rule that banned unauthorized literature. The SDS defended their publication, citing the ruling at Berkeley and stating they “do not believe that the University has the right to regulate the off-campus activities of students.” Later copies of the Student Handbook changed the rule from requiring publications to be approved by office

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244 UGA SSOC-SDS flyer, Box 56, Davison papers.
245 “Student Power and You”; Parent to Davison, Box 56, Davison Papers.
246 SDS Papers Series 2A No. 115.
247 The Red and Black 23 April 1968
248 Alumni to Davison, Box 55, Davison Papers.
249 Gregg L. Michel, Struggle for a Better South, 181.
250 The Atlanta Journal 18 April 1968.
251 The Red and Black 6 April 1967.
of student activities to, in 1970, allowing free copies and help with designs and layouts for recognized student organizations printing publications.\textsuperscript{252}

As the policy of \textit{in loco parentis} ended due to student protest and vocal dissent, universities began to stop governing a student’s private life. In addition to curfew and housing rules at UGA, students had to “secure the advice of a counselor” before getting married and then must notify the Dean of Men or Women after getting married.\textsuperscript{253} In the 1966-67 report from the Dean of Women the most serious disciplinary problems besides false sign-outs were “premarital pregnancy and cases of immorality.” By the 1970 report, the disciplinary issues were no longer personal, but rather academic and legal in nature—plagiarism and forging checks.\textsuperscript{254}

Besides restrictions on discipline, some more progressive students felt restrictions on intellectualism. The Port Huron statement stated that college neglects “personal cultivation of the mind.” Universities today offers classes on African American studies, women studies, Native American studies, as well as classes on history from around the world and classes that include authors of many backgrounds. The 1960s university, as many detractors complained, did nothing but prepare students for life in white-collar suburbia. Greg Calvart, National SDS Secretary in 1967 said “students are the trainees for the new working class and the factory-like multiversities are the institutions which prepare them for slots in the bureaucratic machinery for corporate capitalism.”\textsuperscript{255} The UGA chapter of the SDS was similarly brutal in their statement in The Red and Black, accusing the university faculty mission of being “nothing less than the feeding of facts and programmed ideology into heads of unquestioning cattle.”\textsuperscript{256}

As a result, across the nation SDS chapters created “Free Universities” that would both democratize and radicalize the university experience. People would teach “classes” and students would decide when, where and how they classes would be taught. Free Universities appeared on the campuses of Berkeley and Chicago in 1965. They existed in ten different cities by 1966, spreading to 15 by the beginning of 1967. By 1973, there were 800 of these Free University type schools.\textsuperscript{257} The chapter at UGA, formed in fall of 1968, covered a range of issues such as “Black History,” “Lessons of Vietnam,” “Modern Poetry,” and, probably influenced by the SSOC’s Southern Consciousness, “Tom Watson and Southern Populism.” In 1968, 235 UGA students enrolled in the Free University, which “far exceeded the estimated student sign-up.”\textsuperscript{258} The nature of these classes showed that some students wanted more variety and inclusion in classes. In addition, Free Universities combatted the underlying anger of protests against university regulations. “The University is not a democracy at all” David Simpson said when talking about the Free Universities, “All powers are invested in the Board of Regents or in the President of the University. The Free University experiments with alternatives.”\textsuperscript{259}

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\end{itemize}
The Black Student Union (BSU) issued a statement of certain changes they wanted to the university, including the establishment of an African American studies program. While at first Davison misconstrued the idea as wanting a program with exclusively black teachers and students and called it “not academically sound or legal,” shortly afterwards, an Afro-American studies program was established at UGA. This is significant because, in the BSU President’s words, the curriculum is geared towards whites and western civilization; there is “little incentive to study white students” subjects that de-emphasizes accomplishment of blacks.”

Today, not only are there African American studies programs in schools, but history and English programs place more of an emphasis on topics other than white historical figures and writers.

UGA was also one of the few universities that still required compulsory ROTC. While the UGA’s ROTC building was met with arson and vandalism, the changes to the program occurred after more democratic means. A former UGA SDS President said that compulsory ROTC valued obedience over intellectual curiosity and proposed a bill to the Student Senate that would abolish the program. The SDS circulated a petition against compulsory ROTC saying it was a waste of time, that most universities have voluntary programs, and stressing that a student should decide for himself if he wants to take ROTC. On April 11, 1968, the Student Senate passed the resolution against the program. In November, the administration started taking steps to end the compulsory program, citing the majority of students who wanted a voluntary program. This proved true; for once the program became voluntary, enrollment dropped by 50%.

The University today is a product of the upheaval of students in the sixties. Students now have the right to free speech, freedom from curfews or dress codes, and freedom from university regulation of off-campus conduct. While the student left is often seen as just opposing the Vietnam War, they had a bigger impact on the university than foreign policy. The student left also laid the groundwork for women’s liberation, as the language and organization tactics popularized by the Civil Rights Movement, National SDS, and used by universities across the country were later applied to women who wanted more respect and opportunity as activists. The recognition of sexism and desire for equality that exist today are a product of the women from the 1960s who made it an issue and who used organization techniques to create lasting change.

By excluding protests on Southern campuses, one ignores the magnitude of the student left protests, and fails to realize the national effect they had. Besides expressing their discontent with the war, students across the country changed the face of the university campus itself. By ignoring women when discussing protests of the 1960s, one ignores the roots of the Women’s Liberation movement, a movement that has tangible and long reaching effects on society. University reform and Women’s Liberation were two of the most significant impacts of the student left, and to fully understand this, it is imperative that women as well as southerners are included in the narrative.

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Effect of folate on lipid accumulation and cell proliferation in human primary adipocytes

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ABSTRACT. Folate is a water-soluble vitamin essential for cell metabolism. Its distinctive metabolism in obesity has been suggested from human studies but the specific role of folate in adipocyte growth is unknown. The objective of this study was to determine the influence of folate on differentiation and proliferation of human primary preadipocytes. Cells were exposed to 0.06, 6 or 60 μM folic acid (FA, oxidized form) or 5-methyltetrahydrofolate (MTHF, reduced form). FA and MTHF decreased lipid accumulation in mature adipocytes, while MTHF exhibited a greater inhibitory effect on lipid accumulation. FA had little to no effect on proliferation in preadipocytes, while MTHF increased proliferation. These results indicate that biologically active reduced forms of folate may have a greater inhibitory effect than the oxidized form on adipocyte differentiation in human adipocytes. This study supports preliminary findings in murine cell lines demonstrating the importance of maintaining folate availability during adipose cell development.

Introduction

Folate is an essential water-soluble vitamin that is involved in DNA synthesis and epigenetic regulation such as DNA methylation. Folate deficiency during pregnancy is known to lead to abnormal development of the fetus. It has been reported that there is an inverse relationship between serum folate concentrations in pregnant women and the likelihood of having a baby with neural tube defects (NTDs) (Czeizel & Dudas, 1992), suggesting that a lower consumption of folate during the critical period for neural development will greatly increase the baby’s risk of having spina bifida, anencephaly, and other NTDs. In addition to folate deficiency, obesity is also reported to be associated with an increased risk of pregnancy affected by NTDs. Rasmussen et al (2008) demonstrated that a mother who is overweight, obese, or severely obese has a 1.22, 1.70, or 3.11 greater risk of having a baby with NTDs, respectively. Moreover, population-based surveys show that serum folate concentrations in women of childbearing age decrease as their BMI increases (Mojtabai 2004) and short-term pharmacokinetic studies of an acute folic acid dose demonstrate that obese women have an impaired serum folate response (daSilva et al., 2013). Therefore, it is suggested that obese women of childbearing age may have an impaired folate metabolism and require higher folic acid intakes to attain comparable serum folate concentration to reduce the risk of NTDs.

Although population-based studies and human intervention trials demonstrate impaired folate status and metabolism in obese individuals, the mechanism has not yet been explained. Anderson et al (2013) reported that impaired folate response in obese women is associated with percentage body fat, providing a possibility of abnormal folate metabolism in adipose tissue. Also, according to Marques et al. (2013) folate deprivation can interfere with adipocyte metabolism and promote the hypertrophic growth of adipocytes in a murine cell line. Thus, we hypothesized that cellular folate availability will have an effect on
preadipocyte proliferation and adipocyte differentiation in human primary adipocytes.

**Methods and Materials**

**Reagents**

Folic acid (FA), methotrexate (MTX) and cytosine b-D-Arabinofuranoside Hydrochloride (AraC) were purchased from Sigma (*St. Louis, MO, USA*) and 5-methyltetrahydrofolate (MTHF) was gifted from Merck & Cie (*MTHF; Schaffhausen, Switzerland*). Insulin-like growth factor-1 (IGF-1) and Tumor necrosis factor alpha (TNF-α) were purchased from R&D Systems (*Minneapolis, Minnesota, USA*). AdipoRed Assay reagent was purchased from Cambrex BioScience (*Walkersville, MA, USA*) and CellTiter Blue Cell Viability Assay reagent was from Promega (*Madison, WI, USA*).

**Cell cultures**

Primary human adipocytes derived from female donors were purchased from ZenBio Inc. (*Research Triangle Park, NC, USA*) and used to test the hypothesis. After thawing, the human subcutaneous adipocytes were centrifuged and counted using a hemocytometer. The cells were passaged once before undergoing folate treatment.

For proliferation treatments, approximately 3,000 cells/well of primary human preadipocytes were plated onto 96 well plates in preadipocyte media (PM-1; ZenBio). Three different concentrations of FA and MTHF were administered in folic acid-free proliferation medium (modified PM-1, Zen-Bio): 0.06 uM, 6 uM, and 60 uM (Figure 1A). We chose 0.06 uM because it approximates the human serum folate concentration. The normal cell culture media concentration of folic acid for primary human adipocytes is 6 uM. For this experiment, 60 uM was used to see how an increased dose, compared to pharmacological concentrations, of folic acid would affect proliferation and to make trends easier to view.

For differentiation treatments, approximately 13,000 cells/well of primary human preadipocytes were plated onto 96 well plates and 120,000 cells/well of primary human preadipocytes were plated onto 6 well plates for Oil Red O staining. The same 3 concentrations of FA and MTHF were used as for the proliferation experiment. FA and MTHF were added into folic acid-free differentiation media (DM, ZenBio) and folic acid-free adipocyte media (AM, ZenBio) as shown in Figure 1B. DM contains nutrients necessary for human preadipocyte differentiation such as insulin, dexamethasone, isobutylmethylxanthine, and PPARg to maximize the differentiation of primary human preadipocytes. To allow for a potential positive effect of FA/MTHF treatment, all cultures were performed under submaximal conditions (DM diluted to 30%), during the early stage of adipogenesis. FA and MTHF treatments were added into folic acid-free DM (30%) for the first 7 days and folic acid-free AM for the second 7 days. To confirm the effect of folate on differentiation, methotrexate (MTX), a folate metabolism inhibitor was added to standard DM and AM (not folic acid free) during the differentiation period. A wide range of concentrations (0uM, 1 uM, 10 uM, 20 uM, 40 uM and 80 uM) of MTX was used in order to get a full spectrum of results.

**Cell proliferation assay**

Preadipocytes were treated with FA and MTHF as shown in Figure 1A. IGF-1 (10 nM) and AraC (1 uM) were used as positive and negative controls respectively. After 24, 48, and 72 hours of treatment, media containing treatments were removed, - replaced with 100ul fresh medium without treatment and 20ul CellTiterBlue reagent was added. CellTiterBlue is a dye that measures the enzymatic activity of the cells, so the darker the dye, the more enzymatic activity and thus the more cells. The florescence was read using a microplate reader.
(Molecular Devices, SpectraMax M5) at 560/580 nm, and the data were analyzed.

**Quantification of lipid content**

Lipid content was quantified using AdipoRed assay reagent according to the manufacturer’s instructions. Cells were plated in 96-well plates and treated with FA or MTHF for 14 days of differentiation. DM (100%) and TNF-α (2.5ng/ml) were used positive and negative controls, respectively. Media with treatment was changed every 2-3 days. On day 14, the treatment media was removed and cells were rinsed with PBS. Wells were then filled with 200ul PBS, and 1ul AdipoRed reagent was added. After incubation for 10 minutes at room temperature, florescence was measured with a microplate reader (wavelength 485/572 nm) and the data were analyzed. AdipoRed is a dye that measures the amount of lipid accumulated in each well, with a higher fluorescence reading indicating more lipid accumulation. Cell proliferation was also measured on day 14 using CellTiterBlue as described above to verify that the reduction in lipid accumulation was not due to loss of cells.

**Oil Red O staining**

Cells were treated with FA or MTHF in six-well plates during the adipogenesis period (Days 0-14) as described above. On Day 14, cells were washed with PBS and fixed with formalin for 30 minutes at room temperature and stained with Oil Red O and hematoxylin (Park et al, 2009). After staining, cells were mounted with Fluro-Gel™ (Electron Microscopy Sciences, Hatfield, PA, USA) and the images were captured using QCapture software (QImaging, Surrey, BC, Canada).

**Statistical analysis**

Data (mean ± s.e.m.) were analyzed using GraphPad Prism (version 5.04, GraphPad Software). One-way ANOVA with Tukey’s post-test was performed to evaluate group mean differences and to determine the effect of folate treatments on proliferation and lipid accumulation of primary human adipocytes. Differences were considered significant at P<0.05.

**Findings**

**FA had no effect on proliferation while MTHF increased proliferation in human primary preadipocytes**

As shown in Figure 2, FA at multiple concentrations had no effect on cell proliferation (Figure 2A). However, MTHF increased cell proliferation in a dose dependent manner (Figure 2B), suggesting that the reduced form of folate, but not the oxidized form, affected adipocyte proliferation in human primary preadipocytes. As expected, AraC, the negative control, arrested cell proliferation and IGF-1, the positive control, increased cell proliferation linearly over 72 hours, confirming the capability of the cells to respond to positive stimuli.

**FA tended to decrease lipid accumulation, while MTHF significantly decreased lipid accumulation in human primary mature adipocytes**

As shown in Figure 3A, FA tended to decrease lipid accumulation but the effect was not significant. However, MTHF had a larger and significant inhibitory effect on lipid accumulation, suggesting that the reduced form of folate is the more active form in adipocytes. Tumor necrosis factor alpha, our negative control, resulted in no lipid accumulation, as expected. Culture in full differentiation medium, our positive control, resulted in very high amounts of lipid accumulation, also as expected. Oil Red O staining and counter-staining with hematoxylin confirmed these results as shown in Figure 3B, allowing visualization of intracellular triglyceride in cells after treatment.

To determine whether the inhibition of folate metabolism has an adverse effect on adipocyte lipid accumulation, we tested the effect of a folate metabolism inhibitor on lipid
accumulation in human primary adipocytes. MTX was added in varying concentrations in folate containing media for 14 days of culture. Lipid accumulation and cell viability were measured as mentioned above. As shown in Figure 3C and 3D, MTX treatment in folate containing media did not alter lipid accumulation in human primary adipocytes.

Discussion

Obesity has been associated with an impaired folate metabolism, but the role of folate in human adipocyte metabolism has not been studied. Our study demonstrates, for the first time, that the reduced, biologically active form of folate inhibited human primary adipocyte lipid accumulation and increased human primary preadipocyte proliferation, whereas the oxidized form of folate did not alter lipid accumulation or proliferation in these cells. This finding is relevant to the biological condition where folic acid (FA), the chemically stable folate form used in supplements and fortified foods is reduced to be active in body (Bailey 2013, Garcia-Bennett et al., 2011). The body has mechanisms that convert FA to metabolically active tetrahydrofolate and then to MTHF that are likely not present or fully functional in the in vitro cells (Pietrzik et al., 2010). Our finding of a larger effect of MTHF in human primary preadipocytes is perhaps explained by a lack of coenzyme activity to make FA metabolically active (Pietrzik et al., 2010).

It has been reported that serum folate concentrations and body mass index/body fat percentages are inversely proportional (Mahabar et al., 2007, Anderson et al., 2013). However, currently, little is known about the mechanism by which folate affects lipid accumulation in adipocytes. To our knowledge, the only report on folate metabolism in adipocytes was performed in murine adipocytes (Marques et al., 2013). Marques et al. reported that inhibition of folate metabolism by MTX treatment lead to enhancing adipocyte differentiation in a murine cell line. However, our study is the first report using human primary adipocytes. We added two different forms of folate into folic acid-free media in order to directly measure the effect of folate on cells. Similar to the study in murine cell line, we observed that the active form of folate reduced human adipocyte lipid accumulation. The concentration which has an inhibitory effect on human adipocyte lipid accumulation was higher than the biological concentration for MTHF. However, a much higher pharmacological level of folate acid was required to see the non-significant reduction in human adipocyte lipid accumulation. This may be due to the difference of the biological activity of two forms of folate.

Folate is essential in nucleotide synthesis for DNA, and since DNA is essential for proper cell growth and proliferation, folate is in turn essential for cell proliferation (Bailey 2013). In our proliferation study, MTHF increased cell number in a dose dependent manner in this cell type. Marques et al. (2013) reported that inhibition of folate metabolism reduced the cell proliferation in murine cell line. It is possible that folate plays an active role in cell division and induces more cell proliferation in both murine and human adipocytes.

MTX is a known folate metabolism inhibitor which acts by disrupting a cascade of enzymes related to folate utilization. The disruption in DNA synthesis by MTX causes a decrease in cell proliferation, by blocking cell folate receptors. Once taken up into cells, MTX inactivates dihydrofolate reductase, which is essential in converting folic acid to dihydrofolate and tetrahydrofolate which are in turn converted into 5, 10-methylenetetrahydrofolate (Swierkot & Szechinski, 2006). Thus, we expected that MTX might eliminate the inhibitory effect of MTHF
on adipocyte lipid accumulation. However, in our study, MTX had no overall effect on lipid accumulation. This is in contrast with the study by Marques et al (2013) which found that MTX increased lipid accumulation. These differential findings may be primarily due to the difference in cell types. However, cell type difference does not explain the unexpected findings in our results. We saw the reduction in lipid accumulation by adding MTHF into folic acid-free media, but we did not observe the enhancement in lipid accumulation by adding MTX into folate-containing media in the same cell type. This difference could be caused by a variety of reasons. The media folic acid concentration we used in two experiments may not be comparable. MTX treatment was conducted in the folate containing media provided from the manufacturer which contains 6uM folic acid. At this concentration we did not observe the inhibitory effect of folic acid on lipid accumulation. The inhibitory effect on lipid accumulation was observed at higher concentration (Figure 3). Thus, adding MTX in 6uM folic acid containing media may not be appropriate to see the adverse effect because 6uM folic acid did not alter lipid accumulation. Further study using additional doses of FA and MTHF along with MTX treatment appears warranted.

Another possible cause of the lack of effect of MTX on human primary adipocyte lipid accumulation is that the MTX may be unable to bind to the folate receptors. Along with reduced folate carriers that MTX normally binds to, thus inhibiting folate metabolism, there is another carrier system which transports folates by glycosylphosphatidylinositol-anchored folate receptors. These receptors have a higher affinity for FA and MTHF than MTX in cancer cells (Parker et al., 2005, Spinella et al., 1995). Weitman et al (1992) reported the presence of glycosylphosphatidylinositol-anchored folate receptors in normal cells as well as in a malignant cell line. This suggests that it is possible for a folate receptor to still function and work around MTX inhibition, which would support our findings of no effect on human primary adipocyte lipid accumulation. Additional research is needed to determine if glycosylphosphatidylinositol-anchored folate receptors are present in human primary preadipocytes.

Considered together, our data demonstrate that biologically active form of folates inhibited lipid accumulation and enhanced proliferation in human primary adipocytes. Although the study was performed in vitro and cannot fully replicate conditions present in vivo, the findings nonetheless provide further insight into potential biological mechanisms associated with abnormal folate metabolism in obesity.

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FIGURES AND FIGURE LEGENDS

Figure 1. Treatment protocols for proliferation and differentiation in human primary preadipocytes. Depicted are the timelines of treatments for the preadipocyte proliferation (A) and differentiation (B). FA, folic acid; MTHF, 5,10-methyltetrahydrofolate.

Figure 2. Effect of folic acid (A) and 5-methyltetrahydrofolate (B) on proliferation in human primary preadipocytes. Preadipocyte proliferation was measured after 24, 48, and 72 hours of treatment with the corresponding concentration of FA or MTHF, 1 uM AraC, or 10nM IGF-1. Values are mean±s.e.m. *Different from control, P<0.05.
Figure 3. Effect of folic acid and 5-methyltetrahydrofolate on lipid accumulation in human primary adipocytes. (A) Lipid accumulation was measured on day 14 treatment with (include concentration info as from figure 2). (B) Oil Red O images were shown at X20. Effect of MTX (concentration info to explain meaning of 1MTX, etc.) on Lipid accumulation (C) and cell number (D) were measured as mentioned above. Values are mean±s.e.m. *Different from control, P<0.05.
Deep Ocean Photochemistry: Photochemical Production of Carbon Monoxide in the North Pacific

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ABSTRACT. The photochemical production of carbon monoxide in fresh seawater samples from the North Pacific was measured at discrete time points during solar simulator irradiations that lasted up to 48 hours. These samples were obtained during a three-week oceanographic cruise in August 2013, and analyzed using a gas chromatograph (SRI 8610C) for carbon monoxide (CO) concentration determinations via a headspace equilibrium method. Surface samples (~5 m depth) and deep samples (3000 to 5000 m) showed an average initial CO production rate of 1.2 ± 0.5 nM/hr and 1.1 ± 0.6 nM/hr respectively. These results indicate that the dissolved organic carbon present in the North Pacific (most of which is refractory) is not very photochemically reactive. These novel results will force a reevaluation of the role of marine photochemistry in dissolved organic carbon dynamics, particularly in conjunction with companion studies performed during the cruise by Miller et al. (in preparation).

1. Introduction

The increasing average temperature of the Earth has been linked to rising concentrations of greenhouse gases in the atmosphere such as carbon dioxide, methane, and nitrous oxide (Change, 2007). One greenhouse gas in particular that receives a lot of attention is carbon dioxide (CO2) due to the large and increasing anthropogenic input of CO2 into the atmosphere. The amount of carbon dioxide in the atmosphere is approximately equal to the amount of dissolved organic carbon (DOC) in the ocean (Hedges, 1992), and these two pools are involved in a complex, dynamic equilibrium. The DOC pool has direct effects on the atmospheric CO2 pool through oxidative pathways, such as respiration and photooxidation of DOC. If the DOC is photochemically reactive, photooxidation of this material may be a substantial source of CO2 entering the atmosphere.

Most of the oceanic DOC is refractory dissolved organic carbon (RDOC), where refractory indicates that bacteria cannot consume it quickly. RDOC is well mixed through the water column (Figure 1).

Figure 1. DOC fractions in the ocean, taken from “Production and removal processes” Carlson, C. A. (2002). Here, the RDOC is shown as well mixed through the water column. The labile and semi-labile carbon indicated in this figure represents carbon that is available for...
bacterial consumption (though the semi-labile carbon is less available than the labile carbon).

A subset of this pool is deep ocean refractory carbon (DORC), which dominates the deep, dark ocean. The DORC pool has been dated at 4000-6000 years old (Druffel, 1989; Williams, 1987), meaning that it has been circulated through the entire ocean 4-6 times. With each circulation this refractory carbon has been exposed to sunlight, yet it has survived multiple cycles. This seems to indicate that DORC is not photochemically reactive. However, contrary results were found in the deep waters of the Sargasso Sea in the North Atlantic (Mopper, 1991). There, the deep water showed increased total production rates of carbon monoxide and low molecular weight (LMW) carbonyl compounds when it was irradiated using natural sunlight for up to five hours. Using these rates and other data from the study, the residence time of this DORC was calculated using a one-dimensional steady state model (Broecker, 1982) to be 500-2100 years. These results would indicate that all of the DORC could be removed via photochemistry in approximately a single oceanic cycle. This begs the question: if DORC is circulating multiple times through the ocean (as shown by its age), can it really be photochemically reactive? This paper will shed some light on one piece of the DORC puzzle through examination of photochemical production of carbon monoxide (CO), which is an indicator of photochemical reactivity.

In order for a photochemical reaction to occur, light energy must be absorbed by the substrate. The compounds that absorb solar radiation in the ocean are termed colored dissolved organic matter, or CDOM. When CDOM absorbs photons, electrons in the ground state gain energy and occupy what is called an excited state. There are many reactions that can take place from this excited state. Typically, the energy is lost as heat through vibrational relaxations. However, there are other possible pathways for an excited electron. These pathways are pictorially described by a Jablonski diagram (Figure 2).

![Jablonski diagram adapted from “Principles of Molecular Photochemistry: an Introduction” (Turro, N. J. R., 2009). See text for explanation.](image)

As shown in Figure 2, the substrate has absorbed energy from light (1) and consequently an electron jumped from its ground state ($S_0$) to an excited state- either singlet ($S_1$) or triplet ($T_1$) depending on electronic pairing. From the singlet excited state, the electron can release energy through the emission of light known as fluorescence (2), through an internal conversion (3) which is a radiationless release of energy (no photons are emitted), or the electron can undergo an intersystem crossing from the singlet excited state to the triplet excited state (4) which is also radiationless. From the triplet excited state the electron can then release energy through the emission of light known as phosphorescence (5), or it can undergo another intersystem crossing from $T_1$ to the ground state $S_0$ (6). In addition to these photophysical and radiationless transitions among electronic states of the system, chemical reactions originating from excited states such as $S_1$ and $T_1$ can occur as shown by the yellow curved arrows. Either one of these reactions can lead to the
photoproduction of CO. One such reaction occurs when CDOM electrons are excited due to light absorbance and interact with oxygen to yield a hydroxyl radical (OH·). These radicals then catalyze the decarbonylation of organic molecules containing at least one carbonyl functional group (Kagan, 1993; Redden, 1982; Pos, 1998). However, there are mechanisms for CO photoproduction that are independent of oxygen (Gao, 1998).

The rate of photochemical production of any compound can be defined by the rate equation shown below,

$$\frac{dP}{dt} = \sum_{\lambda} E_{0,\lambda} a_{\lambda} \phi_{\lambda}$$

[1]

where \( \sum_{\lambda} \) is the spectral sum (i.e. the sum over all wavelengths, \( \lambda \)) of all components in the equation, \( E_{0,\lambda} \) is the light available, \( a_{\lambda} \) is the light absorbed, and \( \phi_{\lambda} \) is the apparent quantum yield as defined by the moles of product produced or lost divided by the moles of photons absorbed. If any of these terms is zero, there is no photochemical production.

As discussed previously, colored organic compounds can be broken down through photochemical pathways to produce CO, as well as CO\(_2\) and other low molecular weight carbon-containing compounds (Hansell, 2002). It is very difficult to measure photochemical production of CO\(_2\) directly in the open ocean because the background concentration is so high that any additional CO\(_2\) produced via photochemical reactions cannot be distinguished. On the other hand, photochemically produced CO can be measured. Therefore, a ratio relating CO to CO\(_2\) has been developed by several research groups. Simply put, this is an empirical ratio obtained by measuring both CO and CO\(_2\) quantum yields or photoproduction rates and calculating the ratio.

This CO\(_2\):CO ratio was reported by Miller and Zepp (1995) as ranging from 10-65, by Reader and Miller (2012) as ranging from 4.2-73.4 with a mean of 22.5 ± 12.5, and by White et al. (2010) as 15-20. Although it is clear that the ratio is not well defined, relating CO photoproduction to that of CO\(_2\) can still be a useful way to constrain the role of photochemistry in the global carbon budget.

The two pieces of data that are at odds, as mentioned previously, are that the age of DORC is 4000-6000 years old, and that previous experiments have shown that the entire pool can be removed in one oceanic cycle via photochemistry. The aim of this research project is to determine if photochemistry really is a plausible removal mechanism for dissolved organic carbon by analyzing the photochemical reactivity of DORC via CO photoproduction. This is just one part of a larger project involving not only the study of CO photoproduction, but also other experimental approaches to probe the photochemical reactivity of DORC. Photochemical experiments were conducted during a 3-week oceanographic cruise aboard the R/V Melville on fresh seawater samples collected from the North Pacific in August 2013. The deep North Pacific was chosen as the research area for two main reasons: (1) the seawater has not been in contact with the atmosphere since it was formed (approximately 700 years), and (2) the DORC has been almost completely isolated in the deep ocean due to removal of labile carbon by biology during the time it has been out of contact with the surface and mixed layer.

2. Experimental Methods

2.1 Sample Collection

Water from the stations indicated by a red circle along with several others was collected August 5-24, 2013 from the North Pacific (Figure 3) using Niskin bottles mounted on a CTD (Conductivity Temperature Depth)
rosette. Water samples were taken from 5 m, 1000 m, and the maximum depth (3000-5000m) at each station. Results from surface samples (5 m) and deep samples (maximum station depth) are presented in this paper.

Figure 3. Note that the study area overlaps with a well-characterized study area called Line P which corresponds to stations geographically between stations 1 and 29. Also of note is that station 29 is known as Ocean Station Papa, and began as a meteorological data collection site in 1949. Stations at which CO photochemical production experiments were conducted are indicated by a red circle.

Seawater from the Niskin bottle was gravity filtered into a 2-liter polycarbonate bottle (acid washed and conditioned with seawater) using a 0.2 μm Whatman Polycap™ 36AS filter. The 0.2 μm filter excluded any particulate matter, as well as any organisms that would otherwise contribute to the addition or degradation of carbon compounds. This water was taken either directly into the shipboard lab for experimentation, or stored at approximately 4°C in a dark refrigerator until use (stored for 1 day maximum). The polycarbonate bottles act as a cutoff filter for the UV-B wavelengths (290-320 nm) (Sunda, 2002), which includes the wavelength of maximum CO production (White, 2010). Therefore, exposure to sunlight during filtration should not affect experimental results. All glassware and plasticware were soaked in a 10% acid bath and rinsed with 18 MΩ resistance Millipore Milli-Q water. They were also conditioned with the seawater sample prior to use.

2.3 Irradiation Experiments

Filtered seawater was poured into airtight 10-cm quartz spectrophotometric cells that were previously cleaned in a 10% acid bath and rinsed with 18 MΩ resistance Milli-Q water and conditioned with the sample. The cells were then placed in an aluminum black box (Figure 4) that was temperature regulated by a Fischer Scientific® recirculating water bath at 21 ± 0.01 °C. The cells were irradiated in the box using a solar simulator (Suntest CPS, DSET Laboratories) with a Xenon lamp, and samples were removed at discrete time points ranging from 3 hours to 48 hours. The lid of the black box has holes above the position for each spectrophotometric cell so that the light goes directly in the cell. The light intensity is about three times the intensity of noontime summer sun at approximately 30° N latitude. To put this time irradiated into perspective, approximately 48 hours in the solar simulator corresponds to one week in surface ocean conditions (Miller, W. L, personal communication, 2014).
Figure 4. Irradiation experiment set up

The irradiance at each spot is slightly different, and to correct for this the irradiance was measured at each spot using an Optronic Laboratories 756 Spectroradiometer (measures solar-UV-visible ranges). Ultimately, this irradiance profile will be used to normalize the photochemical data, but this information was not used for the results presented in this paper. A cell containing seawater sample (also temperature regulated at 21°C) was kept in the dark and was analyzed at the last time point for a background CO measurement. This served as a blank for each sample.

2.4 CO Measurements

Either 10 ± 0.5 or 13 ± 0.5 mL of seawater was taken out of each cell using a glass syringe and the airspace created in the cell (headspace) was replaced with CO-free air using a column of Schutze reagent, which is an oxidizing substance that converts CO to CO₂ at room temperature. The cells were shaken manually for two minutes in order to achieve equilibrium between the seawater and the gaseous headspace. The headspace gas was then extracted with a glass syringe for analysis using a gas chromatograph (SRI 8610C) with a reduced gas analyzer. The peaks corresponding to CO were integrated using the program software PeakSimple (from SRI Instrumentation).

Standard curves were generated each time a group of samples was measured using 10 ppm ± 5% (Scott Specialty Gas) and 0.5000 ppm ± 5% (Scott Specialty Gases) CO standard tanks. A 10 mL gas sample from one of the standard gas tanks was taken and 5 mL were injected into the gas chromatograph. The remaining 5 mL were combined with 5 mL of CO free air obtained using a column of Schutze reagent. Again, 5 mL were injected into the gas chromatograph and the remaining column was combined with an equal amount of CO free air.

Schutze reagent (Leco) was used to obtain a CO free sample to include as a zero in the standard curves by passing room air through a column packed with the reagent and into a syringe that was subsequently injected into the gas chromatograph (SRI 8610c). The standard curve data and peak areas were used to calculate the concentration of CO according to Ziolkowsi (2000). This method uses the concentration measured in the headspace of the cell and back-calculates the concentration that must have been produced in order to obtain the observed equilibrium. This calculation takes into account the headspace volume and uses Henry’s law constant to adjust for salinity and temperature (Ziolkowski, 2000). The limit of detection was determined to be 0.1 ppm CO by dividing three times the standard deviation of the Schutze blank by the average slope of the linear regression, both of which were calculated using data from all standard curves performed on the cruise. To put this in terms of the headspace
equilibrium measurements, a headspace concentration of 0.1 ppm was used in the above equations to back-calculate the concentration that was in the water. This yielded a limit of detection of 4.20 nM.

3. Results & Discussion

The aim of these photochemical production experiments is to reevaluate the role of photochemistry in the removal of refractory DOC from the oceans. Based on Mopper et al. (1991), photochemistry is believed to be the major removal mechanism of DOC, capable of removing it all within the time scale of one oceanic cycle. However, the age of DORC reveals that it has circulated through the entire ocean 4-6 times, being exposed to sunlight for hundreds of years, which would indicate that photochemistry plays a limited role in DOC removal. In order to assess the relative photochemical reactivity of DORC, CO photoproduction was measured on surface (5m) and deep water (3000-5000 m) samples from the North Pacific (Figure 3).

3.1 Physical Properties and CO Production Rates

Samples from six stations, both deep and surface samples, were analyzed for photochemical production of CO during the cruise. The depth, salinity, and initial CO production rates are shown for surface samples in Table 1.

<table>
<thead>
<tr>
<th>Station</th>
<th>Depth (m)</th>
<th>Salinity</th>
<th>CO Initial Rate (nM/hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>5.0</td>
<td>32.4189</td>
<td>3.2 ± 0.4 (5)</td>
</tr>
<tr>
<td>5</td>
<td>4.8</td>
<td>32.3719</td>
<td>1.0 ± 0.6 (12)</td>
</tr>
<tr>
<td>8</td>
<td>4.0</td>
<td>32.4829</td>
<td>3.4 ± 0 (6)</td>
</tr>
<tr>
<td>17</td>
<td>5.5</td>
<td>32.5016</td>
<td>1.9 ± 0.8 (3)</td>
</tr>
<tr>
<td>24</td>
<td>5.4</td>
<td>32.4893</td>
<td>1.0 ± 0.1 (12)</td>
</tr>
<tr>
<td>29 (Papa)</td>
<td>4.8</td>
<td>32.3663</td>
<td>0.7 ± 0.08 (6)</td>
</tr>
</tbody>
</table>

Data from surface samples were taken at the stations designated in the leftmost column of the table. The initial rates were calculated using the first time point taken, which varies among the stations. The time point (in hours) that was used in the calculation is shown parenthetically. The time points shown were chosen because they were the first data points taken in each experiment.

The salinity values show variability beginning in the first decimal place, which indicates that these samples are likely from the same water mass. This small variation is expected in the surface ocean due to processes that make the surface ocean dynamic, such as evaporation, precipitation, currents, atmospheric interactions, and bacterial activity. The average initial rate of CO photoproduction in the surface samples (excluding stations 3 and 8) was 1.2 ± 0.5 nM/hr. Stations 3 and 8 were excluded from this average calculation because they show about two times higher initial rates of production at 3.2 and 3.4 nM/hr respectively. The reason for these increased initial rates is not known, but one possibility is that the CDOM absorption coefficients for these two stations are higher. The measured absorbance would affect the photochemical rate of production as seen mathematically in Equation 1. If the substance, in this case CDOM, absorbs more photons there will be more photoproduction of product, in this case carbon monoxide, assuming that all samples have the same reaction efficiency. Stations 3 and 8 are not in unique locations relative to the other stations, so any differences based on location can be ruled out. Geographically, stations 3 and 8 are not extremely similar (see Figure 2), so any spatially-derived differences from the other stations can be ruled out (i.e. the two stations are not in a unique location relative to the other stations). The depth, salinity, and initial rate of carbon monoxide photoproduction for the deep samples are shown in Table 2 below.
Table 2. Data from deep samples

<table>
<thead>
<tr>
<th>Station</th>
<th>Depth (m)</th>
<th>Salinity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Station 3</td>
<td>3618</td>
<td>34.6690</td>
</tr>
<tr>
<td>Station 5</td>
<td>4023</td>
<td>34.6818</td>
</tr>
<tr>
<td>Station 8</td>
<td>3786</td>
<td>34.6805</td>
</tr>
<tr>
<td>Station 17</td>
<td>5039</td>
<td>34.6892</td>
</tr>
<tr>
<td>Station 24</td>
<td>4454</td>
<td>34.6892</td>
</tr>
<tr>
<td>Station 29 (Papa)</td>
<td>4236</td>
<td>34.6859</td>
</tr>
</tbody>
</table>

Data from deep samples were taken at the stations designated in the leftmost column of the table. The initial rates were calculated using the first time point taken, which varies among the stations. The time point (in hours) that was used in the calculation is shown parenthetically. The time points shown were chosen because they were the first data points taken in each experiment.

Whereas the surface samples have very similar depths, Table 2 shows a depth range of 3000-5000 m. This is because the depth of the deep water samples was determined by the depth of the seafloor at that specific station. However, the depth difference among stations should not affect the experimental results because below the mixed layer (~1000 m) the water is also well-mixed. For salinity, the first variation among stations is seen in the third decimal place. However, the deep sample at station 3 varies in the second decimal place. Slight differences in salinity in the deep ocean can indicate a difference in water mass, which is defined by where the deep water was formed (i.e. sank), with each source having distinct physical properties such as salinity and temperature. Thus, as salinity is plotted against temperature (called a T-S Diagram), different water masses can be distinguished (Figure 5).

Figure 5. T-S diagram for stations at which CO photoproduction was analyzed.

The T-S diagram for all stations in this study follow the same general pattern, with the exception of station 3. Therefore, station 3 may be a different water mass, or may be partially influenced by a different water mass. Now looking back at the initial rates of CO photoproduction in Table 2, it is seen that station 3 deviates from the general trend (exhibiting an initial rate of $1.1 \pm 0.6$ nM/hr) with a rate of 3.8 nM/hr. Again, this difference could be due to an increased absorbance as discussed previously, or it could be due to influence by a different water mass, which could change the apparent quantum yield or other constituents in the water.

In these samples, the initial CO rates for deep and surface samples were generally similar (Table 1 and 2). Previously, a linear photoproduction of CO was assumed (Mopper, 1991). Following this, rates of CO production were calculated at 12 or 15 hours (depending on which time point was sampled) to better compare production rates in surface and deep samples (Table 3).

Table 3. CO production rates, calculated after 12 or 15 hour time point
The ratio shown in the rightmost column illustrates which production rate is larger: if the ratio is greater than 1 the deep sample had a higher rate of production, and if the ratio is less than 1 the surface sample had a higher rate of production.

CO production after 12 or 15 hours are within two standard deviations of each other for all stations. Generally, the deep to surface ratio is greater than 1, meaning that the deep sample had a higher rate of production. However, because the rates are within two standard deviations it should not be interpreted that the deep water samples are more reactive than the surface water samples. These results are similar to what was found by Mopper et al. (1991), although the magnitude of CO photoproduction rates were much greater than those presented here. They found that surface water samples (0-20 m) from the Sargasso Sea had a CO production rate of 18.6 ± 2.7 nM/hr, and deep water samples (500-4000 m) had a production rate of 16.1 ± 2.2 nM/hr.

The maximum CO produced in each samples is shown in Table 4. Notice that the CO in both surface and deep samples are nanomolar concentrations, which are very small in comparison to the concentration of the DOC pool, which has micromolar concentrations.

<table>
<thead>
<tr>
<th>Station</th>
<th>Surface</th>
<th>Deep</th>
<th>Deep/Surface</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1.4 ±0.5</td>
<td>2.5 ±0.9</td>
<td>1.85</td>
</tr>
<tr>
<td>5</td>
<td>0.9 ±0.6</td>
<td>1.3 ±0.9</td>
<td>1.56</td>
</tr>
<tr>
<td>8</td>
<td>1.0 ±0.1</td>
<td>0.9 ±0.2</td>
<td>0.90</td>
</tr>
<tr>
<td>17</td>
<td>1.8 ±0.2</td>
<td>1.0 ±0.4</td>
<td>0.58</td>
</tr>
<tr>
<td>24</td>
<td>0.6 ±0.2</td>
<td>0.8 ±0.1</td>
<td>1.30</td>
</tr>
<tr>
<td>29 (Papa)</td>
<td>0.6 ±0.2</td>
<td>0.6 ±0</td>
<td>1.06</td>
</tr>
</tbody>
</table>

The number in parenthesis beside the CO concentration given in nM is the time irradiated given in hours. The third column is the ratio of maximum CO produced in the deep sample to that in the surface sample at a given station. If the ratio is less than 1 the surface sample produced more CO, and if the ratio is greater than 1 the deep sample produced more CO. The fourth column is the percent difference between the surface and deep samples at a single station.

A general trend of the deep water producing more CO than the corresponding surface water emerges for almost all stations (station 3 shows the reverse trend), though most of these percent differences are less than the standard deviation for the average. However, the percent differences for station 5 and for
station 8 are 66% and 72% different respectively which is significant (greater than the standard deviation for the average).

A possible explanation of why the surface and deep water at stations 5 and 8 exhibit a high percent difference could be linked to nitrate and nitrite concentrations at the respective stations and depths. Both nitrate and nitrite have the ability to produce radicals during irradiation, and these radicals can contribute to CO photoproduction (Vaughan, 1998). Concentrations of nitrate and nitrite were measured at each station for every depth during the cruise, and the data analyzed by Hansell et al. have recently become available (Figures 6 and 7).

![Nitrate depth profile](image1)

**Figure 6.** Nitrate depth profile for stations at which CO photoproduction was studied.

![Nitrite depth profile](image2)

**Figure 7.** Nitrite depth profile for stations at which CO photoproduction was studied.

The nitrate depth profile shows that its concentration is variable in the surface for the study stations, but as depth increases the nitrate concentrations converge to about 38 μmol/kg seawater. The nitrite depth profile also shows a higher degree of variability in the surface ocean, but then the nitrite concentrations converge to less than 0.05 μmol/kg seawater at about 700 m. In order to assess the importance of nitrate and nitrite concentration on the photoproduction rate of CO, plots of production rate for both surface and deep water samples versus concentration of nitrate (Figure 8) or nitrite (Figure 9) were constructed. These plots showed no relationship between CO production rate and concentration of either nitrate or nitrite, thus this is not the cause of the difference in CO photoproduction seen among the stations.
In addition to nitrate and nitrite, trace metals can also affect photochemistry. Any trace metals in the samples can either increase CO photoproduction (Zuo, 1997) or decrease it (Pos, 1998; Gao, 1998). A certain threshold level of contamination by trace metals must be present in order for them to affect the photochemistry; thus, performing a trace metal analysis might be worthwhile, as it could potentially rule out the possibility of trace metal contamination from the research vessel in particular. Another possible cause of these differences worth mention is the composition of the organic matter. There are specific organic compounds that can yield CO through photoproduction such as compounds containing a carbonyl functional group (Kagan, 1993; Redden, 1982; Pos, 1998). Therefore, characterizing the organic matter in the different stations may explain why stations 5 and 8 higher production rates.

3.2 Time Series

The CO photoproduction data were plotted against time for samples irradiated in the solar simulator (Figures 10 and 11).

Figure 8. CO photoproduction versus nitrate concentrations.

Figure 9. CO photoproduction versus nitrite concentrations.
Figure 10. CO accumulation data for surface water samples (note that y-axes scales differ)
As can be seen in Figure 10, a general trend emerges for the surface water samples. There is an initial production of CO, then between 12 and 24 hours the production slows and the curve begins to flatten. However, the two stations (3 and 8) for which there are long term time points (approximately 48 and 45 hours respectively) show an additional increase in CO photoproduction from 24 hours to 45 or 48 hours. An explanation for this behavior has not yet been found, and more irradiations to 48 hours are planned in order to confirm this trend. It is interesting to note that these two stations 3 and 8 were also outliers in the initial production rate (Table 1).

The deep water samples (Figure 11) show the same trend as the surface water samples- a gradual flattening of the curve following initial production of CO. In the deep water samples, the production of CO approaches a constant value in less than 50 hours of irradiation for most stations. This indicates that the dissolved carbon in the deep ocean (DORC) is not very photoreactive. Similar to the surface water samples, the magnitude of CO produced is on the nanomolar scale whereas the pool of DOC in the deep samples is about 40 μM.
Figure 11. CO accumulation data deep water samples (note that y-axes scales differ)
An important component of this experiment that has not been mentioned previously is the issue of photochemical fading. As described in the introduction, the photochemical pathway to CO production begins with a CDOM matrix, which absorbs light energy from the sun and electrons are consequently excited. Reactions can then occur from these excited states to ultimately produce a carbon monoxide compound. Throughout the irradiation however, these colored compounds are being broken down and the solution is losing color, thereby decreasing the ability to absorb photons needed for photochemical reactions. As can be seen in Equation 1, a decrease in absorption will cause the photochemical rate to decrease. In order to characterize this fading, the absorbance of a given solution at each time point was measured using a 1m path length LWCC (World Precision Instruments) attached to a UV-VIS spectrophotometer (Ocean Optics). This data is not fully processed yet, but preliminary results show a 20-40% fading in absorbance at 320 nm after 48 hours. The entire UV-VIS spectrum was measured for these samples and ultimately the fading will be analyzed spectrally, but the change in absorbance at 320 nm was used to get an idea of the degree of fading because it is at that wavelength that the most CO production occurs according to the action spectrum (White, 2010). The production of CO will be adjusted to accommodate fading and the overall corrected production may in fact be more gradual than what is presented in this paper. However, the 20-40% fading observed thus far would not account completely for the slowing CO production.

### 3.3 Mathematical Model

The long-term irradiation time points in the surface water samples do not agree with the curve flattening trend observed prior to the 48 hour points (Figures 10 and 11). It is also different from the deep water samples, as those series all exhibit an initial production of CO followed by a flattening of the curve over the time irradiated. In order to explain the long-term behavior of the surface water, a two pool mathematical model was developed. This model assumes that there are two pools of carbon in the surface water arbitrarily defined as Pool A and Pool B. Pool A represents the “new” organic carbon that is photochemically labile (can be broken down quickly by photochemistry), and Pool B represents the DORC (cannot be broken down quickly by photochemistry). The premise of this model is that Pool A is used for the production of other species as well as the production of CO, and its ability to produce CO essentially stops after the first 10-15 hours, and that Pool B has a slower but more long-term CO production rate based on the shape of the CO photoproduction curve (Figure 10). The generalized reaction scheme is shown below, where \( k_{2a} \), \( k_{2b} \), are \( k_3 \) and the rate constants for their respective reactions.

\[
\begin{align*}
\text{Other Species} & \xrightarrow{k_{2a}} \text{Pool A} \\
\text{Pool A} & \xrightarrow{k_{2b}} \text{CO} \\
\text{Pool B} & \xrightarrow{k_3} \text{CO}
\end{align*}
\]
Depth (m)

analyzed by Hansell et al. (personal communication, 2014) were used (Figure 12).

![Graph showing DOC concentration depth profile](image)

**Figure 12.** DOC concentration depth profile

The total DOC concentration in the surface water is approximately 65,000 nM/kg seawater based on this figure. The initial DOC concentrations of Pool A and Pool B can be determined from this total value if it is assumed that the North Pacific water is well-mixed over the residence time of DORC (4000-6000 years) and therefore has a constant concentration in the entire water column. It is isolated in the deep ocean, so the DOC concentration between 3000-5000 m is essentially all DORC (Pool B) with a concentration of 40,000 nM/kg seawater. Subtracting that from the total surface concentration of 65,000 nM/kg seawater, the concentration of “new” carbon (Pool A) must be 25,000 nM/kg seawater. To calculate photoproduction of CO over time, the following equation (from Equations 2a, 2b, and 3) was used,

\[
\begin{align*}
[CO]_t &= \left(\frac{k_{2b}}{k_{2a} + k_{2b}}\right) [A]_0 (1 - e^{-(k_{2a} + k_{2b})t}) + \\
&\quad \left[B\right]_0 (1 - e^{-k_3 t})
\end{align*}
\]  

[4]

where [CO] is the concentration of CO at any time t, \(k_{2a}\) is the rate constant corresponding to reaction [2a], \(k_{2b}\) is the rate constant corresponding to reaction [2b], \(k_3\) is the rate constant corresponding to reaction [3], \([A]_0\) is the initial DOC concentration of Pool A, \([B]_0\) is the initial DOC (equivalent to DORC at this depth) concentration of Pool B, and t is time in hours. This equation was then entered into the Matlab Curve Fitting Toolbox, modeled using the surface stations experimental data, and the rate constants \(k_{2a}\), \(k_{2b}\), and \(k_3\) were calculated.

![Graph showing modeled equation for surface samples](image)

**Figure 13.** Modeled equation for surface samples

The modeled fit (Figure 13) had an R² value of 0.80, and rate constants \(k_{2a} = 1.8 \text{ hr}^{-1}\), \(k_{2b} = 2.6 \times 10^{-4} \text{ hr}^{-1}\) and \(k_3 = 2.0 \times 10^{-5} \text{ hr}^{-1}\). From these values, it is clear that reaction 2a is much faster than reactions 2b and 3. In fact, \(k_{2a}\) is approximately four orders of magnitude greater than \(k_{2b}\) and approximately five orders of magnitude greater than \(k_3\). This means that the photoreaction of Pool A going to CO and Pool B going to CO are much slower than the photoreaction of Pool A going to species other than CO. Furthermore, the photoreaction of Pool A going to CO has a rate constant approximately one order of magnitude greater than that of Pool B going to CO. These results
are consistent with the idea that Pool A is used up quickly and that Pool B produces CO more slowly.

In order to check these rate constants, the CO photoproduction data from deep water samples can be utilized. Since a fundamental assumption of this model is that the deep water (3000-5000 m) is all DORC, the rate constant $k_3$ for reaction 3 should fit the CO time series data produced by the deep water samples. However, when the Pool B portion of the equation (shown below as equation 5) is compared to the deep water samples the modeled line and the actual data do not match up (Figure 14).

$$[CO]_t = [B]_0 (1 - e^{-k_3 t})$$

[5]

Figure 14. Deep water CO accumulation with modeled accumulation shown as dashed line.

The predicted CO photoproduction (red dashed line) is slower than what the experimental data (solid black line) demonstrates. The equation for the trend line of the experimental data has an $R^2$ value of 0.82. To improve the kinetic model, the rate predicted by the trend line of the experimental data (1.23 hr$^{-1}$) can be used as the value for $k_3$, again due to the fundamental assumption that all the dissolved organic carbon in the deep water is DORC and thus corresponds to Pool B. In this revamped model, the rate constants $k_{2a}$ and $k_{2b}$ are the only values to be solved for. However, the model yielded a negative value for $k_{3b}$, which is clearly impossible. As a possible remedy for this situation, Equation 4 was modified to include a process from Pool B (similar to that of Pool A) that does not lead to CO production. This modified equation is shown below along with the corresponding reactions,

\[
[CO] = \frac{\left[\frac{k_{2a}}{k_{2a} + k_{2b}}\right] A (1 - e^{-(k_{2a} + k_{2b})t}) + \left[\frac{k_{3a}}{k_{3a} + k_{3b}}\right] B (1 - e^{-(k_{3a} + k_{3b})t})}{1 + \frac{k_{2a}}{k_{2a} + k_{2b}} + \frac{k_{3a}}{k_{3a} + k_{3b}}} [6]
\]

where the variables are defined as they were in Equation 4, and $k_{3a}$ is the rate constant that accounts for Pool B producing compounds other...
than CO. This equation was then entered into the Matlab Curve Fitting Toolbox.

Figure 15. Modeled fit for surface water samples using Equation 6.

The R² for this fit was 0.34, and the rate constants were as follows, \( k_{2a} = 2.0 \times 10^2 \text{ hr}^{-1} \), \( k_{2b} = 2.3 \times 10^{-4} \text{ hr}^{-1} \), \( k_{3a} = 4.2 \times 10^{-4} \text{ hr}^{-1} \), and \( k_{3b} = 0.99 \text{ hr}^{-1} \) (Figure 15). Comparing these rate constants to those from the model fit to Equation 4, it is seen that \( k_{2a} \) is approximately three orders of magnitude larger in the new modeled fit. The \( k_{3b} \) value is slightly smaller in the new fit, but the values are comparable. The newly fit rate constant \( k_{3b} \) is larger than the previous model by approximately one order of magnitude. Now comparing the new rate constants to each other, an interesting pattern emerges. The two rate constants for the production of species other than CO (\( k_{2a} \) and \( k_{3a} \)) are larger than the rate constants for the production of CO (\( k_{2b} \) and \( k_{3b} \)). Also, the photoproduction of CO by Pool B is faster than that of Pool A, which is the opposite of what the previous three equation models showed. However, the model results shown in Figure 12 are not a good fit for the surface water data based on the R² value and the fact that the model indicates an infinite [CO] at time zero which is impossible. This means that something may be incorrect with the following assumptions: photochemical fading needs to be taken into account before fitting the model to the experimental data, there is something happening in the solution that affects the CO chemistry and is not accounted for in these equations, or that the initial concentrations for Pool A and Pool B are incorrect. The last assumption regarding the initial concentrations is mostly likely to be incorrect. The initial concentrations of the two pools are incorrect due to the relationship among DOC, CDOM, and FDOM (fluorescence dissolved organic matter) as shown below.

Figure 16. Relationship among DOC, CDOM, and FDOM

This figure illustrates that all DOC is not CDOM, and therefore all DOC does not absorb light and therefore does not participate in photochemistry. The initial concentrations used for Pool A and Pool B were DOC concentrations, meaning that only a subset of these compounds will participate in photochemical reactions. In order to correct for this, the portion of DOC that is CDOM would have to be determined and the initial concentrations used in Equation 6 should correspond more accurately to CDOM, which are the compounds that will participate in photochemistry. Furthermore, the fact that the model did not work when it was assumed that
all DOC is photochemically available indicates not only that the entire DOC pool is not photochemically active, but also that the DOC pool cannot be used in calculations predicting the concentrations of compounds evolved from photochemical reactions, such as CO and CO$_2$.

4. Conclusion

The data presented in this paper is a small portion of a large project that is assessing the role of marine photochemistry in the removal of DOC from the ocean. Currently, the accepted belief is that photochemistry is the major DOC removal mechanism, capable of removing it in one oceanic cycle (~1000 years). However, the age of the material (4000-6000 years) indicates that it has circulated the global ocean 4-6 times without being removed by photochemistry. These two are in conflict. The CO photoproduction data sheds some light on the photoreactivity of the CDOM portion of DOC, where other studies from the large project analyze the DOC and the FDOM fraction.

The data obtained aboard the R/V *Melville* shows a general trend of an initial CO production that then falls almost to zero (as evident by the horizontal line at longer times). The effects on photochemistry of trace metals and organic matter composition must be explored to elucidate differences among the stations. The data presented here, in conjunction with other experiments performed during the 2013 cruise, and future experiments in the Miller laboratory with stored North Pacific water will be used to attain a big picture of the role of photochemistry in global carbon cycling. From the CO data analyzed to date and presented here, it appears that DORC is not very photochemically reactive, with an average initial rate of CO production of 1.1 ± 0.6 nM/hr of irradiation, which is substantially different from the previously report value of 16.1 ± 2.2 nM/hr (Mopper, 1991). In this study, the surface water sample rates were similar to those from the deep water samples. The conclusion from the CO data presented in this paper is that the dissolved organic refractory carbon is not very photochemically reactive. In light of these results, photochemistry is not likely the mechanism through which the majority of dissolved organic carbon is removed from the oceans.

REFERENCES


Clearing natural forest lowers decomposition rates and results in less diverse macrofauna and mesofauna communities

Allison Koch and Scott Connelly, Ph.D., Ecology

ABSTRACT. Global climate change and increasing demands on world resources continue to lead to concomitant transformations of land use and the widespread loss of biodiversity. These global factors may be threatening local ecosystem functions—the various ways in which biotic and abiotic components interact to maintain the health of the system. This study explored the effects of anthropogenic change on the essential process of decomposition. Mesh leaf litter bags were placed at two sites near San Luis, Costa Rica: in natural forest and in an area that had been converted to pasture. Some mesh bags were filled with homogenous leaf clusters, which contained the plant taxa Cecropia, Rubiaceae, or Solanaceae. Others were categorized as heterogeneous and contained all three plant taxa mixed. This was done to simulate diversity loss. Bags were collected at four intervals over 37 days, re-weighed, and emptied of decomposers—the macrofauna and mesofauna community—for further analysis. Leaves in the forest decomposed faster than their counterparts in the open pasture, and on all collection days, leaves placed in the forest hosted a more diverse fauna community than leaves placed in the pasture. Heterogeneous leaf groups did not show significantly greater levels of fauna diversity than homogenous leaf groups, suggesting that biodiversity loss may not affect decomposition. Clearing the natural forest, however, does impact ecosystem function by leading to slower decomposition rates and less diverse macrofauna and mesofauna communities.

INTRODUCTION

The Food and Agriculture Organization of the United States (FAO) projects that from 2005 to 2050 the expanding population will cause world food demand to increase by 70% (FAO 2009). Even since 1950, the global population has nearly tripled (FAO 2012). Drawing on past and continuing support of such trends, Thomas Malthus (1798) and Paul Ehrlich (1968) elucidated concerns about the relationship between rising population and Earth’s food supply. Despite growing confidence that the planet will be able to produce enough food, “The Race for What’s Left” (Klare 2012) continues and lingering questions of food scarcity engender concerns surrounding land use. A surge in food demand beginning in the 1950s has already led to great transformations. Latin American countries in particular have experienced significant changes in the past half-century as forest was converted to serve agricultural purposes. Costa Rica has felt these affects most noticeably.

Costa Rica’s rate of deforestation during the latter half of the 20th century was Central America’s highest, as the country lost nearly 42% of its forests (Harrison 1990; Butler 2011). Agriculture is the principal force behind tropical forest destruction (Baker 2011, Butler 2011, Harrison 1990), and overwhelmingly, it is the expansion of cattle as an agricultural commodity that most directly led to massive post-1950 deforestation in Costa Rica. Indeed, pasture is “the only single type of land use with a significant negative association to forest cover” (Harrison 1990). Bananas and coffee have led to deforestation, but their effects are not nearly as great as the damage done by conversion of forest to pasture. Bananas and coffee together account for less than 1/20 of the land that is
devoted to cattle ranching (Baker 2011). For a country that was 99% covered with forest in pre-colonial times, the increase in deforestation has been devastating. Forest coverage declined from 85% in 1940 to only 35% in the late 1980s (Butler 2011), and pasture had amounted to one-third of Costa Rica’s total land area by the 1990s (Harrison 1990).

For this reason, Costa Rica is an ideal location to study effects of lost forest cover on ecosystem function. Ecosystem function was brought to the forefront of conservation dialogue with the works of Paul Ehrlich. Ehrlich conceptualized the forest as valuable for the services that it performs—such as regulating atmospheric gases, continuing the water cycle, and recycling nutrients in the soil (Ehrlich and Mooney 1983; Ehrlich and Ehrlich 1992). Valuation of ecosystem services continues to provide a framework for investment efforts in conservation.

Central to tropical forest ecosystem function is the recycling of nutrients through decomposition. Leaf litter constitutes a major source of nutrients in often nutrient-poor Neotropical ecosystems. As leaves are broken down by terrestrial fauna, fungi, and bacteria, nutrients are released into the soil where they become available to plants. Plants constitute a vast proportion of the biomass in tropical ecosystems, indicating the importance of continuous decomposition. Furthermore, the decomposer community is critical to this process. This research collected mesofauna and macrofauna (small and microscopic ground-dwelling organisms) from decomposing leaf pats in standardized mesh bags. The abundance (the number of individuals) and richness (the number of taxa represented by those individuals) were of particular interest.

The goal of this study was to investigate how decomposition may be affected by the overarching environmental concerns of globalization, climate change, and biodiversity loss. As outlined above, the increase of food demand in the global marketplace has incentivized land use changes in marginalized areas. Forested lands are being replaced by pastures, which allow more sun, heat, and air movement into the ecosystem. Coupled with climate change, this could significantly affect decomposition. Leaves decompose at slower rates when exposed to either excessively low or high moisture levels. This is because critical bacteria and fungi die in dehydrated soils, and in oversaturated soils, anaerobic conditions inhibit decomposition (Moorhead et al. 1999). Conversely, higher temperatures also associated with climate change encourage faster decomposition rates (Karhu 2010) and may therefore not adversely affect the nutrient cycle. More studies are needed to evaluate the impacts of land use and climate change, and few have focused on tropical forest regions. This research attempts to fill this void. By comparing decomposition processes in pasture and forest sites, this study explored how anthropogenic transformation to an open system affects one ecosystem service.

Biodiversity loss is another side effect of deforestation and climate change. In an environment with reduced diversity levels, fewer kinds of leaves will fall to the forest floor and fewer species of decomposers will be present to convert those leaves into reusable nutrients. Removing variety in the forest may alter its function. Plant families, for instance, have distinctive chemical profiles. Nitrogen (N) content, lignin content, and the carbon to nitrogen (C:N) ratio are notable factors that impact decomposition patterns (Moorhead et al. 1999). These substrates vary considerably between taxa, and studies have shown that there is resulting variance in decomposition rates (Cornelissen 1996; Adams and Angradi 1996). Leaves from three taxa were selected for this
study: *Cecropia* (family Urticaceae), Solanaceae, and Rubiaceae. This research introduces homogenization of flora as a variable for study; mixed leaf groups were compared with same-leaf groups.

This study explores decomposition rates and decomposer communities among leaf groups in natural forest and open pasture sites. It was hypothesized that 1) homogenous leaf groups host a less diverse decomposer community and therefore decompose at slower rates than mixed leaf groups; 2) leaf groups decompose slower in pasture; and 3) macrofauna and mesofauna abundance and diversity also decline in cleared areas.

**METHODS**

**Study Site**

This research was conducted on and near the University of Georgia Costa Rica campus in San Luis, Costa Rica (Figure 1). The campus is situated in pre-montane cloud forest of the Monteverde province. The forest site is characterized by disturbed old-growth forest and secondary forest. The pasture site is located on a steep, southwest-facing slope and was not grazed by cattle at any point during the study period. No trees shaded the grass field. Experiments were conducted in the rainy season from September to October.

**Experimental Methods**

Freshly fallen leaves were collected from trees in the Rubiaceae, Solanaceae, and Urticaceae (*Cecropia*) families. Leaves were spread on frames in a dry box and dried for 72 hours. To determine preliminary leaf mass, each of 96 mesh decomposition bags was weighed before and after being filled with leaves. A numbered metal tag was placed in each bag to serve as an identifier. 72 bags were homogenous (leaves from each family filled 24 bags), and 24 bags were mixed (contained leaves from all three families). 48 bags (12 of each category: Rubiaceae, Solanaceae, *Cecropia*, and mixed) were randomly placed along a trail within natural forest, and 48 bags were randomly scattered in the cleared pasture (Figure 2).

Bags were left to decompose and were collected at four intervals (days 8, 16, 25, and 37) within the study period. Three bags of each category were randomly selected for each collection. Decomposition bags were immediately enclosed in a garbage bag. Both bags were hung on a clothesline, allowing any terrestrial fauna to fall from the mesh decomposition bags into their respective garbage bags. Macrofauna and mesofauna were identified to order using a microscope. Decomposition bags were placed in a dry box for 72 hours and weighed to determine leaf mass lost.

**Statistical Methods**

The Shannon-Weiner index was used to compare the diversity of macrofauna and mesofauna communities. A regression analysis tested the effect of time on fauna abundance and diversity.

**RESULTS**

Leaf mass as a percentage of original weight declined over time (Figure 3) in all types of leaves in the open pasture and in the forest. Overall, leaves decomposed faster under forest cover than their counterparts in the open. Considering both forested and cleared areas, *Cecropia* leaves lost the least amount of biomass, followed by mixed leaf bags, Rubiaceae leaves, and then Solanaceae leaves. Rubiaceae leaves in the open and Solanaceae leaves in the forest had completely decomposed by the end of the experience.

19 orders of terrestrial fauna were identified. Six of these taxa, however, were represented by four or fewer specimens; only 13 orders were thus used in the analysis. The four largest groups that were represented were mites (1,894), Amphipoda (1,839), Collembola (919), and Hymenoptera (893).
Means were computed for the abundance and richness of fauna in each bag at each site and during each collection period. Abundance between forest and open areas was highly variable (Figure 4), but overall, R² regression analysis showed that abundance declined logarithmically over time from an average of 98 specimens per bag to 35 specimens per bag. Fauna order richness was also extremely variable (Figure 5), and R² regression analysis showed no significant change. Nevertheless, the forest site had a greater diversity of decomposers in most leaf groups; Rubiaceae leaves exemplify this trend. Regression analysis revealed no significant correlation between time and richness.

Within the forest, *Cecropia* and Rubiaceae leaves hosted the most diverse macrofauna and mesofauna communities; their respective indices peaked at 25 and 16 days (Figure 6). On the final collection day, levels of diversity in both of these groups had dropped below Solanaceae and mixed-leaf groups. In the open, all leaf groups except Solanaceae reached high levels of diversity by the first collection day (Figure 7). Levels then remained the same for the remainder of the experiment. On the final collection day, however, diversity among Solanaceae leaves was much higher (diversity index 1.688; this group did not exhibit the plateau pattern). Rubiaceae leaves completely decomposed and had a diversity index of 0 by day 37. Removing time as a variable, Solanaceae leaves hosted the most diverse decomposer communities of all the leaf groups in the forest, but the least diverse group in the open (Figure 8). Rubiaceae leaves also hosted more diverse communities in the forest. *Cecropia* and mixed-leaf bags, however, both showed higher diversity values in the open. When study site is also removed as a variable, Solanaceae leaves exhibited the lowest levels of diversity and *Cecropia* leaves presented the highest levels (Figure 9). When all leaf data were compiled, the forest site had higher diversity levels at all collection periods (Figure 10); diversity peaked at 25 days (diversity index 1.61). Decomposer diversity in the cleared pasture reached its peak earlier (diversity index 1.33 at day 16) and increased only minimally to the end of the experiment.

When both time and study site were removed as variables, homogenous leaf groups had slightly higher diversity figures than heterogeneous leaf groups, with respective diversity indices of 1.74 and 1.64 (Figure 11); this was not statistically significant (P> .05).

**CONCLUSIONS AND DISCUSSION**

Leaf mass declined over time as decomposition occurred. These rates varied among plant families, as was exhibited by the relatively incomplete physical decomposition of the *Cecropia* leaves and nearly complete decomposition of Solanaceae leaves. Nitrogen content, lignin content, and C:N ratios were mentioned above as possible controls on decomposition rates. These factors could explain the trends seen here. *Cecropia* leaves have a very high C:N ratio of 35.6, a lignin:N ratio of 26.7, and a lignin content of 24.9% (Gonzalez. and Seastedt 2000; Keller et al. 1958). Materials higher in N will decompose faster (Michaels 2013), so perhaps N levels in Solanaceae leaves are significantly higher than in *Cecropia* leaves. One study showed that a plant in the Solanaceae family colonized soils with low C:N ratios (McDonald et al. 2008), indicating the possibility that Solanaceae leaves likewise have low C:N ratios. More research needs to be done to determine if C:N ratios are significantly different between *Cecropia* and Solanaceae leaves to cause the differences in decomposition rates shown in this research.

Mites, Amphipoda, Collembola, and Hymenoptera were well represented in this study, but their numbers skewed toward one
ecological niche. While there was no decline in richness over time, Amphipoda and Hymenoptera had a larger presence overall in the forest, and mites and Collembola were more numerous in the pasture. These populations may be environmental indicators of forest disturbance, and this merits further research. [For information on these taxa, see Illig (2007); Fasulo (2011); Bellinger et al. (2013); McGlynn and Poirson (2012).]

Macrofauna and mesofauna abundance declined logarithmically over the course of study. With a decreasing amount of biomass available, leaf pats are increasingly strained to support higher levels of fauna activity. Leaves in the forest nonetheless hosted more diverse decomposer communities than leaves in the open, suggesting that decomposers do favor a forest environment. This is consistent with the finding that decomposition rates were lower in pasture. Whether the decomposer preference for forest can be traced to shade, moisture, habitat diversity, or predator dynamics was not explored in this study.

The findings of this study have significant implications for higher trophic levels. Amphibians who dwell in leaf litter, for instance, are one such concern. Amphibians are one of the most threatened populations worldwide, and many cases of decline, particularly in Central America, have occurred in areas that are largely protected from direct anthropogenic forces (Whitfield et al. 2007). Previous research has attributed these “enigmatic” amphibian declines to chytridiomycosis—a disease affecting temperate regions and the montane tropics (Lips et al. 2006). However, a long-term study by Whitfield et al. (2007) from La Selva Biological Station also found widespread amphibian decline, in lowland Costa Rica. This region is protected and dominated by old-growth forests, but since 1970, amphibians that dwell in the leaf litter have declined by 75% (Whitfield et al. 2007). According to the study, recent climate shifts have impacted the rates of litterfall and decomposition so significantly that standing litter mass has been reduced (Whitfield et al. 2007). The amphibians that depend on a certain depth of leaf litter are thus suffering the localized consequences of global climate change. As amphibians depend on the macrofauna and mesofauna communities, higher trophic levels depend on amphibians. The complex food webs that characterize an ecosystem could be profoundly disrupted by minor changes in ecosystem functions like decomposition.

Comparison of heterogeneous and homogenous leaf groups showed no statistically significant difference on decomposition function, suggesting that diversity loss may not negatively impact decomposition. Future research should investigate this claim, as its ramifications are huge. Biodiversity is highly valued for many reasons. Ecotourism, for instance, is an increasingly important part of Costa Rica's economy. The country depends on “selling” its biodiversity to the international community, and they pride themselves on the fact that, by 2011, 51.0% of Costa Rica was forested (Butler 2011). Coffee agroforestry, cocoa agroforestry, silvopastoral systems, diverse polycultures, organic farming, and swidden agriculture are being explored as profitable alternatives to cattle ranching and the accompanied deforestation that was discussed above.

Deforestation is inseparable from climate change, biodiversity loss, and rising consumerism. These are critical trends affecting our current and future environment. Drawing from such global themes, this study near San Luis, Costa Rica found that clearing the natural forest negatively impacts ecosystem function, lowering decomposition rates and resulting in less diverse decomposer communities. More
studies are necessary to examine how global concerns affect tropical forest ecosystem processes in particular, as well as the people who depend on them.

**ACKNOWLEDGEMENTS**

The author thanks Scott Connelly for advising through experimental design; Mark Fisher for aiding in identifications; J.P. Schmidt for editing feedback; and the UGA Costa Rica campus, for the facilities, materials, and property on which this experiment was conducted.

**Figure 1.**
Satellite image of the UGA Costa Rica Campus in Monteverde, Costa Rica. Circled in red are the forest and pasture sites in which the research was conducted. (Courtesy of Google Maps).

<table>
<thead>
<tr>
<th>Leaf Composition Categories</th>
<th>Study Site</th>
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<tr>
<td>Heterogeneous</td>
<td>Mixed <em>Cecropia</em>, Rubiaceae, and Solanaceae</td>
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<td></td>
<td>Pasture</td>
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Figure 3. Leaf decomposition over time. At each collection day (days 8, 16, 25, and 37), three bags of each type were removed from both the forest and cleared area. Decreases in mass (g) were computed as a percentage of the originals. Means are plotted above. In nearly all cases, leaves placed in the forest decomposed at a faster rate than their open-area counterparts. Looking at the change in Mixed Open between days 8 and 16, and the similar change in Cecropia Forest between collection days 16 and 25, however, we see that leaf mass as a percentage of original weight increased. This is due to random selection: those that were collected earlier happened to randomly decompose faster on average than other bags in their group. In general, Cecropia leaves lost the least amount of biomass, followed by mixed leaf bags, Rubiaceae leaves, and then Solanaceae leaves.
Figure 4. Abundance of mesofauna and macrofauna identified within the decomposition bags collected after 8, 16, 25, and 37 days of exposure in forested and cleared environments.

Figure 5. Richness as measured by mean number of mesofauna and macrofauna orders represented in the decomposition bags. Decomposition bags in the forest generally had a wider variety of ground-dwellers. Rubiaceae leaves exhibited the greatest difference in richness levels between cleared and forest sites.
Figure 6. Diversity of macrofauna and mesofauna over time among decomposition bags placed within the forest, as measured by the Shannon-Weiner diversity index. Diversity within the decomposer communities in *Cecropia* and Rubiaceae peaked after the second collection. Solanaceae and mixed-leaf bags hosted increasingly diverse communities up to the last collection on day 37.

Figure 7. Diversity of macrofauna and mesofauna over time among decomposition bags placed in the open field, as measured by the Shannon-Weiner diversity index. Rubiaceae leaves received an index of zero for the lack of leaves and fauna in the final collected bags. Despite this, diversity indices in Rubiaceae, *Cecropia*, and mixed leaf groups all increased quickly and then leveled. Solanaceae indices continued to increase up to final collection.
Figure 8. Diversity of the four leaf groups in each study site, with time removed as a variable. Decomposition bags filled with Solanaceae leaves were most diverse in the forest, but least diverse in the cleared site.

Figure 9. Diversity indices for mesofauna and macrofauna communities found within the four types of decomposition bags. Both time and study site were removed as variables. Overall, *Cecropia* leaves hosted the most diverse communities and Solanaceae leaves hosted the least diverse communities.
Figure 10. Diversity of macrofauna and mesofauna between forested and cleared sites, as measured by the Shannon-Weiner index. At all collection days, decomposition bags in the forested area attracted a greater diversity of decomposers than bags in the open area. Additionally, diversity peaked (in the forest) or level out (in the open) by the third collection period.

Figure 11. Difference in diversity between homogenous leaf pats and the heterogenous decomposition bags. Homogenous leaf groups host a more diverse macrofauna and mesofauna community, although the difference is negligibly small.
REFERENCES


Who Saved Thad Cochran?: Racial Politics and Voter Mobilization in a Deep South Runoff

Zachary S. Jones and Charles S. Bullock III, Ph.D., Political Science

ABSTRACT. The June 3, 2014 Mississippi Republican Senate Primary saw State Senator Chris McDaniel defeat 40-year incumbent Senator Thad Cochran with 49.5% of the vote to Cochran’s 49.0%. Because neither candidate received a majority, the two were forced into a runoff election three weeks later on June 24. Defying expectations, Cochran defeated the Tea Party-backed McDaniel to secure the Republican nomination. Many claimed that Cochran’s unlikely victory was the result of his campaign’s appeals to traditionally Democratic African-American voters to “cross over” and vote for Cochran in the Republican runoff. This research investigates those claims, as well as the potential impact of African-American voters on the outcome of the runoff election. Simple linear regression and Pearson-R correlation statistics suggest the possibility of African-American influence on the runoff. A closer analysis using ecological inference provides conclusive evidence that black voters in Hinds County were essential to Cochran’s victory. This research also draws upon relevant literature, news articles, and historical data to provide perspective on runoff elections, turnout, and racial voting patterns in the Deep South.

Introduction

On June 24, 2014, incumbent Mississippi Senator Thad Cochran secured the Republican nomination for Senator in a come-from-behind victory against State Senator Chris McDaniel. Seventy-six-year-old Senator Cochran was by no means a stranger to electoral success. As the first Republican to be elected statewide in Mississippi since Reconstruction, he never won re-election with less than sixty percent of the popular vote after first assuming office in 1978. However, Cochran’s electoral prospects seemed to be dimming in 2014, as the aging Senator finished behind his Tea Party-backed challenger in the state’s June 2nd primary election. Many assumed that low voter turnout typically associated with primary runoff elections would virtually ensure Cochran’s defeat at the hands of a concentrated, mobilized, and extremely conservative electorate (Harrison 2014).

On June 24th, those assumptions proved wrong. Turnout across the state was up an unheard of twenty-one percent—over 60,000 ballots cast—as Cochran defeated McDaniel with over two percent of the vote. Media groups and political pundits offered explanations for the increase in turnout and Cochran’s ability to secure this larger electorate. After the primary, Mississippi newspapers spoke of Cochran’s campaign reaching out to overwhelmingly-black Democratic voters to “cross over” and support Cochran in the runoff (Pender et. al 2014). Senator McDaniel was quick to criticize Cochran’s unorthodox campaign strategy, stating in his first speech after the election that “there is something a bit unusual about a Republican primary that’s decided by liberal Democrats” (Pender 2014).

Political scientists have often dealt with questions of turnout and voter trends in runoff elections (see Wright 1989; Bullock and Johnson 1992; Bullock et al., 2002). However, little research has examined the phenomenon of crossover voting in primary runoff elections. The 2014 Senate race in Mississippi has drawn considerable attention to this practice. This research will look for evidence of crossover voting by black voters in the runoff, and examine to what extent their participation impacted the elections outcome. Cochran’s victory also raises numerous questions about
cross-party appeals in primary runoffs, racial politics and voter mobilization, and the political influence of African-Americans in Republican-dominated Southern states—all of which will be explored in this paper.

**Review of Relevant Literature**

Eleven states, the vast majority of which are in the South, currently have provisions for runoff elections (“Primary Runoffs”). The primary runoff system in the South was originally a means to ensure Democratic dominance in the era of one-party politics. As M.V. Hood (2014) explains, the majority vote requirement kept extreme Democratic candidates from securing the nomination with just a plurality of the vote. Much of the research regarding Southern primary runoffs has focused on turnout. Stephen Wright's 1989 analysis of Democratic gubernatorial, senatorial, and congressional runoffs from 1956 to 1984 finds that seventy-seven percent of those elections had lower turnout than the primary. He finds that in all states with runoffs, excluding Louisiana, turnout was likely to decline by an average of twelve percent (Wright 1989). As he explains, voter ambivalence, restricted choices, and the loss of attractive races keep voters from the polls in runoff elections. If primaries in the state are open (as they are in Mississippi), voters are even less likely to turnout for primary runoffs. A more recent analysis of 109 runoff elections in another saw voter turnout decrease in all but 4 cases (Bullock, et. al 2002).

Wright’s study, which was conducted when the South had yet to fully transition from single-party dominance to two-party competition, presents an interesting parallel to today’s Republican dominance in Southern states. He finds that states controlled by the Democratic Party were “more likely to display higher runoff turnout as a percentage of first-ballot turnout;” high inter-party competition was associated with drops in turnout between the primary and runoff (Wright 1989). This can be attributed to the fact that single-party dominance gives the primary elections of the dominant party a higher degree of importance. As V.O. Key (1949) described the “Solid South,” whoever won the Democratic primary was virtually guaranteed to win the general election. The more competitive the opposing party in the general election, the less likely (at least in the eyes of the average voter) the general election winner would be decided in a given party’s primary.

Recent evidence points to Mississippi senatorial races as less than competitive. The state elected its first Republican Senator in 1978 and has not had a Democratic Senator in 25 years. When opposed by a Democratic candidate in the general election, Cochran had won by an average of 34 percentage points. Wright’s hypothesis suggests that the recent dominance of the Republican Party in Mississippi senatorial races would lead to a smaller drop-off in turnout between elections. Bullock, Gaddie, and Ferrington (2002) describe a similar logic: determinative elections are more likely to attract voters than those that only narrow the candidates. Thus, if black voters in Mississippi saw the Republican runoff as determinative of who would represent them in the Senate, it would be reasonable for them to cross over and participate.

The available literature on crossover voting in United States primaries is brief, and political scientists have a difficult time even defining the practice. For the purposes of our investigation, we use the definition described by Alvarez and Nagler (1999), which generally excludes independent voters, and refers to identifiers of one party voting in the primary of the opposing party—for example, self-identifying Democrats voting in the Republican primary. Other research (Wekkin 1988) categorizes independent voters who “lean” one
way or another as partisan for purposes of defining crossover voting. In the absence of voter surveys (as our research uses aggregate turnout data), this distinction is mostly irrelevant. Instead, it merely provides us with a workable definition for the phenomenon we are looking for in Mississippi.

Most previous investigations into crossover voting utilized surveys to hunt for crossover voters, and framed their analysis in terms of strategic voting behavior. Obviously, these investigations are prone to self-reporting bias, but are noteworthy in that they find consistently low levels of crossover voting behavior in primaries (see Adamany [1976], Hedlund and Watts [1986] and Wekkin [1988] for investigations of crossover voting in Wisconsin primaries). In terms of strategic voting, a crossover voter might know that their preferred candidate has no chance at winning the general election. Thus, they could cast their vote for another candidate who has a better shot at winning the general election—so-called “positive strategic” voting (Alvarez and Nagler [1999], Southwell [1981]).

Alvarez and Nagler (1999) analyze presidential preference primaries and other primary elections for evidence of crossovers and strategic voting. Using survey results for presidential preference primaries from 1980-1996 and King’s ecological inference methods for aggregate county data in Washington and Ohio primaries, they find low levels of crossover voting in general and primary elections (around 12% in both directions), and very few instances of strategic voting. In fact, they find survey data from the 1992 presidential preference primary in Mississippi that shows 6.9% of those surveyed in the Republican primary were self-identifying Democrats, as well as 7.8% Republicans in the Democratic primary. Unfortunately, the age of the data and lack of accounting for race prevents us from drawing any conclusions about black voter behavior.

In a Deep South state with a racial history like Mississippi, a number of external pressures and considerations are in play when black voters go to the polls—often at the expense of strategic voting. If an election’s status as determinative was the only consideration motivating black voter behavior, we might expect to see black voters participating in red state Republican primaries much more frequently than they do. However, black voters remain mostly invisible in Republican politics; in the 2012 Mississippi Republican primary, only two percent of black citizens participated (Parker and Martin 2014). Instead, African-Americans continue to be the most faithful supporters of the Democratic Party. As Wielhouwer (2000) explains, black voting blocs in the South are an extremely powerful and cohesive political force. The ability of parties to mobilize this constituency is crucial, especially in close elections or cities, where black turnout can be decisive. This is an especially important in Mississippi, where the electorate is 37% black.

Historically, the Democratic Party has overwhelmed its Republican counterpart in mobilizing the black vote. A reason for this success has been the party’s ability to tap into established channels of influence in the black community, particularly church groups and civic organizations that lower the cost of voting by providing information, transportation, and a sense of solidarity and purpose. Wielhouwer finds that Democratic canvassing patterns suggest a refined ability to utilize community and religious leaders to turn out the black vote. Democrats have been extremely successful targeting these black “subgroups,” whereas Republicans have shown little strategy in doing so (Wielhouwer 2000). If Republicans were able to establish inroads with black communities
in Mississippi in 2014, we might be able to explain how so many black voters got the message to vote for Thad Cochran. However, our research must first clearly establish that black voters did in fact cross over on June 24th.

**Method and Material**

Election data was available through the Mississippi Secretary of State’s website, with vote totals for each candidate in the primary and runoff, organized by county and precinct. The researcher also collected county data for the 2012 presidential election, specifically Democratic vote share, to provide comparisons to the 2014 primary and runoff data. Unlike some other Southern states, Mississippi does not include voter demographics in its election statistics, so racial demographic data was obtained via a court-ordered congressional plan summary adopted in 2012. This summary provided voting age population totals organized by race at the voter district (VTD) level. VTDs were matched with the reporting precincts for both elections. In the event that precinct names were changed between 2012 and 2014, county election commissions were contacted and the necessary adjustments were made. VTDs that did not appear in the official recapitulation were discarded.

At approximately 37%, Mississippi has the highest proportional black population of any state in the nation. Of 82 counties, the black population percentage ranges from 2.9% (Tishomingo – extreme northeast Mississippi) to 85.3% (Jefferson – near the Delta region), with an average of 41.1% (See Map 1 in the index for a visual representation of black population concentration). Using simple linear regression methods, the researcher explored relationships between black population percentages and a number of electoral statistics specific to the primary/runoff races, including vote share of candidates, total vote increases, changes in turnout, and a “turnout capture” figure, which details how much, if any, of the turnout increase candidates secured between the two elections. Maps with color-shaded counties were created using an online service to provide a geographical comparison between heavily-black counties and turnout change and capture. Additionally, the researcher assigned weighted “impact” scores to counties based on their respective share of overall votes cast to highlight those most influential in determining the outcome of the runoff. Counties with the highest impact scores were examined at the precinct level to analyze changes in voter behavior from the primary to the runoff.

From here, the researcher employed ecological inference methods in King’s *A Solution to the Ecological Inference Problem: Reconstructing Individual Behavior from Aggregate Data* (1997) to infer turnout and voter propensities for black and white Mississippians. The ecological inference program *EI* (via statistical software *R*) and the simpler, stand-alone *EzI* program were used for these operations. Our first model requires observed variables turnout ($T_i$), total VAP ($N_i$), and the proportion of black VAP ($X_i$), and seeks to estimate unobserved quantities of interest $\beta_b$ and $\beta_w$, the rate at which black and whites vote. Second-stage models estimating voter propensities require an additional candidate vote share ($V_i$) for each unit analyzed. These models expand on the 2x2 case to infer the support for each candidate for those black and white voters that turned out.

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264 The Congressional Plan Summary and VTD data were provided by the Mississippi Standing Joint Reapportionment Committee
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<th>Vote</th>
<th>No Vote</th>
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<tr>
<td>Black</td>
<td>$\beta_b$</td>
<td>$(1 - \beta_b)$</td>
</tr>
<tr>
<td>White</td>
<td>$\beta_w$</td>
<td>$(1 - \beta_w)$</td>
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Ecological inference models utilized data collected at the precinct level. In order to provide the best estimates of our quantities of interest, the researcher used the 15 counties with the highest proportion of black citizens for estimates of $\beta_b$ (297 precincts), and 15 counties with highest proportion of white citizens for estimates of $\beta_w$ (324 precincts). In some instances, data from specific counties were removed to establish controls.

**Preliminary Results**

First, we compare Cochran’s performance in each county in the primary and runoff elections to Barack Obama’s performance in the 2012 election. If black Democratic voters did in fact cross over and vote for Cochran in the runoff, we would expect to see a stronger relationship between Democratic vote share in 2012 and Cochran’s vote share in the runoff than in the primary as a result of increased efforts to appeal to black voters between the two elections. Plotting Obama vote share against Cochran vote share yields a Pearson r of .514 in the primary, which indicates a moderate, positive relationship between the two vote shares. The correlation is even higher in the runoff at .591. These figures are the first indication that a relationship exists, but our results are far from conclusive.

Next, we compare the black population percentage in each county to the Cochran vote share in that county for the primary and runoff elections. We expect to see a stronger relationship between black population percentage and Cochran vote share in the runoff election than in the primary. The primary Pearson r correlation is .504, indicating a moderate, positive relationship between the two variables. The relationship between black population percentage and Cochran vote share in the runoff is stronger, with a Pearson r of .561. R-squared values of .25 and .31 for the primary and runoff, respectively, indicate that our line of best fit does a slightly better job at explaining the variance in the runoff than in the primary, but almost 70% of the variance in vote share is explained by something other than the racial makeup of the counties.

An examination of Cochran’s vote increases gives us our strongest relationship yet. We calculate this figure by dividing the change in total votes for Cochran by the number of votes for Cochran in the primary.
Figure 1 shows the black population percentage plotted against the percentage increase in total votes cast for Thad Cochran in each county. A Pearson r of .738, indicates a very strong, positive correlation. Over 54% of the variance in Cochran’s vote increases can be explained by the racial makeup of the county. On the other hand, when we plot black population percentage against McDaniel’s vote increases (Figure 2), black population explains less than 1% of the variance ($R^2 = .005$). These telling figures provide our best evidence thus far of black voters crossing over.

Next, we shift our focus to turnout in the runoff election. Overall, the state saw a 21% increase in voter turnout between the two
elections. Turnout increased in all but two of Mississippi’s 82 counties, ranging from 6.7% in Greene County, where blacks make up less than a third of the population, to 98.6% in Jefferson Davis, where blacks outnumber whites 59% to 39%. Of the two counties where turnout decreased (George and Hancock, shown in yellow in Map 2), both are on the Gulf coast, both have a black population less than 10%, and together make up two of the four counties with the lowest black population in the state. On the other hand, of the ten counties that saw the highest turnout increases, six are located in the heavily-black Mississippi Delta region; together, they average 68% black population.

A closer look at the relationship between black population and changes in turnout provides key insights. A Pearson r of .599 indicates another strong positive correlation, revealing a tendency for areas with a high percentage of black population to have higher turnout increase between the primary and the runoff election. For each percentage point change in black population, we see almost a half percentage point change in turnout. Maps 1 and 2 provide geographic perspective on this relationship. Map 1 shows that counties closest to the Mississippi River—especially the Delta Region between the Mississippi and Yazoo Rivers in the northwestern portion of the state—have the highest concentrations of black citizens. Coastal counties and those in the extreme northeast have the smallest concentrations. A comparison of Maps 1 and 2 shows significant overlap between high black areas and high turnout areas—especially in the Delta region.

A turnout capture figure for each county adds further depth to our findings. This figure is calculated by dividing the number of votes each candidate gained in the runoff by the total increase in turnout. We see familiar geographic trends in Map 3, which highlights counties where Cochran captured a majority of the turnout. The correlation between black population percentage and Cochran turnout capture is once again moderate and positive (.572). Again, Senator Cochran captured more of the turnout in heavily-black Delta counties.

When turnout capture is weighted against the county’s overall share of the statewide vote total in the runoff, we get a clear picture of where mobilization for each candidate was the strongest. For example, Senator Cochran captured 83.6% of the turnout increase in Hinds County, the most populous county in the state and the location of the state’s capital, Jackson. Voters in Hinds accounted for approximately 6.8% of all ballots cast in the state. Multiplying these two figures together gives us our weighted score 5.547 for Senator Cochran, the highest county score for either candidate. Senator McDaniel found his highest score (4.397) in Desoto, where he captured 85% of the turnout increase in a county responsible for approximately 5% of ballots cast.

Finally, we examine some descriptive statistics regarding voting behavior in a few of these influential counties. In Hinds County, of 118 precincts, 117 saw increased turnout in the Republican runoff versus the primary – an average increase of 68 ballots cast per precinct. Of those 68 ballots, 57 of them went for Cochran. We also see a pattern of low turnout areas in the primary turning out disproportionately for Cochran in the runoff. For example, Precinct 41 saw a total of four voters participate in the Republican primary, and all of them voted for Cochran. In the runoff,
that number jumps to 99, with 95 votes for Cochran. Of the precincts that saw more than 200 participants in the Republican primary, Cochran gained an average of 82 votes in the runoff for an average increase of 17.8%. In those precincts that saw less than 50 votes in the Republican primary, Cochran gained an average 43.8 votes in the runoff, for an average increase of 337%.

**Ecological Inference Models**

Our results thus far suggest that black voters in Mississippi played some role in Cochran’s runoff victory. In order to determine the scope of their influence, we would need to know individual-level behavior of black voters, including the rates at which they turned out and their level of support for each candidate. However, as is often the case in the social sciences, such data is unavailable. To determine black turnout in the Republican primary and corresponding support for Cochran, we have little choice other than to make ecological inferences. Broadly, ecological inference is the process of gleaning details about individual behavior from aggregate data. Ecological inference has been a topic of intense debate in the social sciences for the past 75 years. Before King published his method in 1997, experts were divided between the approach of Duncan and Davis’s (1953) method of bounds, and the statistical approach of Goodman’s regression (1953).

The method of bounds allows us to establish a deterministic range of values for quantities of interest based on turnout $T_i$ and the proportion of the electorate that is black, $X_i$. Consider a school-wide election for student body president, with each class representing a separate voting precinct. If we know that 10 students in Mrs. Smith’s French class voted, and 20 students in that class are black, we can say with 100% confidence that between 0 and 10 black students in that class voted, a range of [0,1]. When we factor in $T_i$, $X_i$, and $N_i$, which necessarily incorporate the proportion of white students and the total number of students in the class, black turnout possibilities, and thus the bounds themselves, narrow significantly. If we were to average the bounds for all of the classrooms, we could obtain a deterministic bound for the school-wide levels of turnout for black and white students. Likewise, if we average the bounds for all Mississippi precincts analyzed, we obtain deterministic bounds for black and white turnout in the state.

Goodman’s model regresses turnout $T_i$ on $X_i$ and $(1-X_i)$ to estimate quantities of interest. His method assumes that black voting behavior is homogenous across districts; for example, that blacks in urban areas turn out at the same rate as blacks in rural areas. Further, Goodman’s regression sometimes leads to out-of-range estimates (for example, blacks voting at a rate of 105%). King’s model incorporates elements of both Duncan and Davis’s method of bounds and Goodman’s regression, using a statistical approach to extract data from within the bounds. The models rely on many of the same assumptions as Goodman’s (no heteroscedasticity, for example), but give better results while avoiding some of the pitfalls. King’s method is currently the most widely-used ecological inference method, having been used extensively in voting rights litigation since 2000 (King et al. 2004).

Figures 3 and 5 show tomography plots for our samples of black and white counties in the primary election. Each line of the tomography plot represents one precinct, which exhausts all of the possible combinations of black and white turnout. As King et al. (2004) explains, the information lost due to aggregation forces us to draw an entire line. Thus, we know that our true quantities of interest for each precinct lie somewhere on our line, but we need the rest of King’s method to narrow it down.
Figure 5, which represents the 324 precincts of the 15 whitest counties in Mississippi, shows mostly flat, horizontal lines – indicating the relative uncertainty of estimating black turnout in districts where black VAP as a proportion of overall VAP is miniscule. On the other hand, Figure 3 shows a number of steep, vertical lines, indicating more certainty and less variability in black turnout. Our density plots (Figs. 4, 6) show the density of simulated point estimates for $\beta_b$ and $\beta_w$. The plot for $\beta_w$ is roughly bell-shaped and centered around 20% turnout, while $\beta_b$ is clustered tightly under 1% turnout. Table 1 below shows our median estimates of aggregate quantities of interest for the primary. Based on our estimates, less than one half of 1% of black voters voted in the Republican primary, while approximately 20% of white voters participated. Considering what we know about turnout in midterm primary elections and the racial polarization present in Mississippi elections, these are not unreasonable estimates.

<table>
<thead>
<tr>
<th></th>
<th>Vote</th>
<th>No Vote</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>0.2053</td>
<td>0.7947</td>
</tr>
<tr>
<td>Black</td>
<td>0.0049</td>
<td>0.9951</td>
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Table 1: 2x2 Contingency Table – Primary

Fig. 3, 4: - Black Counties Tomography Plot (left) and Density Plot (right) for estimates of $\beta_b$
Figures 7 through 10 (p. 17) provide estimates for quantities of interest in the runoff. We immediately notice a sharp contrast between the density plot of estimates of $\beta_b$. Figure 8 shows a roughly bimodal distribution, with a high concentration of point estimates near .05, and smaller peak near .80. Incidentally, Figure 7’s blue contour line shows a large 95% confidence interval for our estimates, reflecting the skewing effect of the group of high-end point estimates on the rug plot. Based on the compactness of this group, we can surmise that some precincts had unusually high turnout as compared to the rest of the state. Estimates for $\beta_w$ remain relatively unchanged from the primary to the primary runoff. Table 2 (below) gives our mean estimates for our quantities of interest.

<table>
<thead>
<tr>
<th></th>
<th>Vote</th>
<th>No Vote</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>0.2333</td>
<td>.7667</td>
</tr>
<tr>
<td>Black</td>
<td>0.1030</td>
<td>.8970</td>
</tr>
</tbody>
</table>

Table 2: 2x2 Contingency Table – Runoff

The estimates show an increase in black turnout of .0981. Thus, based on our models, and before establishing any controls, black turnout appears to have jumped from less than 1% to 10% between the primary and the primary runoff, while white turnout made only modest gains.

We could end our investigation here and conclude that blacks statewide went from almost zero participation in the Republican primary to turning out at half the rate of their white counterparts. However, this would ignore possible warning signs pointing to the disproportionate effects of a few counties.
Considering what we learned about Hinds County precincts from our preliminary investigation, as well as the anomalous second group of high-end estimates in Figure 8 (p. 18), a narrowed investigation is necessary. When we isolate and run 2x2 EI models on Hinds County precincts only, we get a clearer picture of what happened.

Fig. 7, 8 - Black Counties Tomography Plot with 95% CI’s (left) and Density Plot (right) for estimates of $\beta_b$
Figures 13 and 14 (p. 19) provide primary and runoff comparisons for Hinds County. Our 2x2 model estimates aggregate black turnout in the primary at around .5%—results similar to our multi-county model. In the runoff, we note wide aggregate bounds of $\beta_b: [.08, .80]$ versus the tighter bounds of $\beta_w: [.63, .73]$ reflected in the mostly flat, horizontal lines of the runoff tomography plot. The density plot suggests that black turnout in some precincts remained at primary levels for the runoff (negligible), while others turned out at extremely high rates. Estimates of black runoff turnout averaged around 41%, no doubt influenced by a few extremely high-turnout precincts. If we control for the high-turnout Hinds county precincts and only consider the other 14 counties with the highest percentage of black VAP, our estimated aggregate black turnout drops back down to around 2%.

<table>
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<tr>
<th>Median Estimates - $\beta_b$</th>
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</thead>
<tbody>
<tr>
<td>Primary</td>
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<td>.9951</td>
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<tr>
<td>Runoff</td>
<td>.1030</td>
<td>.8970</td>
</tr>
<tr>
<td>Runoff – No Hinds County</td>
<td>.0262</td>
<td>.9738</td>
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Table 3 – $\beta_b$ comparison across elections with controls
Figure 13- Hinds County Primary (left) v. Runoff (right) Density Plots

Figure 14- Hinds County Primary (left) v. Runoff (right) Tomography Plots
Why was turnout for a Republican candidate so high in Hinds County? Federal Election Commission (FEC) records indicate a substantial amount of cash directed towards get out the vote efforts in the area. In fact, FEC Schedule B PAC disbursement records allow us to track almost $150,000 from a Republican PAC to black political operatives in the Jackson area. Mississippi Conservatives, a pro-Cochran PAC headed by Henry Barbour (nephew of former governor Haley Barbour) donated approximately $144,000 to All Citizens for Mississippi, a PAC that was hastily set up a few days after the primary in a strip mall in Jackson. This PAC—led by Bishop Ronnie C. Crudup, a black community leader and pastor at New Horizon Church International in Jackson—took out ads in local newspapers urging black voters to support Cochran in the runoff before the PAC was even on file with the FEC (Willis 2014). Disbursement records show thousands of dollars distributed to local citizens for “door to door get-out-the-vote operations.” One individual was paid $31,000 in the span of four days for his efforts. Records indicate that the rest of the money went towards radio and advertisements in local papers. Speaking on his decision to start the PAC, Crudup stated that “none of those Republicans were involved in my decision; it was me. Everything we did was legal, and none of it was unethical” (Gates 2014).

So what would have happened if the black voters in Hinds County stayed home during the runoff? Ecological inference can give us a rough idea of what that election might have looked like, but it is going to take some more work. So far, we have operated under the assumption that blacks that voted in the Republican primary or runoff unanimously supported Thad Cochran, but we have given little thought to what level whites supported each candidate. At this juncture, we can run second stage ecological inference models using a new variable $V_i$, which represents the vote share in each precinct captured by Thad Cochran. Using what EzI already knows about turnout levels for black and white voters, it can incorporate the new vote share variable to estimate the level of support given to each candidate. Table 4 summarizes our findings.

<table>
<thead>
<tr>
<th></th>
<th>Cochran</th>
<th>McDaniel</th>
<th>No Vote (Runoff)</th>
</tr>
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<tr>
<td>Black</td>
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<td>.0499</td>
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<tr>
<td>White</td>
<td>.4397</td>
<td>.5603</td>
<td>.7667</td>
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Table 4 – Voter Propensities

Our models estimate 95% black support for Thad Cochran in the Republican runoff. White voters were split, with only 44% supporting Cochran, and the other 56% supporting Chris McDaniel. We can use these voter propensities and turnout rates to gives a very rough projection of what would have happened if black turnout remained constant from the primary to the runoff.

Total Black Votes = (Total Black VAP x Primary Turnout) x Cochran Support

= (767,499 x .0049) x .9501
≈ 3573 votes

Repeating these operations for both white and black voters for each candidate, and without considering Hispanic or voters of other races, we find that Chris McDaniel beats Thad Cochran by almost 32,000 votes. Conversely, if we use the black turnout figures from the runoff, Thad Cochran is the winner by a large margin (54.1%). In reality, Thad Cochran won with only 50.9%.

Understandably, our model is nowhere near perfect. Ecological inference, in its attempt to translate the aggregate into individual, uses broad strokes where precision is preferable. Without reliable exit polling or true levels of black participation, we cannot verify our results. However, some anecdotal polling evidence suggests that we are not entirely off the mark. As one political observer noted, Chris McDaniel was polling well ahead of Thad Cochran in the days leading up to the runoff (Enten 2014). He suggests that this is because the polls used a model of the electorate built to look like the same group of voters who participated in the primary (i.e. negligible black turnout and roughly 20% white turnout). The poll he cites, conducted four days before the election, has
McDaniel winning with 52.5% of the vote. Our model, also constructed based on primary levels of black turnout, comes close—McDaniel wins with 52.6%.

**Discussion**

With the help of ecological inference, we can conclusively state that black voters in Mississippi crossed over and voted for Thad Cochran in the runoff election, with Hinds County the epicenter of Cochran’s victory. Without the black voters of Hinds County, Cochran would most likely have lost by a substantial margin in the runoff. But even more important than what our models revealed to be true is what they showed to be false. Cochran’s victory does not reflect a statewide trend of black voters crossing over and turning out; this phenomenon was limited to a specific geographical area. In fact, our analysis showed that outside of Hinds County, black turnout in the runoff was comparable to turnout in the primary—that is, virtually nonexistent.

The 2014 Mississippi Senate Runoff was not a bellwether event for racial voting behavior in the Deep South. No evidence suggests that black voters will now regularly play a part in Republican primaries, nor was the runoff a commitment by black voters to support Cochran in the general election. Of the ten counties that lent the most support to Cochran in the runoff, not a single one of them gave a majority of their votes to him when he faced Democrat Travis Childers on November 4th. In those counties, Childers overwhelmed Cochran by an average of 19.6 percentage points. In Jefferson County, with the highest percentage of black citizens of any county in the United States, Cochran won 74% of the vote in the runoff election. Facing a Democratic candidate in the general election, he barely broke 22%.

Why were black voters willing to break from traditional voting patterns and support Thad Cochran in the runoff? As Bishop Crudup explains, “sometimes, you’ve got to be willing to cross the line, and go over to some strange places for our interests” (Parker and Martin 2014). Speaking after the election, he gave his reasoning behind supporting Cochran:

“Thad Cochran has always been fairly even-handed towards the African-American community. If you’re African-American in this state, and you want to be successful, you have to be more thoughtful with your vote… [The runoff] was a community interest, and black voters needed to respond. People did not think African-Americans were savvy enough to cross over. But if they’ll cross over once, they’ll do it again” (Crudup 2014).

Newspaper advertisements before the runoff touted Cochran’s appropriations record as a supporter of African-American interests in the state, including steering funding to historically black colleges and universities, free clinics, and levee repair across the Delta region in the wake of Katrina (Willis 2014).

Perhaps the most important consideration for potential black voters was not Thad Cochran’s record, but that of his opponent. One black voter, commenting on Chris McDaniel’s focus on “Mississippi values,” remarked “traditionally, things that have been associated with Mississippi values and what the state stands for are things that are not good for minorities….that scares me” (Parker and Martin 2014). Another particularly incendiary radio advertisement paid for by All Citizens for Mississippi called a victory for Chris McDaniel “a loss for the reputation of [Mississippi], for race relationships between blacks and whites and other ethnic groups” (Hall 2014). These, and a number of other unverifiable advertisements, fliers, and robocalls were sharply criticized by the Tea Party, which called them a “dishonest…character assassination of Senator McDaniel and his supporters” (Martin, et al. 2014).

Invoking race in runoff elections is not unique to Mississippi. Rozell and Wilcox (2000) examine another Southern runoff where racial appeals had the opposite effect by mobilizing white voters against the more moderate Republican candidate. In the 1998 Republican gubernatorial runoff in Alabama, incumbent governor Fob James and his challenger Winton Blount both sought the endorsement of black Birmingham mayor, Richard Arrington, Jr. Arrington eventually endorsed Blount.
and urged Democrats to vote in the runoff (Neal 1998). Before the runoff, James’ campaign sent out 300,000 flyers statewide that depicted Blount standing in between Mayor Arrington and some of his black staffers sporting afros (Rozell and Wilcox 2000). The weekend prior to election, he ran a television advertisement with the same picture and the tagline, “Winton Blount sold out the Republican Party. If he wins Tuesday, who will be the real Governor?” (Sack 1998). In the runoff, turnout increased by over 100,000 votes, and Blount, despite outspending James five to one and polling ahead leading up to the race, was defeated 55.9% to 44.1% (“A Shameful Legacy”).

Like the 1998 Alabama gubernatorial race, racial politics likely had a mobilizing effect on voters in 2014 Mississippi. But racial considerations do not provide a complete picture of what happened on June 24th. Thad Cochran’s victory was also a demonstration of the powers of political incumbency, efficient and well-financed get out the vote efforts, and a mobilized black community. If nothing else, our research forces us to adjust our perception of what a Deep South African-American voting bloc looks like. The idea that black voters vote cohesively is not a new concept, but we now have conclusive evidence that they were willing to cross over and save a Republican incumbent.

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Pender, Geoff. 2014 “McDaniel shouldn’t tread on Tuesday’s vote.” The Clarion-Ledger (June 25).

Pender, Geoff, Deborah Berry, and Dustin Barnes. 2014. “Cochran wins runoff; McDaniel refuses to concede, plans challenge.” The Clarion-Ledger (June 25).


## Appendix

<table>
<thead>
<tr>
<th>Election</th>
<th>Quantities of Interest</th>
<th>Mean</th>
<th>St. Dev.</th>
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<td>( n = 297 )</td>
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EI Model Results – All Quantities of Interest
Map 1- Black Population Percentage by County
Map 2 – Percentage Turnout Increase by County

Source: dynmaps.net (c)
Map 3 – Percentage Turnout Capture by County

Source: [mapsource]
The Justification of Peacekeeping: The Rationality of State Contribution to the UN

Patrick Wheat and Andrea Everett, Ph.D., International Affairs

ABSTRACT. The United Nations Department of Peacekeeping Operations (UN DPKO) has acted as one of the most well-known international organizations for the past sixty years, taking part in 67 operations aimed at stabilizing regional conflict and alleviating humanitarian concerns across the globe. Peacekeeping missions organized by the DPKO are comprised entirely of voluntary contributions of soldiers from individual nations. As these contributions play an important role in the DPKO’s continued operations, understanding the factors that are likely to encourage or discourage states from participating in UN missions is of paramount importance. One of the most interesting aspects of this contribution question is understanding the factors that cause states with fewer military resources (personal, weapons, equipment, etc.) to contribute more than states with a large amount of resources. Most of this motivation appears to come from political will within the nation and from the financial compensation given by the UN to states that contribute forces to peacekeeping mission. If either of these factors is lacking or unnecessary, the state is less likely to contribute. To demonstrate this, I will use case studies from nations such as Bangladesh, Ethiopia, Cambodia and Thailand.

Introduction

After the conclusion of the Cold War, conflicts both internally in a state and between state actors have shifted from a primary east versus west focus to disputes over cultural and territorial concerns. These cases range from ethnic conflict in Kosovo, Rwanda and Sri Lanka to civil wars in the Congo, Libya and Syria. One of the primary methods the international community uses to address these conflicts without violating state sovereignty is by using an international organization to act as the main intervening actor. Of the international organizations that operate in this capacity, the most prominent is the United Nation Department of Peacekeeping Operations (DPKO). The DPKO’s goal is to “operate as a unique instrument developed by the United Nations as a way to help countries torn by conflict to create the conditions of lasting peace” Sitkowski, A. (2006). UN peacekeeping: myth and reality / Andrzej Sitkowski ; foreword by Tadeusz Mazowiecki. Westport, Conn. : Praeger Security International, 2006.

The Peacekeeper Corp has been one of the most recognizable symbols of international activism since their establishment in 1948. The DPKO has completed 55 missions in Europe, South America, Africa, Asia and the Middle East. With 16 missions still active across the globe, the role of the Peacekeeping forces in these conflicts has adapted to each one, ranging from police assistance in Haiti to refugee


support in Libya\textsuperscript{268}. One of the key factors required for the DPKO to operate is for states to contribute forces to the Peacekeeping Corp, as the UN does not have a standing army it can draw from for these missions\textsuperscript{269}. As of 2013, 114 countries were contributing a total of 91,216 military observers, police and troops to UN peacekeeping operations. Of the 91,216 state contributions to the DPKO, 54,225 come from only 10 countries\textsuperscript{270}. While this is not overly surprising, as the United Nations is funded by financial contributions from its member states, interestingly, those 10 countries with top contributions are Bangladesh, Pakistan, India, Ethiopia, Rwanda, Nigeria, Nepal, Jordan, Ghana and Egypt\textsuperscript{271}. Of these nations, only Rwanda and Pakistan serve as non-permanent members of the United Nations Security Council, demonstrating a discrepancy between contributions to the UN Peacekeeping Forces and the state’s role within the United Nations and the international community\textsuperscript{272}.

**Hypothesis**


Based on the evidence presented on past contributions by states to the DPKO, I can conclude that states are more likely to participate in peacekeeping missions if their military receive benefits through participation or if there are regional security concerns in the nation that the mission is takes place in. In order to support this claim, I will use case studies based on the contribution history of Bangladesh, Ethiopia, Thailand and Cambodia. These case studies will be used due to their each presenting different histories, activities and contribution levels with the DPKO over the past several decades, allowing us to look at them as representations of the entire spectrum of contributions to the UN.

**Public Action Concerns**

To best address a state’s interest in contributing to a peacekeeping mission, I look at peacekeeping as a product of public action. Best summarized by Shimizu and Sandler’s explanation, “A more general representation for peacekeeping is that it yields multiple outputs or joint products that are purely public to the global community, impurely public to some nations, or private (country specific) to the country engaged in the peacekeeping”\textsuperscript{273}. These three levels of benefits of peacekeeping work to best explain how different states decide to contribute to the DPKO.

The category of pure public good is available to almost all member states in the United Nations, as the role of peacekeeping attempts to stabilize a state or end a conflict, which could ultimately destabilize a region. By doing this, it is likely that state actors in the surrounding areas will be motivated to act to limit violence and that state actors who are not

in the surrounding areas may see benefits in assisting to end the conflict before too much damage is done to the region. However, as with most public goods, the problem arises from the need for contributions when many states do not see their role as necessary for the success of that public action. To compensate for this, the United Nations provides financial incentives to contributing states for soldiers, technology and weapons provided. However, these incentives alone often fail to generate more than a token of support from a contributor.

The second level is impurely public, where the effect of the public good is not felt equally across the international community. One interpretation of this concept is the role of state ideology and public support, as states are affected in different ways by the success or failure of various types of missions. This role of state ideology can be thought of something that benefits state actors but does not impact them in a tangible way if the public action is unsuccessful. This can include actions that would support a state's ideology, such as encouraging a democratic intervention into an autocratic state, or intervention that is supported by the media of a specific state, such as intervention as a result of public support for humanitarian reasons. However, this has proven to be a less impacting factor upon state behavior, as ideology without tangible benefit to the state that is contributing is not a cause that most states are willing to contribute significant resources to.

The third aspect of this model speaks to state-specific decisions. Whereas the other two aspects of this model allow for fairly straightforward decisions about contributions (with the public good being state stability and the partial public good being public interest within state), the third aspect can be affected by any of the various aspects I have discussed before. A state’s motives in regards to peacekeeping shift from mission to mission, especially when the priority of the state is not international recognition or respect. The previous two public action models share the same flaw: they are only focused on one particular aspect that motivates all states. As will be discussed, a variety of factors are usually in play. These range from interest in raising international profiles, desire to increase foreign direct investment, or political motivation to get involved with the Peacekeeping Corps. This third aspect is the one most seen when evaluations are conducted upon states motivations involving peacekeeping contributions, as the first two fail to create testable results that can motivate large contribution responses from state actors.

**Operationalization of Concepts**

Using this public action view of Peacekeeping contributions, I then am able to begin analysis of individual states as multiple motivating factors rather than simply one factor bearing a huge amount of significance. This allows for a better understanding of states behavior, as it is extremely unusual for all states to be motivated by one factor. If I were to focus on a singular factor for contribution, I would likely miss different motivating factors for states. The motivating factors for the United States of America to contribute are different than the motivating factors for the United

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Republic of Tanzania. Factors that appear to have strong impact based on previous contributions from different nations are the desire to increase a state’s standing within the international community, the financial contributions that the United Nations offers as reimbursement to nations who contribute peacekeeping units, the desire to assist in conflict to assuage concerns of regional security if the conflict is in close proximity to the nation who is contributing, the benefits that the states military may receive as a result of participating in the Peacekeeping process, or the interests of the individual nations in offering humanitarian relief to nations in need.278

These factors were found to have played the largest impact based on research of individual case studies throughout the DPKO’s existence and were found to have played a largest impact on state decision making. They also have been cited by several nations in both formal declarations and informal statements that peacekeeping operations are a central pillar to that nation’s international involvement.279 Furthermore, the states that have contributed smaller amounts have no use for these motivating factors. For example, the United Kingdom is not motivated by these factors due its prominent standing in the international community and the fact that they require no foreign assistance to maintain their military budget.280 Finally, these were selected as contribution factors due to their being repeatedly cited in different research publications and by the DPKO’s internal analysis of peacekeeping contribution.281 Using these established factors, I will then attempt to identify which most influence state behavior through the case study examples of the whole spectrum of state contributors.

Within the international community, the contribution of forces to the Peacekeeping Corps has been portrayed as a noble cause and all nations who participate are to be commended. This practice has been noted within the DPKO since its establishment. A prominent example of this concept was used to recruit nations to participate in the Korean War, where the United States was one of the nations to advocate that the Peacekeeping efforts were a vital international effort that should be supported alongside their own military efforts between 1950 till 1953.282 During the modern era, we have seen an increased trend in developing nations where their governments are interested in contributing to build a better perception of themselves in the international community. This has proven especially true in nations where peacekeeping missions were conducted in the past. Examples of nations that


have had peacekeeping missions active within their borders and contribute significantly to the DPKO include Ethiopia, Rwanda, Egypt, Pakistan and India\(^{283}\). While this view has assisted with several nations’ reputation on the world stage, this alone does not act as a significant factor as the benefits of this prestige are usually intangible rather than providing tangible benefits for the nations in question\(^{284}\). To incentivize nations to contribute to the DPKO, the United Nations set up a system of financial reimbursement for both troops and equipment that states contribute. The average peacekeeping troop is compensated at approximately $1,200 per month, with pieces of equipment being valued at different rates depending on their type\(^{285}\). As many nations have substantially lower gross domestic products than others, this amount of reimbursement incentivizes third world nations more than it does first world nations. For example, Bangladesh, which has a very strong stated interest in peacekeeping, pays lower ranking troops from $141.97 to $185.85 a month, depending on how many years they have been in service. This differential means that troops that participate in peacekeeping operations are able to make substantially more than those in the normal military\(^{286}\), creating a substantial economic incentive for some third world nations. However, it does not serve as a strong single motivator for second or first world states.

One of the main operating factors of most Peacekeeping missions is to ensure that post-conflict states are able to establish stable governments and to make sure that there is no relapse to violence within the nation. This was seen in several cases, such as the missions in Rwanda, Ethiopia, Eritrea, East Timor, and Bosnia\(^{287}\). While it is in the general interest of most states to ensure that any violence (intra- or inter-state) is limited, there is specific interest in ensuring that any violence by a state in close proximity to your state does not extend into your own borders. The primary reason for this is that if the violence spreads, there is a good chance that it would spill across the borders of its neighboring countries. As a result of this, nations that are in close proximity to the peacekeeping mission may be more inclined to contribute to ensure that the violence does not spread, therefore protecting their own state along with stabilizing the nations in the region. An example of this motivation is Ethiopia, who has worked to stabilize the conflict in the Sudan by contributing large amounts of peacekeeping forces to the UN missions there, with a stated motivation of ensuring that the violence in the Sudanese region does not spill over their own borders\(^{288}\).

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288 KENKEL, K. (2013). Five generations of peace operations: from the “thin blue line” to “painting a
When a nation contributes to the DPKO, an added benefit of participation alongside financial compensation is that the soldiers who participate in the Peacekeeping program receive additional training from the commanders of the mission from around the world. This additional training gives the individual soldiers access to advanced training protocols, different styles of operating from nation to nation and the ability to train alongside individuals of other nationalities which they may not have encountered in their home countries. The benefits of this stem from the fact that these soldiers then have the ability to take those new protocols back to their home militaries and impart them on their individual forces, which will help improve their military’s capabilities. Also, peacekeepers are trained in different types of equipment that might not be available within their own nations, meaning they are then able to advise their commanders on the use of such weapons and whether they should be acquired. Additionally, in some cases soldiers are unfamiliar with joint civilian-military enterprises which are explained during this training to the soldiers. This knowledge can be taken back and shared with their home nations and can help to forge new relationships between the military and the civilian government. An example of this happening was in Cambodia, where an improved military-civilian government relationship was built after the fall of the Khmer Rouge regime thanks to this training.

Finally, many nations have stated in their national security doctrines that they are invested in ensuring that humanitarian issues are addressed quickly and definitively to reestablish a democratic government within Haiti, as there were no other motivations for the military action proposed to Haiti beyond ensuring that its illegitimate government ended the abuse of civilians. While most nations propose an interest in humanitarian concerns, many nations are unwilling or unable to contribute serious military resources based solely on humanitarian issues. When states do intervene with the claim of humanitarian issues as their motivation for intervention, it is more common that the states have additional reasons and are not just acting solely upon humanitarian concerns. While all of these factors have been cited as the reasoning behind peacekeeping contributions at different points in time, the most consistent contributions have come from nations that appear to be able to reap tangible benefits from their contributions to the Peacekeeping program. From this, I can demonstrate that the factors of financial compensation, military benefits and regional security concerns are more likely to result in substantial contributions over time. Furthermore, I can take this assumption from the perspective that all nations who are involved in the peacekeeping program are able to receive financial compensation, leading me to conclude

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that while it is a factor in general contribution to the DPKO, it does not help explain the actions or motivations of the individual states who contribute as some cite it as necessary but others do not.

**Case Studies**

*The Nation of Ethiopia*

The contributions of Nation of Ethiopia to the Department of Peacekeeping Operations have fluctuated over the past several decades, with moderate participation in the 1960’s followed by severe inactivity during the 1970’s and 1980s. Ethiopia began re-contributing troops in August 1994 to the UN Assistance Missions for Rwanda, where they allowed the use of a battalion of troops until July 1995. It was not until September 2003 that Ethiopia began sending large amounts of troops to UN missions around Africa, fluctuating from 3,000 troops in 2003 to over 6,000 troops in 2013. Ethiopia only contributes troops to missions that are located in Africa, with major contributions going to UN Mission in Sudan, the UN-AU Hybrid Mission in Darfur, the UN Mission in South Sudan and the UN Interim Security Force for Abyei. This is unusual as Ethiopia is one of several nations that have pledged contributions to the African Standby Force as part of the East African Standby Force, yet they have not contributed any soldiers since the AU Mission to Burundi to implement the Burundi Peace Accords in 2004, which only lasted for several months. This indicates a predisposition to work with the United Nations DKPO over other sources, as there have been several operations over the past decade that Ethiopia has not contributed to. Furthermore, Ethiopia is the leading contributor of female peacekeepers to the United Nations Peacekeeping Forces, but has one of the lowest contributors of officers, with most of the forces contributed being soldiers without leadership positions within the DPKO.

The main rationale for Ethiopia’s contributions was outlined in The Foreign Affairs and National Security Policy and Strategy of Ethiopia, where the government acknowledges that the country’s development, peace and security is intertwined with those of neighboring countries throughout Africa. The Ethiopian government has also been able to take advantage of the training protocols proposed as a result of peacekeeping training and the additional military experience that their soldiers are able to receive with advanced weapons during their tours with the DPKO. Furthermore, Ethiopia has placed a large focus on regional stability as a factor in its security regime, as Ethiopia shares borders with several states that have had UN Peacekeeping conducted within their borders in the past. Finally, Ethiopia’s history of working with the UN has created a normative attitude that there is strong support for UN assistance within their government. The only argument made against Peacekeeping contributions is concerns that the contributions are not able to effectively ensure

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internal security, specifically concerns about the existence of several rebel movements within Ethiopia\(^{299}\). At present, however, the Ethiopian government has made no indications that they intend to decrease their involvement in the DPKO in the near future.

**People’s Republic of Bangladesh**

Bangladesh is the current leader of contributions to UN missions, with participation in 52 countries over the past several years. Bangladesh currently has 8,843 soldiers allocated to the Department of Peacekeepers Operation for 2013, with 107,429 soldiers serving over the past 20 years\(^{300}\). The key increase occurred in 2001, where contributions went from 2,000 soldiers in 2000 to 6,000 soldiers in 2001. Bangladesh peacekeepers have served in a variety of locations, serving as the top contributor on the missions to East Timor, Democratic Republic of Congo, Cote D’Ivoire, Sudan, South Sudan and Haiti\(^{301}\). The Bangladesh motivation for participating in Peacekeeping operations is stated in the national Memorandum of Understanding from 2006, where the Bangladesh government states that their country’s difficulty in ensuring a sustainable democratic state makes them predisposed to contribute in whatever way possible to ensure a smooth democratic transition for other nations who require such assistance. Public opinion in Bangladesh has remained high since 2000, with a major source of this support coming from the perception that continued work with Peacekeeping operations will deter any later attempts to resume military control of the government, as had happened several times during the 1970s and 1980s\(^{302}\).

The Bangladesh Military stands as the main source of decision making as it pertains to troop distribution with little civilian oversight, so a majority of explanations for Peacekeeping interests stem from the military. Two of Bangladesh’s main concerns are in population control and economic growth, with the gross national income per capita averaging at $700. As a result, the UN compensation rates, resting at around $1,200 a month, served as a strong economic incentive for Bangladesh\(^{303}\). Between 2001 and 2010 the UN paid Bangladesh $1.28 billion for compensation of troop contributions, contingent-owned equipment and any additional costs including medical or damage costs to personnel or equipment\(^{304}\). Additionally, the Bangladesh military have been able to use the Peacekeeping opportunities with the United Nations to gain training on two main fronts. One main priority is continuing a positive relationship between the civilian leadership and the military hierarchy, which is still a new phenomenon in Bangladesh due to their only having transferred to a democratic government within the past few years\(^{305}\). The second aspect was the advanced training that the troops were able to receive in conjunction with the

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\(^{301}\) Islam, N. (2010). The Army, UN Peacekeeping Mission and Democracy in Bangladesh


\(^{305}\) Islam, N. (2010). The Army, UN Peacekeeping Mission and Democracy in Bangladesh.
Peacekeeping forces, which allowed the Bangladeshi military to grow more efficient as a result. This aspect of training was such a strong point for the government that the Bangladesh Institute of Peace Support Operations Training was created to both encourage and to facilitate training for peacekeeping operations around the globe. UN peacekeeping may also produce other indirect economic benefits through facilitating contracts in new markets for Bangladeshi businesses, especially in the pharmaceutical and agricultural sectors. One example of this is Bangladeshi entrepreneurs leasing land in African countries to establish farms to help meet the food requirements of both Bangladesh and the host countries. This possibility provides a stronger economic argument for contributing to Peacekeeping operations, but the main concern for the military is improving soldiers’ combat ability through interactions with other nations. Such multinational exposure helps them gain operational expertise and first-hand knowledge of the latest doctrines and military equipment, which has served to improve the military’s encouragement for Peacekeeping.

The Kingdom of Thailand

The Kingdom of Thailand has undergone a rapid modernization over the past twenty years, with significant progress in both military technological capability and advanced training protocols. Thailand was heavily involved in contributing to the DPKO during the 1990’s when they donated transitioning the nation from occupation by Indonesia to a sovereign state. They continued to hold a presence there until 2004 when all troops were removed from the region. Since 2004 providing minimal troop contributions in favor of offering financial aid to nations in need of assistance, which they did for nations such as Burma following the Cyclone Nargis in 2008 and by donating $382,000 and 20,000 tons of rice to Haiti after the earthquake in 2010. While the government of Thailand has stated they have a continued vested interest in Peacekeeping operations, this has not been reflected in troop contributions to the DPKO. For example, during March 2014, Thailand contributed 32 soldiers to Peacekeeping operations around the globe. This extremely low contribution numbers down from a high of 1,500 in 1999 question Thailand’s commitment.

When Thailand’s contribution history is considered, a strong indication towards regional concerns being a primary factor when it comes to peacekeeping contributions becomes apparent. One of the main issues involving the East Timor conflict was the Thai government’s concern that the conflict could potentially spread from the islands to the mainland. This prompted Thailand, which is situated close to Indonesia (one of the main parties in the East Timor conflict), to contribute substantial troops.

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FOREIGN RELATIONS. (2008). *Background Notes on Countries of the World: Kingdom of Thailand, 7.*

to the transition efforts in East Timor to address that issue. After the conclusion of the mission to East Timor, there was a drop in force contribution back to pre-Timor levels\(^{311}\). Additionally, Thailand’s government had no stated interest in increasing international participation or prestige through the program, and the financial incentives were not enough to encourage their country due to their relative high GDP per capita compared to other nations in the region. Finally, due to the high level of industrialization within Thailand, the Thai military is currently the 24\(^{th}\) most advanced military in the world\(^{312}\). As a result, they hold no strong incentive to work with the DPKO to receive either financial or military bonuses that occur as a result of participation. Based on past behavior it appears very unlikely that the government of Thailand will be willing to increase its contributions to the DPKO in the foreseeable future unless a direct regional security concern arises that the UN is involved with.

**The Kingdom of Cambodia**

The Kingdom of Cambodia has a long history with United Nations Peacekeeping, since the UN deployed there during the United Nations Transitional Authority in Cambodia (UNTAC) from 1991-93 to ensure a smooth transition of power from the Khmer Rouge regime to the civilian government\(^{313}\). Cambodia began formally contributing to Peacekeeping missions around the world in 2005 and since then has contributed more than 1,600 to seven different missions in Africa and Asia. Of the troops contributed to these missions, the Cambodian military have contributed more in specialized areas rather than just supporting troops. These specialized areas have included officers trained in landmine removal, engineering, the maintenance of public order and the provision and advancement of military access to medical supplies\(^{314}\). As of March 2014, Cambodia has contributed 641 troops to missions in the Sudan, Lebanon and Mali. While the Cambodian government does support the mission of the DPKO, they have taken a very strong reactionary response to Peacekeeping decisions rather than establishing a policy where they are required to contribute. In fact, the only time that any form of policy towards Peacekeeping was established in Cambodia occurred in the 2006 White Paper Policy, which established that the military had jurisdiction over the decision to contribute peacekeeping forces to the UN on a case by case basis\(^{315}\). However, the Cambodian government went on to establish the National Centre for Peacekeeping Forces, Mines and Explosive Remnants of War (NPMEC) in 2005, which was designed to train and support military soldiers interested in working with the UN\(^{316}\). This seems to indicate a long-term interest in


continuing support to the United Nations peacekeeping mission, despite their rather low participation rate.

After the fall of the Khmer Rouge regime in 1999, a great investment was made in reforming the military and placing it under civilian authority. A large scale example of this investment has been a general shift from active conflict training to a much more intense focus on supplementing combat skills with peace time operating procedures, including national reconstruction tactics, humanitarian assistance training and engineering training\(^{317}\). This, in addition to the established interest in working with the UN Peacekeeping Corp as a result of their previous actions within Cambodia, has made the military and the government invested in receiving the training peacekeeping can provide. Specifically, the training that military has received in multinational operations and the practical expertise in tasks associated with peacekeeping operations such as civil-military relations and humanitarian assistance efforts have been cited as being key planks in the reforming of the Cambodian military\(^{318}\). This fact, combined with the desire of the Cambodian government to contribute more actively to the UN to rebuild their prestige in the international community, has led to Cambodia beginning to contribute forces to the UN. However, it may take several more years before Cambodia begins to contribute in substantial numbers due to the fact that while the military-civilian relationship in Cambodia is rebuilding, there is still much work to be done before the civilian government is going to be completely comfortable with the military investing large amounts of personal in the DPKO.

**Analysis**

Based on the case studies of Bangladesh, Ethiopia, Thailand and Cambodia, I am able to paint a broad picture of states' behavior in regards to peacekeeping contribution. In the cases of Bangladesh and Ethiopia, there are consistent high contribution statistics that have only risen over the past ten years. Alternatively Thailand is a state that was briefly a serious contributor state for a specific period of time and then returned to being a low contributor state. Finally, in the case of Cambodia, there is a state that has kept their contribution levels consistently on the low end of the contribution spectrum. These four examples give me the basis I need to compare to my list of factors to better identify the motivation behind either strong or weak contribution levels to the DPKO.

Ethiopia demonstrates both the active need for participation to respond to regional proximity concerns and the desire to advance the training of the soldiers of an army based on the protocols that they would receive as part of the Peacekeeping Corp. With Ethiopia’s government dictating that they will not contribute to missions outside of Africa, the opportunities for Ethiopia to contribute to the Peacekeeping Corp are marginally constrained\(^{319}\). However, this focus on Africa has allowed the government of Ethiopia to accomplish two goals; first is the ability to build up Ethiopia regionally, within the African Union and within the United Nations as one of the main state actors within Africa. This serves


to increase their own standing and political ability to act both within their own region and internationally. The second goal is to make sure that the region stays stable, allowing for investment and growth which will benefit not just Ethiopia, but also her neighbor states as well. Additionally, the Ethiopian military has made strong advancements in their ability to function due to receiving the training protocols from the DPKO. These two factors have benefited Ethiopia, therefore increasing the likelihood of this contribution trend continuing in the future.

While Bangladesh has not been impacted by regional concerns as they apply to peacekeeping, they are influenced by the benefits that come both from a military and from a financial standpoint with peacekeeping contributions. Since the military of Bangladesh is one of the weaker of these case studies, ranking 56th globally based on arms, access to technology and military training, the need to improve their response capabilities is something that has remained consistent during the past several years. As a result, the advanced training and the access to weapons technology have served to advance the Bangladeshi military to the point that they have been able to make substantial advancements to their permanent operating procedures and to the relationship between the civilian and the military aspects of the government. Furthermore, Bangladesh’s low GDP per capita indicates the financial compensation procedures are strong encouragements for recruiting soldiers to participate in the program. Based on these facts, I can conclude that as long as the current military benefits and financial compensation methods hold steady, then the Bangladeshi participation rate will continue to rise.

In Thailand, however, there is a much lower contribution rate than we saw ten years ago at the high point of their contribution during the East Timor mission. This indicates that since there are no active conflicts within Thailand’s region that could lead to disruption within their borders, the Thai government is unwilling to commit serious troops to the cause of peacekeeping. Furthermore, with the fact that Thailand has a good reputation within the international community, a lack of need for military advantage due to their pre-existing advanced capabilities and the lack of necessity for financial compensation when their own financial resources are more than sufficient indicate that Thailand is unlikely to increase their contribution levels substantially in the near future. The most likely scenario for an increase would be if a nation in close proximity to Thailand needed assistance, where if past trends hold, they would be willing to contribute. However, unless that occurs, Thailand’s contribution to the DPKO seems likely to remain minimal.

With the case of Cambodia, we have a nation that has been consistently disinclined to contribute substantially to the DPKO. While


they have consistently supported a few hundred troops during the past few years, the government of Cambodia has stated that their main motivation is to ensure internal security and to crack down on drug smuggling within their own borders. As a result, the benefits that Cambodia does enjoy from Peacekeeping contributions seem to be limited to focusing on giving the limited soldiers who do participate additional training and from the standpoint that Cambodia has been able to support humanitarian concerns across the globe.

While regional security and financial assistance are factors in this decision making process, we have seen that the main interest of the Cambodian military is still focused on acquiring additional resources and training through the DPKO. Despite this, the Cambodian government has yet to make a strong push to invest more resources into Peacekeeping contributions beyond their current levels. Therefore, unless the United Nations offers up additional resources as incentive, it is unlikely that Cambodia will increase their participation rate past pre-existing levels.

The strongest examples from these case studies where states have invested large numbers of troops were states who were able to receive tangible benefits for their contributions, whether that was in financial compensation, advancement when it comes to military equipment and training, or increased regional stability. While the desire to increase prestige in the international community or humanitarian concerns were cited as reasons in several cases, neither factor was consistent enough to prove its impact on state contribution. The concept of financial compensation from the United Nations to the contributing nations was a benefit; its existence alone was not conclusive in the case studies to cause more states to contribute solely on that factor. When paired with additional factors, such as access to military training or regional security concerns, it did provide for additional justification for actors to engage in peacekeeping efforts. At the same time, based on the evidence presented the desire to increase access to military training and equipment or to ensure regional security for national protection were both influential factors on states decisions to contribute to the DPKO.

**Conclusion**

Based on the information collected in this paper, I am able to better predict state behaviors when considering their contributions to the Department of Peacekeeping Operations. If the state perceives itself to be receiving a substantial benefit as a result of contributing, they are more likely to participate. The most common factors that appear to be influential in this decision are the interest in improving military capabilities through receiving advanced training and materials from the Peacekeeping mission in question or that by supporting the mission in question the contributing nation is able to ensure regional stability and security to protect their own borders. The United Nations remains one of the most prominent international organizations in the world, thus it is relevant to better understand what states actors are considering in regards to additional commitment to this organization. With the clear assumption that Peacekeeping contributions are more likely to be increased if the military benefits and security concerns are present for that nation, we are better equipped to understand how states will react when the next nation calls for aid from the United Nations.

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Unfunded Liabilities in Connecticut’s Public Pension System and Policy Responses

Kayla Wilding and David Agrawal, Ph.D., Economics

ABSTRACT. Connecticut had 243 percent of states’ adjusted net pension liability (ANPL) relative to their government revenues as calculated by Moody’s Investor Service. The median value of ANPL for all states for FY 2012 was 64 percent. Only Illinois had a higher liability ratio in the country, and Illinois has enacted major reform to shore up their funds. If reforms are not put in place soon, Connecticut may run out of funds. Should the state run out of funds, public workers could be looking at cuts in their pension benefits, as workers did in Detroit, the state could default and request a federal bailout, or the cities could declare bankruptcy. I evaluate policy options in terms of their effectiveness in decreasing the amount of unfunded liabilities, providing retirement security, and the transparency with which benefits are paid out to employees. Political feasibility and equity among different groups of workers across ages and sectors are other important goals of the desired policy. Three policies I analyze are increasing the income tax, increasing the retirement age, and switching to a collective defined-contribution plan. Switching to a collective defined-contribution plan is the most effective in terms of my established criteria. The implementation of this policy must include educational pushes for the public and legislators, and compromise between the major stakeholders.

Background

Connecticut has one of the lowest percent of funded liabilities in its public pension system, amounting to approximately 49 percent (Babbage and Hun 2014). The state has $27,668 of pension debt for every person in Connecticut, the second highest per capita amount in the nation (Moody). If the state makes no changes, calculations suggest Connecticut could run out of money by 2019 (Laing, Rauh). Underfunding of pension plans in other cities has led to current taxpayers paying the bill, and has, in the case of Detroit, Michigan, put the security of employees’ retirement at risk (Mahler). Legal constraints, difficult subject matter and strong opposing forces make accomplishing reform difficult. Despite these challenges though, several states have managed to enact successful reforms and serve as models (McGuinn).

Pension plans are offered in three forms: defined-benefit, defined-contribution, and collective defined-contribution. A defined-benefit plan promises a percentage of a worker’s salary as their annual benefit after retirement (Johnson). A defined-contribution plan, more commonly known as a 401(k), sets up an individual retirement savings account equal to the predetermined contribution made by the employee and employer. The individual manages this account and can roll it over into a new company’s plan should they change occupations. The final plan, the collective defined-contribution plan is similar to the defined-contribution plan, other than the pension provider manages all of the employee’s retirement accounts. This structure takes away the risk of a lack of investment sophistication by employees and transfers the responsibility to the provider, typically a knowledgeable and experienced investor. Many states have enacted a combination or modification, known as a hybrid, of these typical plans.

Pension actuaries use two main methods to calculate assets and liabilities in their plans.
The first method is the Governmental Accounting Standards Board (GASB) method. In this calculation, actuaries are allowed to calculate assets using an average of the market value over several years. For liabilities, the plans’ actuaries use a discount rate equal to the rate of expected return on investments. In the second method, the fair-value approach, the actuaries must use the current market value for assets, and must use the municipal securities interest rate. Critics of the GASB method believe that the pension plan’s actuaries are using discount rates based on overly optimistic rates of return (Russek). Connecticut, has set their rate as one of the highest in the country, meaning they have likely underestimated their liabilities. Economists estimate Connecticut’s liabilities using the fair-market value as about four times the amount calculated using the state’s current actuarial assumptions (Moody).

From 2002 to 2011, the costs of upholding pension systems doubled. This increase contributed to municipalities declaring bankruptcy including Stockton, California and Detroit, Michigan (Biggs, “How”). The costs in Connecticut for full-career employees retiring today are calculated to be more than one million dollars, present value, in average lifetime benefits (Biggs, “Not”). Out of all the states, 35, including Connecticut, have not been able to make the full actuarially required contributions for their pension plans for at least one year during the period 2010-2012 (Fiscal). Even with a generous 8 percent return on investments, Joseph Rauh in “Are State Public Pensions Sustainable?” calculates that the state’s pension plan could run out of money by 2019. State Budget Solutions and the Yankee Institute for Public Policy, both of which are think tanks focused on state budgetary issues, estimate even less optimistic outcomes. Using less conservative numbers, they calculate Connecticut’s pensions to be funded only 25 percent and find their liabilities could be as high as $100 billion. Joseph Rauh’s “Are State Public Pensions Sustainable?” estimated $50 billion and the state actuaries calculated the liabilities to equal only $25 billion. These estimates give a large range, but should all emphasize the need for action (Moody).

Negative effects of the underfunding of promised benefits can be felt on three levels: the state system, the public, and those in the workplace.
I will first look at the effects felt on the state level. A negative consequence of unfunded liabilities is the potential downgrading of a state’s credit. Out of the ten states Moody’s rates as having the biggest pension burdens, six have already been downgraded, including Connecticut. Connecticut’s pension plan rating has dropped to Aa3, from their previous Aa2 rating, on Moody Analytics’ scale (Figure 1) (Van Wagner). This credit downgrade affected approximately $14.6 billion worth of Connecticut’s outstanding general-obligation bonds (McDonald). For every 1 percent increase in loss of pension fund revenue, the tax-adjusted municipal bond spreads increase by 10-20 basis points. A lower rating means that states will be looking at higher costs of borrowing should they want to roll over pension funds into bonds (Novy-Marx and Rauh).

As justification for this first downgrade, Moody’s cites the state’s underfunding in the State Employee Retirement System (SERS) and Teachers Retirement System (TRS), which were only funded at 44 percent and 61 percent, respectively, in fiscal year 2010. Even worse, Moody Analytics does not see a drastic change coming soon for the pension system, despite the minor changes implemented so far (Johnson and Lyons). Therefore this trend could continue and could hurt the state more than we have seen, as they are still very strong.

The state legislators will also face the consequence of union opposition to those that support enacting reform. State legislators are put in a difficult position when asked to create pension reform. They are opposing unions, which have a large lobbying effect in elections and policy discussions. In Rhode Island, Representative Timothy Williamson, says “be ready for a backlash and non-support and even though you’re doing the right thing [...] you may not be re-elected.” In Utah, union leaders held rallies and threatened politicians with their seat if they supported the reforms (McGuinn). Francis Destefano, a citizen in Connecticut, displayed his frustration with the current politicians through an op-ed, and indicated that those running in the elections need to address the issue of the pension crisis in their state if they want to be looked favorably upon by the voters (Destefano). However, unknown to most citizens, many state governments, including Connecticut, do not have the legal right to change pension benefits for vested employees, including themselves. This legal obstacle does not let them off the hook completely, as some state legislators have not enacted reform because they are simply afraid of the repercussions if they attack public workers’ pensions (Liang).

Unions immediately responded to Illinois’s and Rhode Island’s reforms in 2014 with lawsuits, claiming the changes were unconstitutional (Mahler). In Illinois, the unions opposed the freeze on cost-of-living adjustments, increases in the retirement age, and limits on the salaries on which pensions are based. In a separate case in Illinois, the state Supreme Court ruled in July 2014 that the state cannot cut previously promised health benefits as they are in fact part of the pension promise. In November, a state court ruled that cuts in current workers benefits are unconstitutional according to the state constitution. Although this decision is being appealed to the state Supreme Court, this outcome has set an important precedent, and has caused pension reform to become more difficult (Sfondeles). Rhode Island had to pull back on proposed changes in order to please the unions (Rhode).

In addition to the state legislators, the public will feel consequences of the liabilities. One effect is the increasing of income taxes to fund the liabilities. In order to pay back some of the debt, or keep the state budget in order, states and cities may be looking at raising taxes
The Yankee Institute believes raising taxes is one of only two possible policies that could bring the system back to sustainability. The other policy they cite would be the state switching to a defined-contribution plan. An increase of the income tax to raise the $2.8 billion that the system is short as of now is needed. This increase includes raising the top individual income tax from 6.7 percent to 9.25 percent. However, they have calculated this increase in taxes could create a drag of up to $309 million on Connecticut’s economy (Moody). According to the Tax Foundation’s calculations, Connecticut’s residents already face working until May 9th to have earned enough income to pay off their taxes for the year, the latest date in the country. This statistic means that the residents in Connecticut face the highest compiled tax rates in the country currently. Therefore, raising taxes not only has negative effects, but could also have substantial political and public opposition.

Another effect of the status quo in the public pension system is the cutting of essential services to help cut down on costs. The services that could be cut include policemen, firemen, health spending, and improvements in infrastructure and education. Vallejo, California cut the number of police officers from 158 down to 104 after declaring Chapter 9 bankruptcy in 2008 due to insolvency. Crime has increased in Vallejo since 2008, which could be partially attributed to the decrease in officers (Laing). Recently, the courts of New Jersey ruled in favor of Governor Christie’s of New Jersey pension cuts. However, the presiding judge believed that the cuts to the essential services having to be made because of the pension cuts would be a bigger problem than the underfunding of the pension system (Haddon).

Finally, those in the workplace will feel negative consequences of the underfunding of pension liabilities. The first of these consequences is a decline in the quality and quantity of public workers. Worker productivity and retention respond to incentives, such as income (Mahler). The current state of the public pension system is ill-suited to attract high-quality employees. In addition, a mismatching of employees’ skills and jobs is occurring due to a diminishing worker mobility possibility (McGuinn).

Second, segregation in workplaces between older, more-experienced workers and younger, newer employees could arise due to the political and legal issues of pension reform. The formula for calculating a worker’s pension amount is “back-loaded” in the sense that it is more favorable to older and longer-term workers disproportionately. Approximately half of government workers leave without any rights to pension benefits. This group are the younger workers whose early work years are weighted lower than years worked later in careers (Biggs, “How”). Advocates of reform may look to young employee groups for support of change as they are more negatively affected by the current system than older workers. This singling-out of younger public employees could cause a rift between the different age groups (McGuinn). Many states have laws that forbid politicians from touching current pension amounts, and therefore they can only reform new worker’s pension plans. Legally, younger workers are disproportionately negatively affected if the system is not reformed (Munnell, Quinby).

Causes and Current Policy Failures

Understanding the past failures is important for advising policy solutions for the future. First, a lack of awareness of the extent of the problem has led to the problem increasing in size. State actuaries’ unrealistic rate of return assumptions have led to a lower estimate of the unfunded liabilities in states, including Connecticut. The state of Connecticut says they
owe $25 billion to their public employees. However, a new study by the Yankee Institute for Public Policy amounts the actual unfunded pension liability at almost $100 billion. They reach this number by using more realistic rates of return than the state is currently using, and by including future obligations in their calculations, which is the method supported by economists (Moody).

Payouts are larger than most public employees realize. The average member of the American Federation of State, County and Municipal Employees receives approximately $19,000 a year in pension benefits after a career in public service. This amount appears to be a modest number; however, some scholars do not agree it is representative of the typical payout amount (Biggs, “How”). Andrew Biggs, a scholar at the American Enterprise Institute, has calculated that Connecticut pays out on average $50,000 per year to retired full-career state employees. An underestimate of $30,000 a year per worker is not a small error. He finds the total average lifetime benefits per employee are over one million dollars (Biggs, “Not”).

A difficult-to-address cause of the problem is an opposition to reform by those involved because of conflicts of interest. Unions have a lot of power in terms of public pension reform (Mahler). They have sued in multiple states and have gotten reforms reduced in effect and even fully repealed (Rhode). Threats from unions to get legislators beat in the next election have led to fear in the legislators, causing them to ignore reform (McGuinn). Legislators are public workers, and reforms could possibly hurt their pension benefits. A worker left to reform their own pension payouts causes an obvious conflict of interest (Destefano).

Lastly, besides the desire to block reform, legal constraints make many reform options illegal. State constitutions have posed as an obstacle for reform. For example, Illinois’s and Rhode Island’s reforms were immediately taken to court as “unconstitutional” (Mahler). Many states do not have the option to reduce the future benefits for current workers. They can only decrease benefits for new workers entering the public sector. The contract system in which Connecticut operates declares the state must have an important public purpose and the action must be reasonable and necessary if it wants to make any substantial impairment to their employees’ contracts (Munnell and Quinby).

There are, of course, many more causes of the problem. However, these appear to be the most influential in the system.

Before prescribing a new policy, you must understand the policies and legislation that are in place currently and their contribution to the problem. Currently, the Actuarial Standards Board, consisting of nine members of diverse actuarial backgrounds, has set guidelines for public retirement systems to follow when it comes to setting and reviewing their actuarial assumptions in calculating their projected liabilities and assets. In Actuarial Standards of Practice No. 27, a process of analyzing the return on investment assumption is put forward. This practice has helped in two respects (Brainard). First, this practice sets assumptions for costs in a 30-to-50 year view. By setting the standard to look at a long period of time, volatility is reduced when calculating costs of pension plans. On the other hand, private pension plans are required by federal regulation to use the current treasury rate as the basis for their costs and therefore contributions. As the interest rate is volatile, the costs are volatile. This volatility was a major factor in many private corporations dropping their pension plans (Brainard).

Second, public plan actuaries have recently reviewed their assumptions, leading to more than half of the 126 plans in the public fund survey to lower their return on investment
assumption since Fiscal Year (FY) 2008. As of December 2013, however, Connecticut has the highest return assumption for Connecticut TRS at 8.5 percent, and Connecticut SERS is at 8 percent. On average researchers assume returns to be 7.72 percent, and only two other plans are over 8 percent (Brainard).

Similarly, Governmental Accounting Standards Board 25 instructs states to make annual required contributions (ARCs), which are the costs of newly accrued benefits due to service and wage increases, amortized payments that make up the unfunded liabilities, and amortized payments that will make up for actuarial losses. The problem is that this rule is not a binding rule or obligation so these contributions amounts are not enforced (Rauh). Splinter finds that states have cut contributions to their pension plans 8 times more than other spending, including cuts to the their ARCs. He finds that one-third of underfunding in 2008 was due to states not paying their ARCs (Splinter). Connecticut SERS hit a low of 80.3 percent of the actuarially calculated ARC in 2010 (State).

Historically, state plan providers believed they could amend or modify pensions, as they had interpreted the plans as gratuities. The Supreme Court enforced this belief by stating pensions benefits were merely an expectation for employees, and the provider has the right to adjust, suspend or even revoke the expected benefits. However, treating pensions as a gratuity has faded, and many courts now view the promised benefits as a contract between the worker and the provider. (Staman).

Several states, such as Illinois and New York, have state constitutions that forbid the state from touching benefits that were expected by the employee at the time of employment. Connecticut protects their pension benefits under contract theory. Contract theory uses the Federal Constitution’s Contract Clause, which prohibits states from passing laws that will impair existing contracts. Courts use a three-part test to determine if a state’s actions are unconstitutional, including determining if a contract exists, if the action is a substantial impairment to the contract, and lastly if the action was justifiable as being “reasonable and necessary” (Munnell, Quinby).

Key Stakeholders

When examining policy options, it is important to identify those that hold interest in the outcome and how they would react to each option. One set of stakeholder in this situation is current public workers and their unions. Based on the Bureau of Labor Statistics (BLS) data, 72 percent of full-time workers in a state will make less than their public counterparts. The average full-career public employee in Connecticut can expect over $1 million in lifetime benefits (Biggs, “How”). Reforms could cost employees benefits. If the retirement age is raised or the cost-of-living adjustment (COLA) decreased, the liabilities will be decreased, but this improvement will be at the cost of the public worker’s pensions (Mahler).

“Double-dipping”, where public employees return to old high-paying jobs while they collect benefits or take multiple public jobs to receive a larger or multiple pensions, is quite common. Another practice within the public sector is the act of spiking in which an employee disproportionately increases their final year’s pay by storing up extra unused vacation and sick leave. This act creates a higher salary for the employee’s final year compared to the salary they earned for any typical year of their career. By “spiking” their final year’s payment they will receive a pension bigger than the expected amount calculated based on their typical salary. A fire chief in California raised his pension by $63,000 a year by “spiking” his final year’s salary. Policy proposals have included stopping “spiking” and “double-dipping”, which would hurt public
workers (Liang). Public employees and politicians do not desire to create reform, because reform could take away from their own paychecks (Destefano).

Public workers and their unions are unlikely to support many reform. These reform include those that means cuts in their benefits, and many states do not currently have the legal allowance for these changes. They have brought lawsuits in several states that have attempted reform and have threatened politicians’ seats to stop reform from occurring (McGuinn).

Another group of stakeholders is the body of the current state legislature. Current legislators are elected by the people in their district. Unfortunately, pension reform is not popular among unions and the public workers as reforms would cut benefits for these groups. Unions are strong groups and have threatened to get legislators’ seats if they support the reforms. Therefore, legislators will not be thrilled about enacting reform as this action might cause them to lose their job. States like Illinois and Utah that have implemented reform have felt this pressure already. Illinois is currently still going through lawsuits over their proposed reforms. Legislators are being paid by the pension system and therefore might have another incentive to oppose reform (Destafano). Legislators do realize reform is their responsibility and duty to their citizens, so they realize some changes must be made even if it costs them their job (McGuinn).

Another stakeholder is the current taxpayers of Connecticut. A possible way for state governments to pay off their increasing pension debt is by increasing taxes on property, income or sales. States could take away essential public services to save money. The loss of public services hurts taxpayers by giving them fewer benefits for the taxes they pay into the system (Liang). The actuarial assumptions made by states for their plans make current taxpayers stakeholders in the issue. If state plans overestimate the investment returns, liabilities are lower and current taxpayers have to pay less than future taxpayers and less than if the plans underestimate the investment returns. By underestimating the returns, the current taxpayers will have to pay higher taxes now to make up for the shortfall (Brainard). Current taxpayers would like the liabilities to decrease, through decreasing pensions of those that earn them through manners such as “spiking” (Destefano).

As current taxes in Connecticut could be raised to offset the debt of the pension system, the taxpayers support reform that would lower the liabilities as long as this increased revenue comes from pension holders and their employers (Moody). They will oppose increases of taxes and will oppose if nothing is done and their public services are cut or lowered (Liang).

Additional stakeholders are private workers and their firms. Private workers are current and future taxpayers, so they are stakeholders for all the same reasons as those groups. Private jobs are typically seen as the higher paying sector. However, recent data by the BLS shows that the average public employee earns $26.11 per hour, while the average private employee earns only $19.41 per hour, before we add in benefits such as pensions. The gap widens to almost a $13 per hour difference when benefits are taken into account (Liang).

Private workers would prefer for public pensions to be cut, because that would mean similar wages across sectors, and lower tax liability. Their firms would prefer not to have to increase the pay they offer to attract workers to stay in the private sector (Liang). Connecticut has increased retirement plans for private workers, which can only be sustained if the state has a good budget (Chen).
Future taxpayers have a stake in the debate of public pension reforms as well. In Illinois, we are seeing that reforms and increases of current taxes are not enough to offset the debt in their system. State legislators have tried to take loans to pay for the debt, but these will have to be paid off by future taxpayers (Dabrowski). Another issue is the current actuarial assumptions are incorrect and are understating current liabilities. By understating liabilities now, tax rates will be too low now, and therefore the future generations will have to pay a disproportionately high amount in the future to make up for the lost revenue (Brainard).

Future taxpayers will want the pension system to be reformed to avoid having the burden of paying off the liabilities placed on them. However, future taxpayers are hard to identify, so it is on the shoulders of current taxpayers and legislators to stand up for future taxpayers (McGuinn).

Policy Alternatives

The alternatives that I analyze are maintaining the status quo, increasing the income tax, increasing the retirement age, and switching to a collective defined-contribution plan. Therefore, I only discuss the other three options in this section.

Policy Alternative One: Increase the Income Tax

As Connecticut looks at increasing debt in their pension plan, they need some method to increase their revenues to pay the benefits they have promised. A possible way for state governments to pay off their increasing pension debt is by increasing taxes on income (Liang). This policy would include increasing the top income tax from only 6.7 percent to 9.25 percent (Moody). Other states in the same predicament have enacted this response already. Illinois, the worst funded state, increased their tax revenue by $7 billion in an increase in 2011 (Dabrowski). Chicago’s current mayor, Rahm Emmanuel, proposed a $750 million increase in the property tax in 2014 to help pay off the city’s liabilities (Merrion). By increasing the taxes, current taxpayers are being held responsible and are paying for current benefits instead of allowing the debt to fall on future taxpayers (Brainard).

Policy Alternative Two: Increase the Retirement Age

A possible way for Connecticut to cut costs is to decrease the number of people to whom it is paying benefits by decreasing the number of years people are paid these benefits. Currently, the Connecticut pension system operates under four different tiers, Tier I, Tier II, Tier IIA, and the recently added Tier III. Each tier sets different policies referring to not only retirement age eligibility, but contribution amounts, payout amount, and other requirements. Under Tier I, an employee is eligible for retirement at age 55 if they have dedicated 25 years of service or age 65 if they have ten years of service. Tier II states an employee may retire at 60 with 25 years of service or 62 with between 10 and 25 years of service. Tier IIA follows the same retirement age restrictions as Tier II. Tier III, implemented in 2011, increased the retirement ages to 63 for those that work 25 years and 65 for those that have worked between 10 and 25 years (Connecticut SERS).

Rhode Island proposed an increase in their retirement age in their reform along with many other states, including Delaware, Florida and Hawaii, that have increased their age slowly over the years (Snell). The state of Connecticut should increase the retirement age to decrease the years of payments they are making to employees in the system. The increase in retirement age will decrease the cost of the program and will create a more fiscally sustainable pension program.
Policy Alternative Three: Switch to a Collective Defined-Contribution Plan

The state of Connecticut has difficulties with their unfunded liabilities because they are spending too much on their current plan (Biggs, “How”). Combined with risks such as market risk that causes the plan provider to shoulder the burden of unforeseen costs, the state needs a way to lower their costs (Mahler). The defined-benefit system used by public pension plans is a major contributor to the increase of unfunded liabilities in states and municipalities. Which type of plan to start using is not obvious. Additionally, implementing the switch poses a political challenge (Rhode). However, currently fourteen states have been able to switch to some type of defined-contribution plan (Moody). A defined-benefits plan is one in which a worker is promised a certain annual amount from retirement until their death. This number is set at different ages and experience levels for workers in the system (Mahler). Defined-contribution sets a rate or amount employees must contribute to their retirement fund annually, so by definition they cannot be underfunded. Many states have combined these two in different ways, such as letting workers opt into the defined-contribution but maintaining their defined-benefits plan (Munnell, Golub-Sass). For the state to lower its costs and risks associated with their plans, the public systems should switch away from an all defined-benefit plan to include a defined-contribution element in some manner.

Alternative Comparison

One or multiple of these policies need to be chosen and enacted so as to address the increasing problem. The state is looking at some of the highest liability amounts per person and the one of the lowest funded ratios in the county. Action must be taken in order to maintain the pension fund, and therefore the payment of pension benefits, and the state’s fiscal status.

My three goals that I evaluated policies on are effectiveness, feasibility, and equity. Within effectiveness, I am looking at how the policy decreases the amount of unfunded liabilities, the security retired workers will have in their funds, and transparency in the amount of funds being paid out. In the interest of feasibility, I gauge the support unions would give to each plan. Lastly, within equity, I am looking at if the policy gives equal work incentives across age categories by looking at the amount of benefits they receive for each year of work, and making sure it increases in a consistent, gradual manner rather than spiking in certain years. In addition, I will be examining if the salaries and compensation including benefits is equal across the public and private sectors.
Figure 2: Evaluation of Policy Alternatives

<table>
<thead>
<tr>
<th>Goals</th>
<th>Effect Category</th>
<th>Policy I: Increase the Income Tax</th>
<th>Policy II: Increase the retirement age</th>
<th>Policy III: Collective DC plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight: 2</td>
<td>LR: Unchanged</td>
<td>LR: Moderate decrease</td>
<td>LR: Moderate decrease</td>
<td>LR: Eliminated</td>
</tr>
<tr>
<td>Goal 2: Feasibility</td>
<td>Retirement Security</td>
<td>Unchanged/Decreased</td>
<td>Decreased</td>
<td>Unchanged</td>
</tr>
<tr>
<td>Weight: 1</td>
<td>Transparency of Benefits</td>
<td>Medium</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Goal 3: Equity</td>
<td>Union Support</td>
<td>High</td>
<td>Low</td>
<td>Medium</td>
</tr>
<tr>
<td>Weight: 1</td>
<td>Taxpayer/Political Support</td>
<td>Low/Medium</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Pension wealth</td>
<td>Unequal</td>
<td>Unequal</td>
<td>More Equal</td>
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<tr>
<td></td>
<td>($) across age</td>
<td></td>
<td></td>
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<td></td>
<td>categories</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Public vs. Private Sector</td>
<td>Negative impact</td>
<td>Mildly Positive</td>
<td>Positive Impact</td>
</tr>
<tr>
<td></td>
<td>(salary and benefits)</td>
<td></td>
<td></td>
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</tbody>
</table>
**Policy Alternative One: Increase the Income Tax**

Overall, Connecticut would need to raise $2 billion to close its pension gap, which could be done through higher income taxes paid by the citizens of Connecticut. However, whenever taxes are imposed, a deadweight loss, or a loss in economic efficiency, is created. This inefficiency arises from consumers perceiving higher prices than those prices received by suppliers. The deadweight loss on the Connecticut economy from the necessary tax increases would amount to $10 billion (Moody). Connecticut’s GDP is currently $250 billion, meaning this loss would amount to 4 percent of the state’s economy (FRED). This policy could cover the entire current shortfall in the pension system if the taxes are raised high enough. This action would therefore be a very effective policy in the short run as measured by this impact category. However, in the long run, pension benefits are likely to increase further. Therefore, the tax revenues could fall short in the long run, unless taxes are raised again. Increasing the income tax, therefore, is not a long run solution.

By itself, this policy will not affect the amount of pension benefits employees are receiving. Because, by raising revenues the costs of the program do not need to be reduced as much or at all if enough revenue is raised. If this policy is enacted in tandem with another, the benefit amounts in the employees’ pensions’ plans will not need to be reduced by as large of an amount to reach solvency. (Staman). Therefore, retirement security should not be affected in the short run. However, this policy is not a long run fix, so there could be a decrease. In the future, tax revenues could not be enough to cover payouts, or benefits might be cut to be lower than the increase tax revenues.

In the last category of effectiveness, I try to evaluate each policy’s level of transparency in the amount of benefits it is paying out to workers. This goal is important, because explained before, a high level of underestimation of benefit amounts has been sourced as exacerbating the problem. Under this policy, the state legislators will need to calculate what level to increase the taxes to and therefore will need to know how much revenue to raise by knowing how many benefits are being delivered. This work should bring their attention to the amounts being paid out. However, it is not incredibly likely the legislators will see all of these numbers, and again the underlying payout system is not being changed, so some lack of clarity will persist.

As Connecticut’s legislature has a majority of Democrats, the taxpaying base would be more inclined to pass a higher income tax rate on the wealthy to help sustain public worker pensions. Because the economy is rebounding, increasing the taxes to restore the tax base to its level before the recession is not unreasonable politically (Munnell “Funding”). However, there is not a high level of support, because increasing taxes can be challenging, especially if people do not see a fix to the underlying problem occurring. The employees and employers in the system will approve of this tax increase, because it means they will not need to increase their annual contributions to fund their plans. The ARCs have not been met recently during the financial crisis and not raising them would allow the states to use the money in other spending areas. The current amount paid out to the employees would not be changed so the unions should support this proposal (Munnell, “Funding”).

As an increase in taxes does not change the benefits paid out the employees, the equity of payments right now would remain unchanged. As of now though the formula for calculating a worker’s pension amount is “back-loaded” in the sense that it is more favorable to older and long-term workers disproportionately.
Approximately half of government workers leave without any rights to pension benefits. These are the younger workers whose work years are weighted lower than years worked later in careers (Biggs, “How”). By not changing anything the inequity faced by these two groups would persist. In the future, if tax increases are not enough to sustain the pension program, cuts will be made in younger and future workers benefits. As for the difference, in the sectors, private workers will be paying higher taxes to support expanding pension benefits for public-sector workers. Many private-sector workers do not have pensions, which is a source of inequity in the sectors.

**Policy Alternative Two: Increase the Retirement Age**

Andrew Biggs, a scholar at the American Enterprise Institute, has calculated that Connecticut pays out on average $50,388 per year to retired full-career state employees. He finds the total average lifetime benefits per employee are over $1 million (Biggs, “Not”). Payouts are larger than most politicians realize. The average member of the American Federation of State, County and Municipal Employees receives approximately $19,000 a year in pension benefits after a career in public service. (Biggs, “How”) Increasing the retirement age by one year would reduce liabilities by 2-4 percent. After a small reform in Connecticut after the crisis, an increase in the age and tenure requirement and a cut in the COLA amounts by 0.5% decreased the Connecticut State Employees Retirement System employer’s cost by 2 percent by 2028 (Center for Retirement Research).

For every year increase in the retirement age, public employees would be giving up the annual benefits and a year of retirement. The annual benefit of a full-career public employee in Connecticut is calculated to be approximately $50,000. Of course, the employee would make their salary for this year, which would outweigh their pension benefit; however, they must work to receive this salary whereas they get to consume all leisure and receive the pension benefits in retirement (Biggs, “Not”).

The transparency of the benefits being paid out will be change very little if at all under this system. This does not fix the back loading of the system, which leads to the underestimation of benefits being paid out, because the average numbers are pulled down by those who earn very little in pension benefits as they work short times in the government. As well, this does not bring attention to the amount being paid out in any way.

Labor unions are more likely to fight this proposal, causing more of a legal and political headache and struggle. In Rhode Island, an increase in the retirement age was proposed. The unions fought the increase back down some, and therefore diminished the benefit that would have been seen had the entire increase taken place (Rhode). The increase in retirement age would need to be phased in, instead of implemented immediately, so it could be seen as more favorable to current employees. Therefore, this policy could hurt younger and newer workers even more, making the system more unequal. However, it would not increase the inequity of the benefit amounts being paid.

By decreasing the costs of the pension system, the state would not need to increase taxes by as much, therefore keeping more of the liability away from the taxpayers. The state would not need to take away as many public services provided by tax dollars making taxpayers even happier. In the long-run, cuts in the cost of the pension program are healthier for the state than other cuts in the state budget, making it more favorable to taxpayers and legislators (McGuinn).

The ages of retirement in the plans are lower than the social security retirement ages.
The life expectancy of Americans is increasing and has increased more than the retirement ages in the pension plans have increased. Therefore, it is logical to think the retirement age for public workers should increase (Rauh).

**Policy Alternative Three: Switch to a Collective Defined- Contribution Plan**

A defined-contribution plan is more fiscally sustainable than a defined-benefit plan. By definition, such a plan cannot be underfunded in the same way a defined-benefit plan can be underfunded (Mahler). Therefore the risk of municipalities declaring bankruptcy or the state defaulting would be eliminated (Moody). By removing risk these plans are more effective and sustainable if the economy does have a downturn. Therefore, the system will not be faced with this problem in the future. As for raising money and fixing the liabilities currently owed, this alternative would not remove the already incurred promised payments, but would lower liabilities if people switch (Mahler). It is likely this plan will need to be implemented for new hires, and older workers would either adopt a hybrid or switch. Therefore, a large decrease in liabilities now is not feasible, but going forward this fixes the underlying problem completely.

This switch could induce unease in the public-sector employees. However, this plan should enable retirement security for public workers. Risk for employees has been mitigated in this plan compared to typical defined-contribution plans. If contributions are kept and investments are made wisely, which they should be as a professional manages the accounts, the employees should not face much loss. In addition, in other states, current employees have been able to opt out of the switch if they do not feel comfortable with the plan (“Rhode Island”).

In the impact category of transparency, I have given this policy a high rating. The state of course will not know how much each person will receive in benefits after they retire as this depends on what is in the individual’s account when they retire. However, this lack of knowledge is different than the current lack of knowledge. In this system, they might not know how much is being paid out after retirement, but in this situation the state is not the one paying out the benefits after retirement, so it is not important for them to know how much they owe. In this plan, it is important for the amount the state will be contributing each year to be transparent. In this aspect of transparency, the state will know how much it is required to be placed into the accounts each year, as is specified in employee contracts. That is the amount they will be paying out, and they have complete transparency in that number.

By switching, the state would not need to ask taxpayers to make the debt payments when markets do not perform at the rate predicted by the plan. Current and future taxpayers would be benefited as the liabilities would decrease in both time periods (Mahler). Therefore, taxpayers should favor this policy and therefore, politicians should find it feasible. As for the unions, as long as the legislators provide an adequate amount of education that the risk of benefits declining has been mitigated, and that employees could opt-out if they desired, they should not fight this switch too vehemently.

This policy would be equitable between the different age categories if it is designed properly. The state and employee will contribute equitable amounts for each employee and therefore the benefits they receive should be equitable. The current problem with the back loading of the formula should disappear. The switch will not only target younger and newer employees, but will affect all employees similarly (Mahler). The only difference in implementation is that some states have allowed current employees to opt-out of switching
whereas new employees will not get the option ("Rhode"). As most private-sector employees already operate under a defined-contribution pension plan, this policy will lead to more equality in retirement benefits across the sectors.

**Policy Recommendation and Implementation Challenges**

I recommend the state of Connecticut switch from a defined-benefit plan to a collective defined-contribution. A defined-contribution plan is more fiscally sustainable than a defined benefit plan as this policy will make very difficult for the system to be underfunded, once it is fully implemented. Because the fund cannot be underfunded, the state will avoid the need for major pension reform in the future, which means that politicians will not be put in the difficult political position that current legislatures are facing. In addition to avoiding the need for reform, the fiscal sustainability of this plan will prevent the current and possible symptoms from being felt again. Other benefits of this policy include that equity will be felt among the different age groups and different sector workers, transparency in the state’s benefit contributions, pooling of risk for employees, and taxpayer relief.

The design and implementation of the defined contribution plan would take legislators’ time and employees’ time. The state legislators would need to spend time understanding the details associated with a defined-contribution plan as opposed to a defined-benefit plan, in addition to understanding the extent of this problem (McGuinn). Therefore, it would require politicians to request more information and educational tools on the subject. An educational campaign about this new plan would be needed for public employees and taxpayers (Mahler). Employees could opt out of working for the public sector if they do not understand the new plan (Biggs, “How”). The more employees that opt out of the switch, the less of an impact this policy will have. Lastly, the legislators would need to be in contact with the leaders of the unions so they can talk through compromises to make sure the policy is amenable to both sides, and thus less likely to face legal opposition.

**Conclusion**

The state of Connecticut has one of the highest amounts of unfunded liabilities in the country. If this problem is not addressed, the state could be looking at defaulting or municipalities declaring bankruptcy. The way the system is currently designed allows for politicians to promise benefits now, while pushing the costs down the road for future legislators to handle. I have evaluated three possible alternatives; however, they are not mutually exclusive. They include increasing the income tax, increasing the retirement age, and switching to a collective defined-contribution plan instead of a defined-benefit plan. I have determined that Connecticut should switch to a collective defined-contribution plan from the current defined-benefit plan. This policy is better than the others because it attacks the problem at the root and by definition will be unable to be underfunded. In addition, it allows for more equity, and does not threaten worker’s retirement security. To face fewer challenges, the implementation would need cooperation among the union leaders and legislators and a strong educational campaign.

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