An Examination of the Single-Payer System: Giving a Number to Adjusting America's Health Insurance Framework

by

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Abstract

This paper looks at the potential savings that can be generated by implementing a single-payer health insurance system in the state of Vermont. Data on health care expenditure within the state is primarily taken from the OACT and Center of Medicare and Medicaid Services. Projections are made for Vermont's health care expenditure under the status quo insurance system versus the health care expenditure that could be possibly realized through implementing the single-payer reforms. Support for assumptions for the financial savings are gathered from three main case studies concerning the single-payer system in Vermont, from Harvard, the state of Vermont, and the University of Massachusetts. The chief assumptions for the research paper concern savings for:

- administrative cost reduction
- fraud and abuse reform
- payment systems reform
- overutilization reform
- governance and administration cost reduction

These assumptions are used to develop a cost-benefit analysis for the state of Vermont that incorporates the cost needed to cover the uninsured population within the state. A sensitivity analysis is conducted on the projections to develop a base, best, and worst case scenario for possible cash outflows going forward. We assert that there are three possible outcomes that our study has implications on: first, implementing a single-payer system will not have any effect on Vermont's health expenditure, second, implementing a single-payer system will make expenditures increase, and third, implementing a single-payer system will make expenditures decrease. We discover that with our assumptions, within any of our scenarios the long-term cost expenditure of Vermont will decrease if we implement a single-payer system, or in other words, the value of implementing a single-payer system is positive.

Acknowledgements

First and foremost, I would like to thank my thesis advisor, Professor Peter Henry, for his support and guidance through the entire year of my research process. His insight into macroeconomics and advice for thesis writing has been invaluable to my paper. I would also like to thank Professor Marti Subrahmanyam for his organization and commitment to the Stern Honors Thesis program. I am thankful that he made this program possible. Finally, I would like to thank my mother, who works in the healthcare industry and inspired my interest in the topic. I would like to dedicate this paper to her for her support and inspiration.

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I.   Introduction

In 2017, healthcare was cited by 35% of Americans as the most important challenge facing the nation in a Bloomberg News National Poll conducted in July (Selzer & Company, 2017). Of the challenges listed within this poll, other concerns trailed behind with unemployment at 13%, terrorism at 11%, and immigration and climate change listed at 10%.

Figure 1
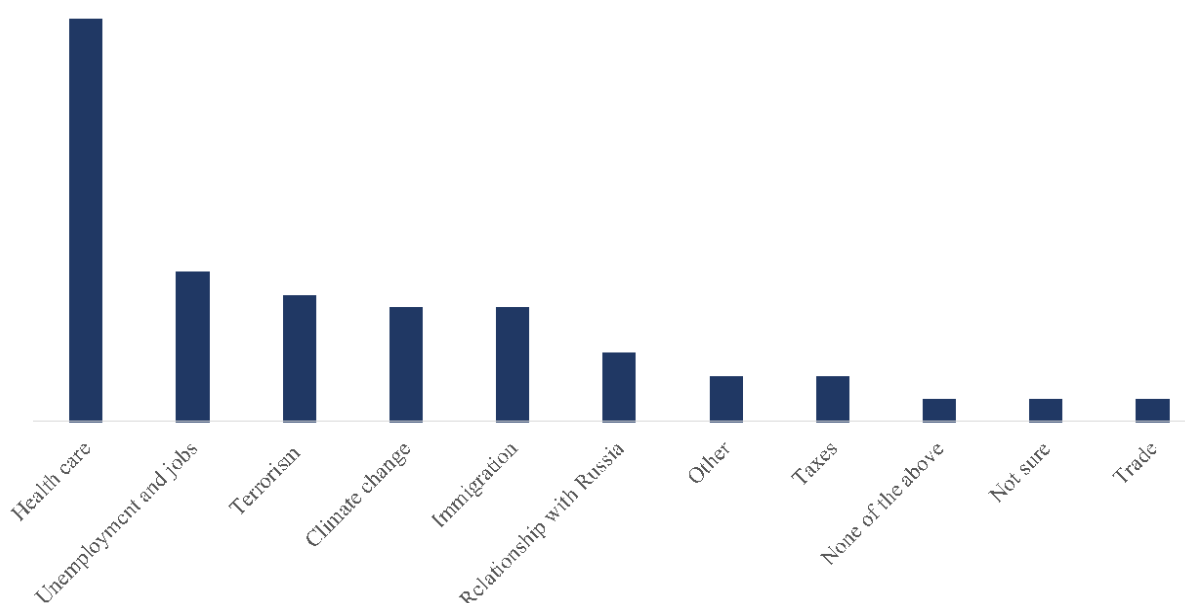
The high degree of interest that is present among the American population reflects the growing discontent with the current health care infrastructure, specifically the average American's access to quality care versus the average cost of health care. Healthcare is expected to rise to 20% of American GDP by 2020, from 17.9% today[1]. The subject of high health care spending has become a contentious matter within the most recent years as affordability of health insurance rises in difficulty for many Americans. In 2016, 45% of adults say that they lack

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[1] Keehan SP, Sisko AM, Truffer CJ, et al. National health spending projections through 2020: economic recovery and reform drive faster spending growth. Health Aff (Millwood). 2011;30(8):1594- 1605.

insurance because the cost of coverage is too high (Kaiser Family Foundation, 2017). With a significant lack of affordability for health insurance, a few key questions arise: 1) Are Americans receiving the full benefit per dollar spent on health care, and 2) How can we reduce the cost of health care?

While individual health insurance plans are inextricably dependent on idiosyncratic risks, a proxy for measuring the benefit that is reaped from each dollar spent on health care can be found in a comparison of the percentage of GDP spent on health care versus the average population life expectancy. Once the data for each country is compiled, it becomes evident that the US is an outlier as one of highest spenders on health care with one of the lowest life expectancies among the OECD countries.

Figure 2
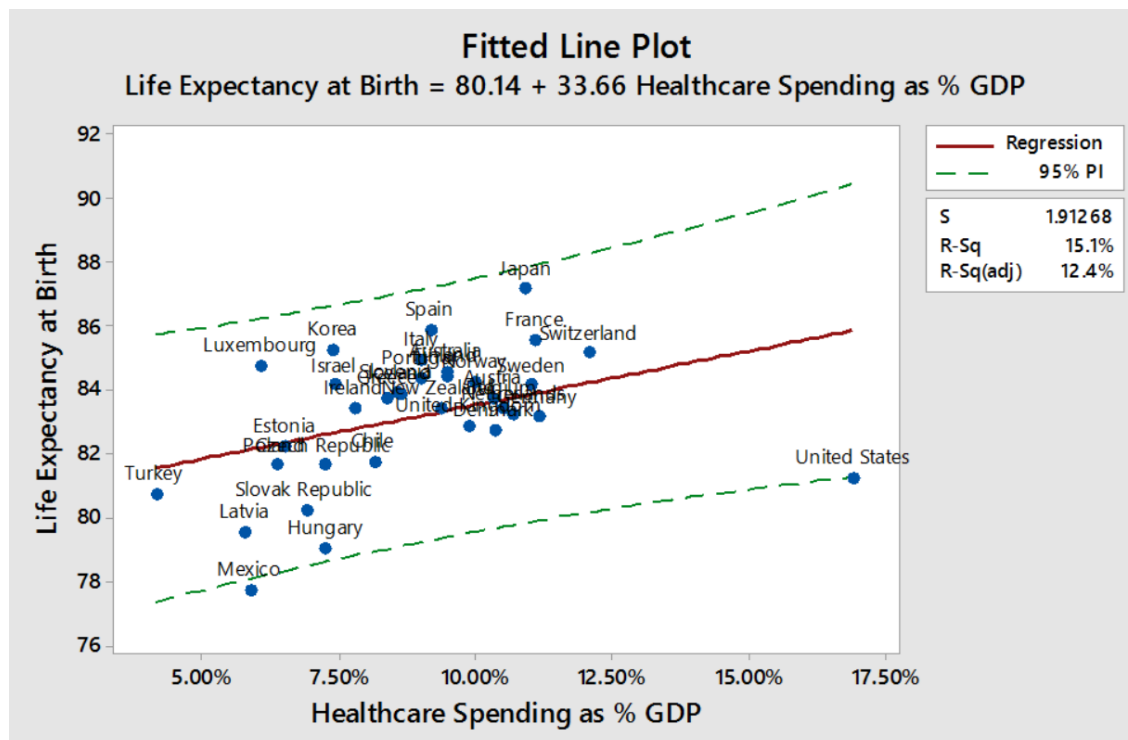
Source: OECD.org

With the data for female life expectancies regressed against health care spending as a percentage of GDP, we get an R-squared value of around 15.1% and a P-value of 0.023, a statistically significant value.

Looking at the above data, we must ask ourselves, what are the reasons behind the US's abnormal level of healthcare expense? Are there areas of obvious waste that are present in the American health care system that can be defined? In a Journal of the American Medical Association paper, Donald M. Berwick and Andrew D. Hackbarth proposes six major sources of excess spending in health care that they call "failures":

1. **Failures of care delivery:** poor execution or failure to adopt best care practices, including but not limited to patient safety systems and preventive care practices

2. **Failures of care coordination:** waste from fragmented care that result in complications, typically for the chronically ill, for whom coordination is essential.

3. **Overtreatment:** excess care for patients that could not reasonably help them, stemming from "outmoded habits, supply-driven behaviors, and ignoring science". Examples include excessive use of antibiotics and surgery.

4. **Administrative complexity:** waste from government, accreditation agencies, payers, etc. creating misguided and/or inefficient rules and practices

5. **Pricing failures:** waste from prices that well-deviate from those expected in well-functioning markets. An example: prices for MRI and CT scans are several times more than identical procedures in other countries due to lack of transparency and competitive markets.

6. **Fraud and abuse:** waste from fraudsters issuing fake bills or running scams. For example, medical identity theft where fraudsters incur medical spending in another's name.

Figure 3

Table. Estimates of Annual US Health Care Waste, by Category[a]

	$ in Billions					
	Annual Cost to Medicare and Medicaid in 2011[b]			Annual Cost to US Health Care System in 2011		
	Low	Midpoint	High	Low	Midpoint	High
Failures of care delivery	26	36	45	102	128	154
Failures of care coordination	21	30	39	25	35	45
Overtreatment	67	77	87	158	192	226
Administrative complexity	16	36	56	107	248	389
Pricing failures	36	56	77	84	131	178
Fraud and abuse	30	64	98	82	177	272
Total[c]	197	300	402	558	910	1263
% of Total Spending				21	34	47

[a] Table entries represent the range of estimates of waste in each category from sources cited in the text. The total waste estimates are simply the sums of the category-level estimates. This simple summing is feasible because the categories are defined in such a way that wasteful behaviors could be assigned to at most 1 category and because, like Pacala and Socolow,[9] we did not attempt to estimate interactions between or among the categories.
[b] Including both state and federal costs.
[c] Totals may not match the sum of components due to rounding.

Berwick and Hackbarth quantify the wastes listed in dollar terms, both to the Medicare and Medicaid system, as well as the health care system as a whole (Figure 3). This paper will attempt to identify potential improvements that can be made to the American health care system in order to decrease some of these wastes, principally through the adoption of a single-payer system at the state level. While certain wastes such as pricing failures are outside of the scope of this paper, many will be relevant.

II.   Defining the Single-Payer Insurance System

In the presidential election of 2016, there was significant buzz around a concept called the "single-payer insurance system", chiefly generated by former candidate Senator Bernie Sanders (Vermont). Perhaps to no surprise, in 2011 Vermont passed legislation authorizing the first state level single-payer health care system in the United States, known as Green Mountain Care. This plan was studied from 2011 to 2014 through various case studies commissioned from

third party sources. However, this plan was abandoned in 2014 due to claimed infeasibility of tax burdens upon small businesses within the state[2]. Nevertheless, the idea was sparked. Building off of the GMC case and the subsequent cost studies, we will attempt to quantify the potential value of the GMC plan if it came into fruition. As concerns about healthcare affordability increases in America, we must question ourselves: is there a potential loss associated with our continued refusal to adopt a single-payer insurance framework, as countries such as Canada, Taiwan, South Korea, Scandinavia, and the United Kingdom have? The goal of this thesis is to give a number to the potential benefit America can glean from adopting a single-payer insurance framework, with the end goal of achieving universal healthcare insurance coverage for all residents. It is important to note that the writer will not be attempting to project the costs associated with expanding healthcare coverage to all citizens, but will merely attempt to provide a net present value to adopting a national single-payer system. If a positive net present value is concluded, the future savings may be used for further expansion of medical insurance coverage for Americans.

To begin evaluating the potential of applying a single-payer insurance framework to the United States, we must first understand what a single-payer system is, and distinguish it from terms that are conflated with it, such as universal healthcare, or socialized medicine. A single-payer system is defined as "health care system in which one entity – a single payer – collects all health care fees and pays for all health care costs"[3]. While a single-payer system implies universal health insurance coverage, in which all residents of a region are covered by health insurance, because the government is responsible for paying for excessive financial hardship in obtaining health insurance, the two terms are not synonymous. All single-payer systems should

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[2] "Why Bernie Sanders' Single-Payer Health Care Plan Failed In Vermont." NPR, NPR, 13 Sept. 2017, www.npr.org/2017/09/13/550757713/why-bernie-sanders-single-payer-health-care-plan-failed-in-vermont.

[3] "Single-Payer System Definition." Healthinsurance.org, 10 Nov. 2017, www.healthinsurance.org/glossary/single-payer-system/.

result in universal health care coverage, but not all universal health care coverage results from single-payer systems. Single-payer systems just happen to be one of the most effective tools in guaranteeing health care disbursement to all citizens. An example of a state that does not have a single-payer system but has universal healthcare is Massachusetts, where every citizen above 150% of the federal poverty level is mandated by law[4] to obtain health insurance, and citizens under provided free health insurance. Employers with more than 10 full-time employees are mandated to provide health care insurance.

A single-payer health insurance framework is also different from socialized medicine, in which the government "the government owns and operates health care facilities and employs the health care professionals, thus also paying for all health care services"[5].

Now, the reader may understand what a single-payer system is. However, one of the biggest struggles in restructuring the American insurance system is first understanding how it is presently structured. The American health insurance system is a homunculus of several different systems for different population segments. A brief overview of four basic types of health care systems follows.

Overview of Health Care Systems

In his 2009 published book, *The Healing of America: a Global Quest for Better, Cheaper, and Fairer Health Care*, T.R. Reid proposes that there are four different types of basic health care systems.

First, there is the **Beveridge model**, where "health care is provided and financed by the government through tax payments, just like the police force or the public library"[6]. This model,

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[4] Massachusetts health care reform law of 2006

[5] "Socialized Medicine Definition." Healthinsurance.org, 9 Nov. 2017, www.healthinsurance.org/glossary/socialized-medicine/.

[6] Reid, T. R. The Healing of America: a Global Quest for Better, Cheaper, and Fairer Health Care. Penguin Books, 2010.

or a variation of it, is in use by Great Britain, Spain, most of Scandinavia, New Zealand, Hong Kong, as well as Cuba.

Second, the **Bismark model** is an insurance system "financed jointly by employers and employees through payroll deduction". This model is found in Germany, France, Belgium, the Netherlands, Japan, Switzerland, and, to a certain extent, in Latin America.

Third, the **National Health Insurance model** combines both Beveridge and Bismark, using private-sector providers, but with payment coming from "a government-run insurance program that every citizen pays into"[7]. This model is found in Canada, Taiwan, and South Korea.

Finally, there is the **Out-Of-Pocket model**, used by what Reid asserts are "countries too poor and too disorganized to provide any kind of mass medical care", where only the rich are able to afford care, and the poor receive no financial support from the government.

It is important to note that of the above four models, the National Health Insurance model is one that is considered to be single-payer health care insurance, whereas the Beveridge model is considered to be single-payer health care service in addition to single-payer health insurance. In the National Health Insurance model, the costs of health care service are publicly funded, whereas in the Beveridge model health providers are also public.

Reid proposes that America has a fragmented health insurance system composed of all four of the above models. For veterans, we are the Beveridge model. For Americans over the age of 65 who qualify for Medicare, we are the National Health Insurance model. For Americans who have insurance included as benefits of employment, we are the Bismark model. Finally, for the remaining 12.2% of Americans who currently lack health insurance, they live under the Out-Of-Pocket model[8]. It is easy to understand why such a convoluted hodgepodge of insurance

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[7] *Ibid.*

[8] https://www.cnbc.com/2018/01/16/americans-without-health-insurance-up-more-than-3-million-under-trump.html

policies is confusing to the average American. In contrast, let us take a look at the single-payer system proposed in Vermont in 2011.

III.   Overview of Green Mountain Care

Green Mountain Care is the most comprehensive attempt to achieve universal single-payer health care in history of the United States. Under this system, claims administration and provider relations functions are put out for competitive bid to the private sector. The plan foresees an incremental move to a public-private system, financed through 14.2% payroll tax, with the majority of burden on the employer at 10.6%. The plan would have had actuarial value[9] of 87% for all Vermonters, and lower health care costs for 90% of Vermonters, those who have income below $150,000. The goal of the plan is to create one publicly financed insurance fund that provides basic benefits to all citizens and pays providers under uniform mechanisms and rates. While the plan was passed on May 26, 2011 and meant to be implemented in 2015, it was ultimately reversed due to lower than expected state tax revenues.

State of Vermont Case Study on Green Mountain Care

On December 30, 2014, Vermont Governor Peter Shumlin released a report on Green Mountain Care that concluded that as of that day, their plans to move forward with a publicly-financed health care system in Vermont is on hold. The report includes advocating for Green Mountain Care, listing the following shortcomings of the current health care system: 1) it leaves out the 7% uninsured in Vermont, 2) it is unfair in how it distributes costs, depending on what benefits are covered by the individual's employer, 3) it sacrifices wage growth and cripples business, 4) it is horribly complex, 5) it is terribly expensive and grows faster than the economy, and 6) it encourages waste and inefficiency.

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[9] Actuarial defined as the percentage of total average costs for covered benefits that a plan will cover (healthcare.gov)

Current Vermont system. The Vermont legislature claims the current health insurance system is broken because of the following reasons. First, for the 7% uninsured in Vermont, when they receive health care services, they receive the largest bills due to a lack of negotiated discounts provided to insurers. Second, it is overly reliant on coverage by employers. Two families with the same exact income and persons can receive vastly different coverage based on what their employers offer. Third, around 44% of Vermonters get their healthcare coverage from employers, a huge burden on employers in both a financial and administrative sense. This creates a drag on wage and firm growth. Fourth, it is unreasonably complex. Fifth, the current health care system in Vermont creates costs that grow almost twice as fast as the state GDP (7.3% between 1991 and 2009 for health care costs versus 4.2% for GDP). Sixth, it encourages waste and inefficiency, and lacks incentives for providing proper care. Duke University estimates that around 30% of care that are provided to patients are unnecessary, which would amount to approximately 1.4 billion in Vermont[10].

Goals of the Proposed System. Shumlin states that the goal of GMC are the following: to cover all Vermonters, to provide coverage that is comprehensive, to simplify the system for Vermonters, employers, and health care providers, to provide for excellent customer service and capable administration, to spread costs fairly, and to ensure that the program is financially sustainable for Vermont and does not hurt our economy, employers, or employees.

Structure. The plan is structured as a "public-private partnership between state government and a designated entity with the ability to contract with providers, implement innovative payment policy, contract with an out-of-state provider network, establish reserves

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[10] https://www.icsi.org/_asset/y74drr/eliminating-waste-in-the-us-healthcare-2012.pdf

against insurance risk and provide excellent customer service"[11]. GMC is expected to cost 4.3 billion in its first year of implementation and 5.2 billion in the fifth year. With an assumption of a health care cost growth rate of 4%, the plan is expected to generate savings of 378 million in the first five years.

Funding. Funding for GMC at the state level would come from current state revenue sources with the removal of revenues associated with the employer assessment, the claims tax, and certain Medicaid premiums. Federal funding for healthcare in Vermont is trended forward from current projections of the Medicaid-eligible population in Vermont, specifically those who are eligible for a Section 1115 Medicaid waiver[12]. An assumption of a "pass-through" of current federal funds currently paid to Vermont residents in the form of refundable tax credits and cost-sharing reductions is also in place[13].

In addition, two new sources of funding will have to be implemented in order to supplement funding in place of employer-based premiums: first, a payroll tax on all Vermont employers of ~11.5% and an income-based premium on Vermont residents on a sliding scale, with the highest-earning Vermonters paying up to 9.5% of income.

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[11] 2014 State of Vermont Report on Green Mountain Care,
http://hcr.vermont.gov/sites/hcr/files/pdfs/GMC%20FINAL%20REPORT%20123014.pdf

[12] From Medicaid. gov: Section 1115 of the Social Security Act gives the Secretary of Health and Human Services authority to approve experimental, pilot, or demonstration projects found by the Secretary to likely assist in promoting the objectives of the Medicaid program

[13] This pass-through will have to be approved through a new Affordable Care Act Section 1332 waiver

Figure 4

Average Change in Net Family Income Post-Reform

	2017	2018	2019	2020	2021
Change in Net Family Income	-460	310	1,210	1,450	1,880

The GMC board estimates that over time the average Vermont family would have higher net family income on average under GMC, due to higher income, lower health care costs, and lower federal tax liability under GMC.

Figure 5

Average Change in Net Family Income by Income Class	
Income Class	Average Change in Net Family Income
<$10000	1,203
$10k - $19,999	952
$20k - $29,999	909
$30k - $39,999	2,012
$40k - $49,999	1,677
$50k - $74,999	2,645
$75k - $99,990	2,452
$100k - $149,999	739
$150k - $249,999	-2,120
$250,000 +	-5,841

Which is not to say that every household will benefit financially under GMC. The study concludes that all households with income under $150,000 will have a positive net financial impact from GMC, which those above will see a negative impact.

Why Vermont did not move forward with GMC

The following is included in the report released by the State of Vermont on December 30, 2014: "Given the current economic climate and other factors, the risk of economic shock is too

high. [...] The policy choices that are necessary, such as a transition plan for small businesses that this report will show to be absolutely critical—are not affordable at this time". While evaluating the true reasons behind holding off implementing GMC is beyond the scope of this report, we can infer that the reasons cited, such as unsustainable pressure for small businesses and unstable political climate, are large motivators. In addition, the distributive nature of the plan, in which households with income greater or equal to $150,000 will incur negative net financial impact, may be a large political motivator towards delaying the plan. Despite Governor Shumlin's statement that the immediate implementation of GMC is infeasible, the researcher believes that objectively reviewing the assumptions made behind the projections of the GMC plan and challenging the results of the study can yield valuable information for future policy decisions.

IV.   Hypothesis

The writer has decided to re-evaluate the assumptions made in the Vermont state case study on GMC, due to the generous nature of the projections. It is integral to future policy decisions that the studies conducted in Vermont in regards to GMC are objective and as accurate as possible. Post-evaluation and adjustments to the assumptions made in the GMC report, the researcher will develop a new value for GMC projected our over nine years. There are three possible outcomes to developing such a number.

1. There will be no significant effect on the original proposed outcome of implementing GMC.

2. There will be a negative net effect on original projections.

3. There will be a positive net effect on original projections.

Before one can undertake a meaningful new projection, one has to look at alternative case studies, chiefly a Harvard case study and a University of Massachusetts case study on Green Mountain Care with different assumptions and conclusions.

V.   Case Study Comparison

Harvard Case Study for GMC

A Harvard case study commissioned by Vermont in 2011 proposes that the state will save 7.3% in administrative expenses, 5.0% in reduced fraud and abuse, 10.0% in payment reform and integration of the benefit delivery system, 2.0% through malpractice reform, and 1.0% in other governance and administration. Justification for the savings are as follows.

Administrative costs are expected to decrease from consolidating insurance functions and reduced administrative costs for providers due to increased uniformity of claims administration. In simpler terms, this means that the infrastructure eliminates the need for members within the health care community to understand and work with the varied rules and myriad benefit packages offered by multiple insurers.

Reduced fraud and abuse costs are expected to result from the consolidation of insurance functions, which makes detection of fraud and abuse easier.

Savings from payment reform and integration of health care delivery are expected to result from reduction of waste and duplication in the health care system. Payment system restructuring to eliminate fee-for-service payment, where economic incentives for physicians to perform more care than needed are significant, and to incorporate a risk-adjusted capitalization* payment system, is expected to result in further 10% reduction. The new payment system would award bonuses to accountable care organizations that achieve quality standards.

Savings from malpractice reform are expected to stem from implementation of a no-fault system, where responsibility for medical accidents, in the case where there is no provable medical malpractice, falls upon the hospital and not the physician.

Governance and administration savings are proposed by the study to come from allowing an independent board to govern the single-payer system. The authors of the study did not provide a source of data for justifying the savings, but state that their "experience with designing and researching health systems around the world suggests that together they will have a modest impact on total health spending, which we estimated to be a further 1 percent reduction in spending compared to a single-payer system that is purely government-run"[14].

Figure 6

Projected Savings From Vermont's Single-Payer Health Plan, 2015–24

Source of savings	Amount (percent of total health spending)
Administrative expenses	7.3
Reduced fraud and abuse	5.0
Payment reform and integration of delivery system	10.0
Malpractice reform	2.0
Governance and administration	1.0
Total	25.3

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[14] "What Other States Can Learn From Vermont's Bold Experiment: Embracing A Single-Payer Health Care Financing System", William C. Hsiao, Anna Gosline Knight, Steven Kappel, and Nicolae Done, Health Affairs 2011 30:7, 1232-1241.

Figure 6

Source of savings	Savings as a percent of total health spending	Time in years for savings to be fully realized
Administrative	7.3%	6
Fraud and abuse	5%	2
Payment reform and integration of delivery system	10%	10
Malpractice reform	2%	5
Governance and administration	1%	10
TOTAL	25.3%	10

University of Massachusetts and Wakely Consulting Group Case Study

The UMass-Wakely paper makes the following key assumptions:

- All Vermont residents will be enrolled in GMC beginning in 2017

- if the individuals have employer-sponsored insurance (ESI) or Medicare, that plan would pay first with GMC supplementing any additional costs

- GMC provides comprehensive health insurance, including mental health and substance abuse, pharmaceuticals, pediatric dental and vision, and care coordination for chronic needs services

- Adult dental, vision, and long-term services are not included in the base model

- the GMC plan has an actuarial value of 87% with remaining covered through cost-sharing requirements, and subsidized if eligible

- GMC will provide administrative functions currently performed separately by the myriad private and public health plans through a single unified system

- GMC pays health care providers 105 percent of Medicare rates

The authors assert that their analysis shows that the administrative savings from moving to a single-payer system would generate a positive net present value even after including the cost of covering more Vermonters and increasing benefits for others. The authors propose that the total cost of providing coverage under GMC for all Vermonters (post-Medicare and ESI contributions) is approximately $3.5 billion.

Figure 7

Estimated GMC Base Costs in 2017 (in millions)

GMC Primary (not eligible for Medicaid-match)	$1,519
GMC Primary - Medicaid-Match Eligible	$1,230
GMC Secondary – Medicaid-Match Eligible	$645
GMC Secondary - Medicare Primary	$83
GMC Secondary – ESI or Other Primary	$21
Total GMC Base Costs	**$3,498**

In addition, "single-payer reform is expected to produce increased savings over time for the State as a result of lower administrative costs and through constraining the overall rate of growth in health care costs"[15]. The authors estimate that the State will save $281 million in the first three years after reform.

Figure 8

Total estimated statewide health care costs, 2017-2019 (in millions)

	2017	2018	2019	3 year total
Without reform	$5,952	$6,262	$6,606	$18,819
With reform	$5,916	$6,175	$6,448	$18,539
Savings with reform	$36	$86	$158	$281

The study makes an additional assumption that the sources of funding that current Vermont system will largely remain the same for individuals covered by Medicaid and ESI, with

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[15] London, Katherine, et al. "State of Vermont Health Care Financing Plan Beginning Calendar Year 2017 Analysis." Commonwealth Medicine, University of Massachusetts Medical School, University of Massachusetts Medical School, 24 Jan. 2013, commed.umassmed.edu/our-work/2013/01/24/state-vermont-health-care-financing-plan-beginning-calendar-year-2017-analysis.

the exception of an increase of $249 million in federal funding through the Medicaid match program. Through the reform, individuals and employers are expected to experience 1.896 billion in healthcare insurance savings through lower costs involved with administration, improved coordination of care and benefits, and lower rates of growth in health care premiums.

Figure 9

	Without reform	With reform	Difference
Individuals and Employers *	$2,228	$332	($1,896)
Federal: Medicare	$1,613	$1,613	$0
Federal: Medicaid Match	$998	$1,247	$249
Federal: ACA	$267	$267	$0
Federal: Other	$209	$209	$0
State Medicaid Funding	$637	$637	$0
Total Sources of Funds	**$5,952**	**$4,305**	**($1,647)**
Total System Costs	**($5,952)**	**($5,916)**	**$35**
Amount to be Financed		**($1,611)**	**($1,611)**

* Individuals and Employers: includes individuals, small group and large group. Without reform also includes Medicare Secondary & Part D premiums. Without reform is net of ACA premium and cost sharing subsidies.

VI.   Data and Methodology

Making Assumptions for Costs Pre-Reform

The Office of the Actuary (OACT) periodically estimates health spending by state of residence and state of provider for policy discussions at the state and national level. The most recent year of estimation is 2014, from which we must make our own projections for spending in recent years. The OACT makes two estimates of healthcare spending by state: one for spending by state of provider, and one for spending by state of residence. Because spending by state of residence is most relevant for our study in estimating the financial benefit for residents of a state in switching to a single-payer system, this will be the principal set of data used within this report. The largest component of health care expenditure in the United States is termed Personal Health Care (PHC)

expenditure, which "includes all health care goods and services consumed and excludes administration and the net cost of private health insurance, government public health activities, and investment in research and structures & equipment" [16]. Because a large component of the expected benefit from adopting a single-payer system arises from administrative savings, which is not estimated at the state-level, it will have to be added back in post-PHC analysis. A summary of the methodology used by the CMS to estimate state-level personal health care follows:

First, expenditures for each PHC service at the state-level is estimated using provider-based survey data. Second, estimates of spending by payer are developed using administrative claims data and survey data. Finally, provider-based expenditures are converted to residence-based expenditures through health care expenditure patterns between states.

The researcher then separated these estimates of state-by-state spending into separate line items of spending for hospital services, physicians and clinics, other professional services, dental, home health, nursing, drugs and non-durables, durables, and other health services.

Thorough data is available for health care spending by state for the years 1991 through 2014. However, thereafter data is limited to projections of national health care spending up to the year 2026 by the CDC. Therefore, our own projections for healthcare spending by state must be made for the years after 2014, if we want to arrive at a net present value for the next 10 years.

Forecasting national healthcare spending by state then expense. We make an important assumption that the percentage that each state makes up of national personal healthcare spending remains relatively stable across the next 10 years. The reason for this is that the average standard deviation for all 50 states across the years 1991 to 2014 for percentage of national healthcare spending is .086%. Furthermore, very little variance is seen for percentage makeup of national

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[16] "Index." CMS.gov Centers for Medicare & Medicaid Services, 21 Dec. 2017, www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/index.html.

spending by each state is seen across the 10 years before 2015. In addition, another important assumption is that the mix of healthcare spending by state remains largely the same. In this way, we forecast base healthcare costs without reform at the state level for the years 2015-2026, for which the CMS does not have forecasts for.

Forecasting Medicaid and Medicare funding. Next, we make the assumption that the percentage of Medicaid and Medicare spending by state remains largely stable. The average standard deviation for the percentage of personal healthcare costs funded by Medicare and Medicaid is 1.62% for the years 2004 to 2014.

Forecasting of Future Administrative Costs. Administrative costs are considered to be a separate line item from the personal health expenditures that are released by the CMS. Our assumptions for administrative cost savings must be separated into government administrative costs and private sector administrative costs. While CMS releases projections of government administrative costs for the next ten years, we must make estimates of average private sector administrative costs, which averages about 8.9% after commission, premium tax, and profit are taken out, according to a 2006 study published by the Council for Affordable Health Insurances[17].

Making Assumptions for Costs Post-Reform

Savings through Administrative Cost Reduction at Firm-level. "It's an incredible bureaucratic mess to get anything done for patients", said Dr. John Cullen, president-elect of the American Academy of Family Physicians. Dr. Cullen's family office employs four full-time staffers who work on insurance, patient billing, and prior authorizations from private and public insurers. In contrast, Dr. Trina Larsen Soles' 12-physician practice in British Columbia has one

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[17] http://mforall.net/files/CAHI_Medicare_Admin_Final_Publication.pdf

full-time staffer dedicated to billing the province's public medical services plan[18]. The myriad of

funding sources for health insurance is one of the major causes of high administrative costs for

the US healthcare system. This, combined with higher prices for medical services and

pharmaceuticals, as well as higher pay for physicians and nurses, largely result in inflated costs

of healthcare for the individual American. In 2016, 8% of US healthcare spending went to

administrative costs incurred by private and public insurers, in comparison of an average of 3%

in ten other wealthy countries (Switzerland, Germany, Netherlands, Canada, Sweden, Australia,

Denmark, UK, Japan, and France)[19]. The assumption that we make here is that by consolidating

to a single payer system, we can increase uniformity of claims administration and thus reduce

administrative costs associated with staffing, time, and training. The Harvard case study makes

an assumption of total cost savings of 7.3% for administrative cost reductions. The UMass cast

study makes an assumption of total cost savings of $281 million over the course of 3 years.

Savings through Reform of Overutilization. Commonly cited sources of inefficiency in

relation to healthcare costs include excessive utilization caused by the US fee-for-service system.

This is the same assertion made through the Harvard case study, where reform to a value-based

payment system will reduce unnecessary care, that reform of the payment system will contribute

to savings of 10% of total health care cost over 10 years. In opposition to this assertion, a study

published in the Journal of American Medical Association (JAMA) suggests that a switch to a

value-based system may have less of a savings impact that previously recognized. Dr. Ashish

Jha, co-author of the article, titled "To Fix the Hospital Readmissions Program, Prioritize What

Matters", studied the effects of the Hospital Readmissions Reduction Program (HRRP) on

readmission rates. The HRRP, a component of the Affordable Care Act (ACA), creates

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[18] Meyer, Harris. "U.S. Healthcare's World-Leading Spending Is Driven by High Prices, Not Greater Utilization." Modern Healthcare, 7 Apr. 2018, www.modernhealthcare.com/article/20180407/NEWS/180409939.
[19] *Ibid.*

"financial penalties for hospitals for higher than expected rates of readmissions within 30 days of discharge for Medicare patients"[20]. Although earlier data suggested that the act was improving care, recent data shows that the benefits may be lesser than previously understood. Jha asserts that there is a certain amount of overutilization, and that value-based systems can improve the current costs. However, Jha concludes that the greatest source of overspending is the unnecessary inflated price of drugs and medical services. To quote Jha, "We completely have a price problem. MRIs cost twice as much in Kansas as in London, and that makes no sense"[21]. A study by Jha finds that the US had per-capita pharmaceutical spending more than twice as high as average spending in the 10 aforementioned countries, $1,443 vs. $680. The average specialist physician in the US receives $316,000 in comparison to $182,657 in the focus group, and the average generalist receives $218,173 in the US in comparison to $133,723 in the focus group.

In response to the JAMA study, we will reduce the Harvard case study's assumption of 10% to a more reasonable degree of cost saving.

Savings through Payment Systems Reform and Standardization. Conflicting payment practices and contracts require entire departments at hospitals for billing. Even more value is wasted through training and time needed to understand billing rules. One of the most interesting discrepancies in health insurance billing is conflicting determinations of Diagnosis Related Groups (DRGs). DRG is a statistical system of classifying any inpatient stay info groups for the purposes of payments[22]. The DRG system was spearheaded in 1983 by Medicare for the purposes of reimbursement. However, astounding discrepancies between DRG systems, a

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[20] Jha, Ashish K. "To Fix the Hospital Readmissions Program, Prioritize What Matters." JAMA, American Medical Association, 6 Feb. 2018, jamanetwork.com/journals/jama/fullarticle/2671454.

[21] *Ibid.*

[22] From 3M, developer of DRGs: a patient classification scheme which provides a means of relating the type of patients a hospital treats to the costs the hospital incurs. DRGs consist of classes of patients that are similar clinically and in terms of their consumption of hospital resources.

component of deciding billing expenses at hospitals, can be found. There are at least three majorly used DRG systems in use.

The healthcare system relies on a set of codes, referred to as ICD-10 (International Classification of Diseases), to report diagnoses and in-patient procedures. Diagnosis-related group (DRG) is a system used to classify hospital cases into one of approximately 500 groups, which takes into account, but is not limited to, severity of disease, prognosis, treatment difficulty, need for intervention, and resource intensity. There is more than one DRG system being used in the United States, but only the MS-DRG (CMS-DRG) system is used by Medicare. The MS-DRG system is used for the Medicare Inpatient Prospective Payment System (IPPS) calculation. Every year Medicare will upgrade its MS-DRG into a newer version. The most current version as of 2018 is 35. DRGs are assigned by a "grouper" program which gathers claim information based on ICD diagnoses, procedures, age, sex, discharge status and the presence of complications or comorbidities. All these factors are used to determine the appropriate DRG on a case by case basis.

Another popular DRG grouper is APR DRG from 3M Health Information Systems. Every year 3M upgrade it to newer version. Currently the latest version is 34. Mass Health is using version 34 since March 1, 2018. Harvard Pilgrim Health Plan and Tufts Health Plan is using version 30. Blue Cross Blue Shield MA Health Plan is using version 26.1 and will use version 34 in July 2018. Each version of DRGs or different DRG's has its unique matching case weight table. Mass Health has its own case weight table.

When payor (commercial payor) and provider (hospital) negotiate contracts, the main part is to negotiate DRG base rate, then the base rate is multiplied against the case weight. Thus

the case weight is critical.[23] Patient's diagnosis/clinic procedure etc. translates to ICD 10. THe ICD 10 plus the patient's personal information, such as age/gender/weight/height/blood pressure etc. then translates into DRGs.

     Savings through reduction on fraud and abuse. Health care fraud is defined as an "intentional misrepresentation, deception, or intentional act of deceit for the purpose of receiving greater reimbursement". Health care abuse is defined as "reckless disregard or conduct that goes against and is inconsistent with acceptable business and/or medical practices resulting in greater reimbursement"[24]. Fraud and abuse can come from two sides of the payment system: providers and members. Providers can commit fraud and abuse by: billing for services that were not provided, duplicating submission of a claim for the same service, misrepresenting service provided, charging for a more expensive service than provided, and billing for a covered service when what was provided was uncovered. Members can commit fraud and abuse by using a member ID card that does not belong to them, adding someone to a policy that is not eligible, failing to remove someone from a policy when they are no longer eligible, and visiting multiple doctors to obtain multiple prescriptions. The National Health Care Anti-Fraud Association estimates that fraud and abuse costs the nation about $68 billion annually (approx. 3 percent of US health expenditure), whereas other estimates place it at as high as 10%. See the following for a comparison of the estimations for fraud and abuse in the US per year from different sources:

Source	Amount
Institute of Medicine of the National Academies	$75B/year
FBI	$80B/year

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[23] Information on DRGs sourced from budgeting manager at Tufts Medical Center in Boston, MA

[24] "Fraud and Abuse." Fraud and Abuse | Blue Cross and Blue Shield of North Carolina, www.bluecrossnc.com/about-us/policies-and-best-practices/fraud-and-abuse.

Andrew D. Hackbarth and Donald M. Berwick	between $82B and $272B in 2011
Center for Medicare and Medicaid Services	$97B (only for Medicare and Medicaid) in 2016

Source: The National Health Care Anti-Fraud Association[25]

As various sources seem to lean towards the low end of the Hackbarth and Berwick estimates, we can make a conservative estimate that in 2011 fraud and abuse losses in the health care system amounted to around $82B, amounting to approximate 4% of national personal health expenditure that year. As such, we can reason that the assumption made by the Harvard case study for 5% reduction of total Vermont health expenditure as a result of reduced fraud and abuse is a gross overestimation. As the system cannot be expected to completely eradicate all fraud and abuse within any system, we can estimate that the maximum reduction made to fraud and abuse within the health system in the next 9 years will be approximately 2% to 3%.

Savings through governance and administration cost reduction. We make the additional assumptions of a reduction in costs of approximately 1% due to additional synergies not captured in the assumptions stated above.

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[25] "The US Health Care System and the Challenges of Fraud." The National Healthcare Antifraud Association, www.nhcaa.org/.

Summary of Savings Assumptions. We will separate out three cases for healthcare projections over the next 9 years, a base case, a best case, and worst case.

Base Case.

Source	Base Case % Reduction	Years Needed to Realize
Administrative Cost Reduction	7.5%	2
Fraud and Abuse	2%	1
Payment systems reform	15%	6
Overutilization	1%	1
Governance and Admin	1%	9

Worst Case.

Source	Worst Case % Reduction	Years Needed to Realize
Administrative Cost Reduction	3.5%	2
Fraud and Abuse	1%	1
Payment systems reform	12.5%	5
Overutilization	1%	2
Governance and Admin	.9%	9

Best Case.

| Source	Best Case % Reduction	Years Needed to Realize
Administrative Cost Reduction	10%	3
Fraud and Abuse	3%	1
Payment systems reform	15%	6
Overutilization	1%	1
Governance and Admin	1%	9

VII. Analysis

Projecting out Vermont Healthcare Expenditure under Status Quo Insurance System.

Total All Payers State Estimates Vermont - Personal Health Care (Millions of Dollars)											
Region/state of residence	2015E	2016E	2017E	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E
Vermont	6,771	7,066	7,375	7,761	8,188	8,643	9,136	9,646	10,192	10,772	11,362	12,058
Hospital Services	3,102	3,238	3,379	3,556	3,752	3,960	4,186	4,420	4,670	4,936	5,206	5,525
Physicians and Clinics	1,162	1,213	1,266	1,332	1,406	1,484	1,568	1,656	1,750	1,849	1,951	2,070
Other Professional Services	213	222	232	244	258	272	287	303	321	339	357	379
Dental	307	321	335	352	372	392	415	438	463	489	516	547
Home Health	200	209	218	230	242	256	270	285	301	319	336	357
Nursing	374	390	407	429	452	477	505	533	563	595	628	666
Drugs and Non-durables	769	803	838	882	930	982	1,038	1,096	1,158	1,224	1,291	1,370
Durables	86	90	93	98	104	110	116	122	129	137	144	153
Other Health	556	581	606	638	673	710	751	793	837	885	934	991

Above find the estimated healthcare costs for Vermont projected as a percentage of national healthcare spending for ten years. As mentioned previously, data from the OACT only extends until 2014, and therefore estimations have to be made for 2015 through 2017. Looking at the average mix of spending by type throughout this time period, it is evident that hospital services take up a majority at 46%, with physicians and clinics at a distant second at 17%. The assumptions that we make for savings therefore directly apply to these two categories of spending. The five assumptions we list above, administrative cost reduction, fraud and abuse, payment systems reform, overutilization, and governance and administration are savings categories that apply to both sides of the insurance payment system, provider and insurer.
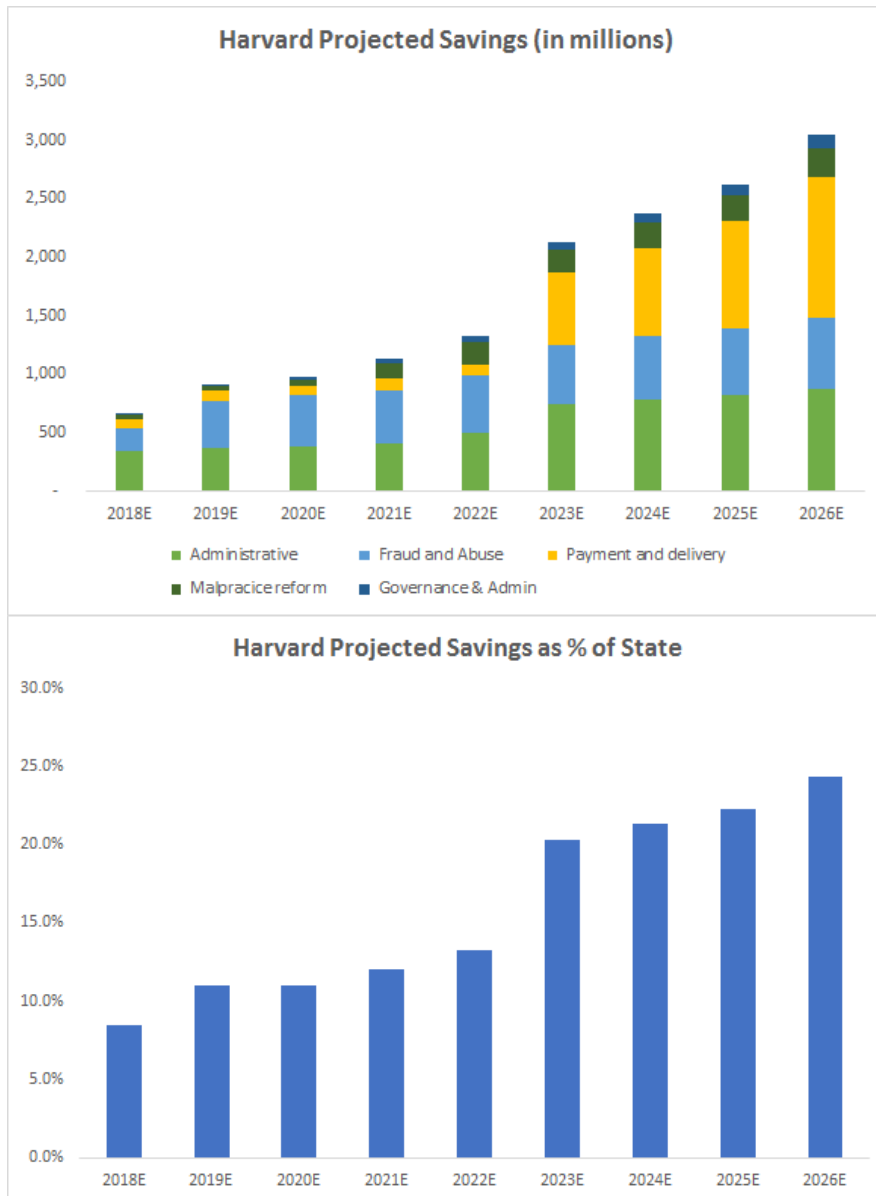
Average Mix of Spending by Service 2015-2026
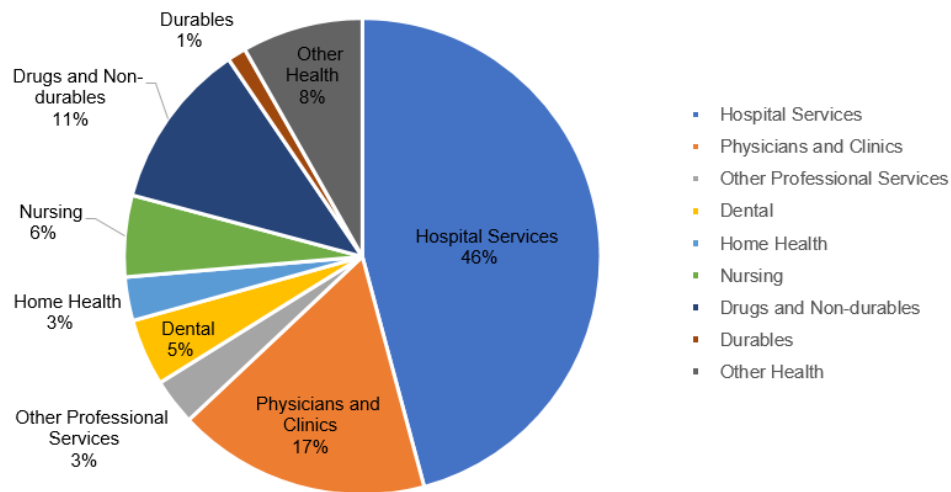
Our goal in the analysis is to take into account the assumptions made in the Vermont, Harvard, and Umass case studies and to apply them to our own projections of Vermont health care costs over the next ten years. Using the percentage savings proposed in the Harvard case study and spreading them out over 9 years in accord to the rate of realization described in the study, the savings should approximately mimic the following in dollar terms.

	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E
Harvard Savings	660	901	951	1,096	1,278	2,069	2,294	2,534	2,930
% State	8.5%	11.0%	11.0%	12.0%	13.3%	20.3%	21.3%	22.3%	24.3%
Administrative	349	368	389	411	506	744	786	829	880
% State	4.5%	4.5%	4.5%	4.5%	5.3%	7.3%	7.3%	7.3%	7.3%
Fraud and Abuse	194	409	432	457	482	510	539	568	603
% State	2.5%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Payment and delivery	78	82	86	91	96	612	754	909	1,206
% State	1.0%	1.0%	1.0%	1.0%	1.0%	6.0%	7.0%	8.0%	10.0%
Malpracice reform	39	41	43	137	193	204	215	227	241
% State	0.5%	0.5%	0.5%	1.5%	2.0%	2.0%	2.0%	2.0%	2.0%
Governance & Admin	8	16	26	37	48	61	75	91	121
% State	0.1%	0.2%	0.3%	0.4%	0.5%	0.6%	0.7%	0.8%	1.0%

The assumptions made in the Harvard case study result to approximately 24.3% in savings for Vermont over the course of 9 years from 2018 to 2026.

Harvard Projected Savings (in millions)

Legend: Administrative, Fraud and Abuse, Payment and delivery, Malpracice reform, Governance & Admin

Harvard Projected Savings as % of State

In contrast, the savings projected by UMass only take into account the potential administrative savings, which they posit is approximately 1.7% of total Vermont health care costs each year.

	2015E	2016E	2017E	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E
UMASS	0	0	122	128	135	143	151	160	169	178	188	199
% State	0.0%	0.0%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%
Administrative	-	-	122	128	135	143	151	160	169	178	188	199
% State	0.0%	0.0%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%

Evidently, there is a distinct contrast between the savings projected by Harvard versus Vermont. I am more inclined to be more positive concerning the savings that can be generated

through administrative savings post-reform due to the overt bureaucratic burden that a complex

insurance system places on providers and insurers. I have outlined this in the data and

methodology section above. Therefore, I disagree with the assumption made in the UMass case

study. However, one important contribution the UMass case study makes is factoring in

financing for the uninsured population in Vermont. Recent data in 2017 shows that the uninsured

population fell to 3.7% in Vermont[26]. It is important to note that in future research that most

states do not have such a low percentage of uninsured, as Vermont has the lowest population of

the uninsured after Massachusetts, which has universal healthcare coverage by mandate. We can

then estimate the cost for providing healthcare using the costs provided in the UMass case,

estimating the cost for providing coverage to the uninsured population in Vermont for the next 9

years[27].

Finally, using our aforementioned assumptions in the three cases of base, best, and worst,

as well as our projections for status quo healthcare spending over the next 9 years, we can find

the percentage savings generated in each of the cases.

| Base Case	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E
Revised Savings	815	1,269	1,556	1,873	2,219	2,599	2,747	2,897	3,075
% State	10.5%	15.5%	18.0%	20.5%	23.0%	25.5%	25.5%	25.5%	25.5%
Administrative	388	614	648	685	723	764	808	852	904
% State	5.0%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%
Fraud and Abuse	155	164	173	183	193	204	215	227	241
% State	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Payment and delivery	194	409	648	914	1,206	1,529	1,616	1,704	1,809
% State	2.5%	5.0%	7.5%	10.0%	12.5%	15.0%	15.0%	15.0%	15.0%
Malpracice reform	78	82	86	91	96	102	108	114	121
% State	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Governance & Admin	8	16	26	37	48	61	75	91	121
% State	0.1%	0.2%	0.3%	0.4%	0.5%	0.6%	0.7%	0.8%	1.0%

Above are the savings estimated for the base case in millions as well as percentage of

status quo state spending. Find the projected savings for the best and worst case in millions and

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[26] http://worldpopulationreview.com/states/vermont-population/

[27] Refer to Table 1 in the Appendix for cost projections for covering uninsured Vermonters

percentage terms in the Appendix as Tables 2 and 3. The resulting savings after the full period of realization is the following in terms of percentage savings, 25.5% for base, 29% for best, and 18% for worst. However, those savings do not incorporate into them the cost for covering the uninsured, which we can find in Table 1 in the Appendix. Therefore, after incorporating those costs, the percentage savings net of covering the uninsured is the following.

Scenario	Percentage Reduction
Best Case	27.32%
Base Case	23.82%
Worst Case	16.32%
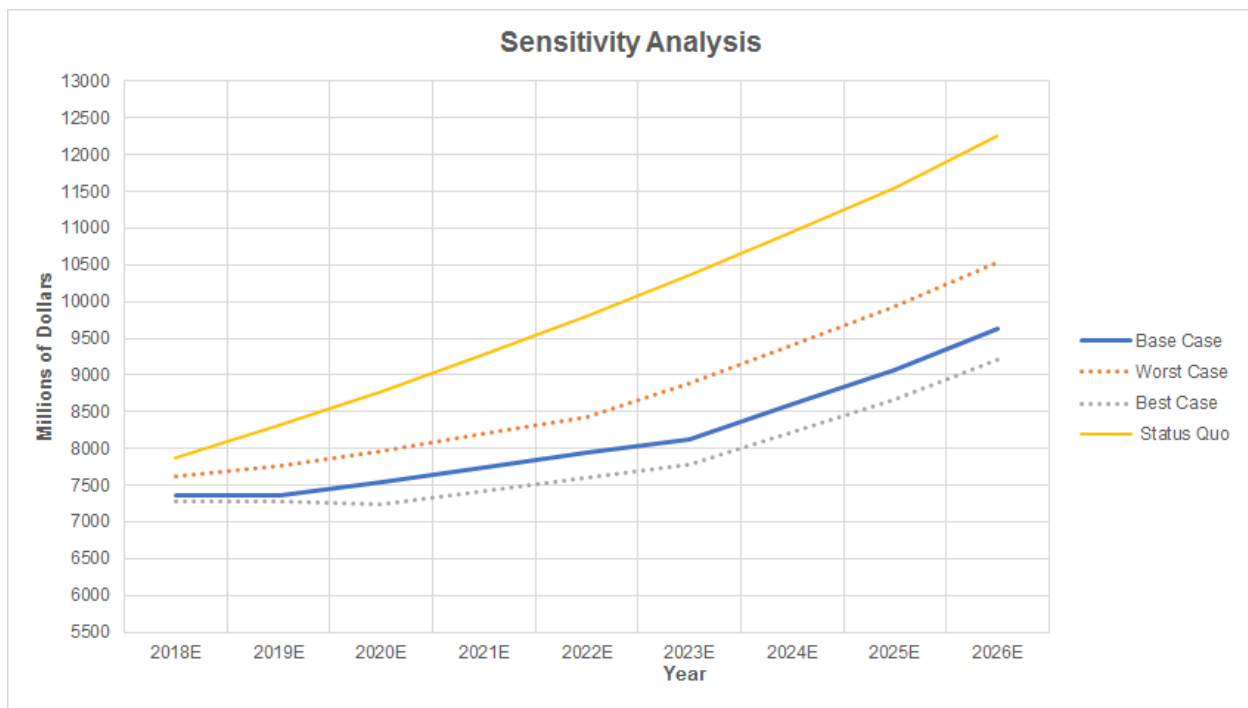
Looking at the sensitivity analysis, we find that we receive positive values in terms of savings in all three scenarios, base, best, and worst. Let us then see how the savings in millions of dollars compares to the projected cash outflows in the Harvard case.
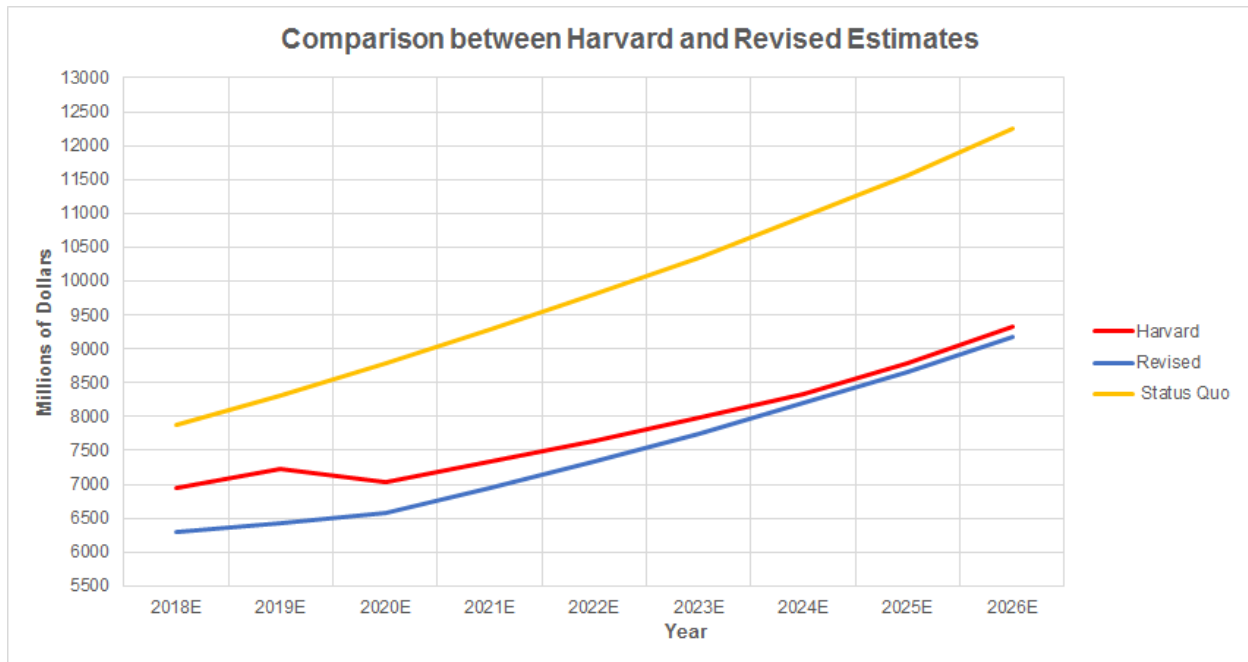
We can see that our revised assumptions allow us to come under the Harvard projections in terms of spending, and represent a more optimistic view of the potential sources of value that are available to us by switching to a single-payer system. If we take our revision to be a more accurate representation of the potential savings, then there are a multitude of implications to the true value and future direction of the single-payer system in Vermont.

VIII.   Concluding Remarks

The implications of this study may be significant for future policy decisions within the state of Vermont and on the national level going forward. First, we find that the implied true value of the single-payer system in Vermont in the long-run may be greater than what the Harvard, UMass, and Vermont case studies posit. Second, we find that these assumptions, if taken to be true, may have implications on the true value of the single-payer system nationally, in that it may be potentially positive as well, in the long run.

However, there are certain caveats to these numbers that we must keep in mind. First, this research incorporates numerous assumptions that, if changed, would significantly change the

results of the study. Second, in terms of financing the shift to single-payer, we assume that we retain federal level health insurance in the form of a Medicare and Medicaid waiver. Third, eradication of employer-sponsored health insurance represents shifting financing over to a high payroll tax, which places the burden on small-businesses. This may potentially choke business growth in Vermont. Finally, the actual costs involved in setting up a system are not quantified, meaning the bureaucratic and organizational costs behind setting up a unified single-payer system across the state of Vermont.

Some opportunities to take this data and research further are the following. First, we can attempt to quantify the costs behind organizing a single-payer system across the providers and insurers in Vermont. This would be beneficial for estimating the large up-front cost that is necessary for setting up a new health insurance system, which may be a deterrent for many policymakers. Second, we can scale the projections for a single-payer system up to the national level.

While this study is heavily based on assumptions, which renders the projections more art than science, the researcher finds that this study is a valuable exercise in considering the potential value of making a structural change to the health care system within Vermont. In objectively considering the future cash flows relating to health expenditure, we can attempt to foresee how this structural change will affect cash flows within the state, and along with that the lives of the citizens who reside there.

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X.   Appendix

Table 1.

Population Estimates	623,960	628,328	632,726	637,155	641,615	646,106	650,629	653,575	656,843
Health care cost per capita	0.0124	0.0130	0.0137	0.0143	0.0150	0.0158	0.0166	0.0174	0.0184
Uninsured Vermonters	23,087	23,248	23,411	23,575	23,740	23,906	24,073	24,182	24,303
Cost for providing health insurance to uninsured Vermont	287.16	302.96	319.78	338.02	356.92	377.10	398.55	420.41	446.16

Table 2.

Best Case	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E
Revised Savings	893	1,351	1,858	2,193	2,556	2,956	3,124	3,295	3,497
% State	11.5%	16.5%	21.5%	24.0%	26.5%	29.0%	29.0%	29.0%	29.0%
Administrative	388	614	864	914	965	1,019	1,077	1,136	1,206
% State	5.0%	7.5%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Fraud and Abuse	233	246	259	274	289	306	323	341	362
% State	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Payment and delivery	194	409	648	914	1,206	1,529	1,616	1,704	1,809
% State	2.5%	5.0%	7.5%	10.0%	12.5%	15.0%	15.0%	15.0%	15.0%
Malpracice reform	78	82	86	91	96	102	108	114	121
% State	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Governance & Admin	8	16	26	37	48	61	75	91	121
% State	0.1%	0.2%	0.3%	0.4%	0.5%	0.6%	0.7%	0.8%	1.0%

Table 3.

Worst Case	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E
Revised Savings	543	860	1,124	1,416	1,736	1,835	1,939	2,045	2,171
% State	7.0%	10.5%	13.0%	15.5%	18.0%	18.0%	18.0%	18.0%	18.0%
Administrative	233	287	302	320	338	357	377	398	422
% State	3.0%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
Fraud and Abuse	78	82	86	91	96	102	108	114	121
% State	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Payment and delivery	194	409	648	914	1,206	1,274	1,346	1,420	1,507
% State	2.5%	5.0%	7.5%	10.0%	12.5%	12.5%	12.5%	12.5%	12.5%
Malpracice reform	39	82	86	91	96	102	108	114	121
% State	0.5%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Governance & Admin	8	16	26	37	48	61	75	91	109
% State	0.1%	0.2%	0.3%	0.4%	0.5%	0.6%	0.7%	0.8%	0.9%