The 2018 Vermont Genuine Progress Indicator Report

Eric Zencey

The Vermont Genuine Progress Indicator Project

March 2018

Produced by the Vermont Genuine Progress Indicator Project
University of Vermont
March, 2018

Publication sponsored by

The Center for Research on Vermont

The 2018 Vermont

Genuine Progress Indicator Report

by

Eric Zencey

List of Graphs

List of Tables

Vermont GPI 2015: Executive Summary

In 2012, Vermont became the first state in the nation to legislate the compilation and policy use of an alternative indicator of macroeconomic performance known as the Genuine Progress Indicator (GPI). (Maryland was the first to do so through Executive Order.) While Gross State Product estimates the dollar value of the gross receipts of the economy, the GPI estimates the dollar value of the net economic benefit produced by economic activity in the state. GPI achieves this net figure by taking a basic measure of economic welfare--Personal Consumption Expenditure--and adjusting it in light of various kinds of costs and benefits that GSP ignores. To accomplish this, GPI compilations assign dollar values to otherwise uncounted costs like degradation of natural resources and to otherwise uncounted benefits like volunteer work and the domestic production (cooking, childcare, and the like) that Vermonters do for themselves.

Gross State Product grew by 2.12% for the year. (See Fig. 1)

Figure 1: Genuine Progress Indicator and Gross State Product for Vermont, 2000-2015, in constant 2015 dollars.

regional neighbors, edging out New York (22nd) and Connecticut (18th) but standing behind Massachusetts, Rhode Island, New Hampshire and Maine. (See Table 1.)

The 2015 GPI increase of 7.0% over the 2014 figure is more than triple the growth in GSP. In 2014, GPI grew by 3.6% over 2013,

The environmental cost indicators that rose were

- Cost of Water Pollution
- Cost of Noise Pollution
- Cost of Climate Change

These increases took an additional $90 million from the GPI compared to their values for 2014.

The Cost of Non-Renewable Energy Resource Depletion is a cost charge for burning irreplaceable fossil fuels, and is priced at what it would currently cost to replace those fossil fuels with renewable alternatives. This figure fell by $201 million dollars, a 3.7% drop, a result that is attributable to ongoing implementation of the state's Comprehensive Energy Plan and its call for getting 90% of the state's energy from renewables by 2050.

Even with this notable progress, the Cost of Non-Renewable Energy Resource Depletion remains the second largest deduction in the GPI accounts behind the adjustment for Income Inequality. In 2015 this cost item totaled $5.2 billion, 26.31% of the GPI bottom line.

This year's GPI compilation uses a new, more realistic figure for the value of clean water to Vermonters. This higher valuation has been "backcast" to previous years, to ensure comparability of the figure from 2000 to 2015. All told, Vermonters lost $2.10 billion of economic value to water pollution in 2015. This represents an increase of $8 million over 2014, a 0.4% increase.

in a form that is readily useful to the compilation. Current methods of data gathering are time consuming, and some data sources have large lags in their reporting times.

k, so that professional staff can dedicate time and effort to the various tasks involved in completing an updated compilation, including collecting data as it is issued, implementing innovations in GPI methodology as appropriate, communicating and coordinating such methodological changes with GPI efforts in other states, and presenting the results in timely written and oral reports to legislators, members of the executive branch, the media and the general public. This years' and previous years' VT GPI work has largely been done on a pro-bono basis. This will not continue.

Improvements to GPI could be had through investment in staffing of the Project. Among the improvements that are needed is

	2014	2015	% Change Since 2014	% Change Since 2005	% Share of GPI
GPI Adjustments					
Personal Consumption Expenditures	28.49	28.943	1.6%	11.36%	146%
Income Inequality Adjustment	6.15	6.48	5.4%	57.3%	-32.8%
Net Durable Goods Services	1.22	1.12	-7.85%	4.2%	5.7%
Cost of Underemployment	0.647	0.599	-7.4%	-1O.9%	-3.0%
Net Capital Investment	1.37	1.55	13.1%	-32.5%	7.9%
Cost of Water Pollution	2.09	2.10	0.4%	3.42%	10.62
Cost of Air Pollution	0	0	0.0%	-100.00%	-0.00%
Cost of Noise Pollution	0.15	0.16	2.1%	8.67%	-0.80%
Cost of Net Wetland Change	0.072	0.072	0.0%	-0.38%	-0.37%
Cost of Net Farmland Change	1.90	1.90	0.0%	0.11%	-9.61%
Cost of Net Forest Cover Change	0.86	0.83	-3.2%	63.39%	-4.20%
Cost of Climate Change	1.67	1.72	3.0%	17.67%	-8.71%
Cost of Ozone Depletion	0.95	0.93	-1.9%	-24.42%	-4.73%
Cost of Nonren. Energy Depletion	5.40	5.20	-3.7%	26.8%	-26.31%
Value of Household Labor	5.10	5.56	9.1%	5.97%	28.12%

Chapter One:

The history and background of the Genuine Progress Indicator

The Origins of National Income Accounting

In the 1930s, during the depths of the Depression, policy makers had few statistical tools with which to grasp the enormity of the problem facing their management of the economy. One report has it that economists in Washington, D.C., charged with putting Americans back to work, were reduced to counting boxcars passing at railroad crossings in order to estimate changes in how much the productive capacity of the country was being put to use.

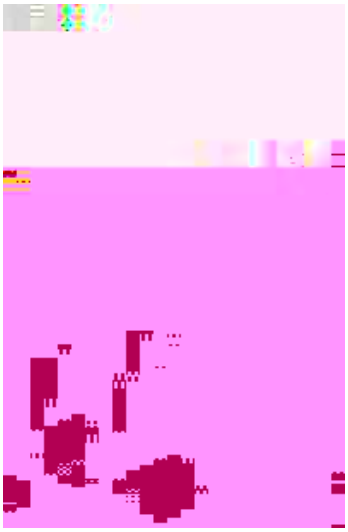


Figure 3 Simon Kuznets, chief architect of National Income Accounting and GDP, who warned against using the number as a measure of economic welfare

In response to the dearth of good information, the U.S. Department of Commerce commissioned Nobel laureate economist Simon Kuznets to lead a team in developing a set of national income accounts--numbers that would show how much of what was being produced within the economy. Their accounts included a powerful invention: Gross National Product, an estimated tally of the dollar value of all goods and services produced by Americans within a year. (GNP eventually gave way to GDP, Gross Domestic Product, as the decision was made to count production where it happened rather than based on the nationality of the workers producing it.) The first report based on the new national income accounts was issued to Congress in 1937.

There is no question that the new accounting system was a powerful tool for assisting policy.

In this "growth above all" world-view, human health, engaged citizens, meaningful lives and safe communities are all thought to depend on increasing GDP. They are not seen to be in and of themselves the foundations of economic life but are thought to be the result of it. This means that rather than treating the economy as the servant of society and its purposes, the growth paradigm instead treats society and its qualities as a subset of the economy and its values. This reversal of the proper order of things (which would be an conomy funou616

but an2636ofut

> glazier's trade, and that seems a good thing, for it puts people to work and money into circulation. It would seem, then, that a glazier who sends an apprentice out into the night to break windows is doing the community an economic service. But that's absurd; as Bastiat went on to argue, the uptick in the glazier's trade is evident but what is difficult to see is the opportunity cost of the expense of repair. Invisible though it might be, that cost is very much a real burden on the community.[9]

Generalizing from there: remedial and defensive expenditures do not contribute to the advancement of our economic wellbeing, but seek to preserve or restore a level of wellbeing we've already attained. They draw expenditure away from the pursuit of goods and services that would make a net increase to our material wellbeing. Though identified more than a century and a half ago, the Broken Window fallacy is still very much with us today, as prominent policy makers –and even some economists-- have pointed to "silver linings" in such catastrophes as Tropical Storm Irene, taking note of the impetus the expenditures on repair would give to the state economy.[10]

This simple error is the result of the confusion of gross with net, and is deeply encoded into any use of GDP (or its state equivalent, GroIivisi4( )-3E-4( )s1t,1g-6(i)1-4(vis)3(i4( )-3)( )-aETBT)-34(e,ea-4(viu(d)-4(i7

Clarke and Lawn 2008; Bagstad et al. 2014; Talberth 2014; Costanza et al. 2016; Barrington-Leigh and Escande, 2018).

	Growth, understood as increased consumption of resources More is always better Resources are in effect unlimited because human ingenuity knows no bounds Resources, capital and labor are mutually interchangeable, i.e. human invention can substitute for resources	Increasing quality of life Preservation of natural capital Satisfaction of human needs Economic processes are sustainable, i.e. do not destroy their pre-conditions for existence

double role--logical extension and yet paradigm disruptor--is a result of GDP's complete unsuitability as a measure of economic welfare and the discipline's having ignored both logic and authoritative caution in adopting GDP as its primary measure of progress.

The first state-level GPI in the US was published for Vermont in 2004 (Costanza et al.), which laid the groundwork for other published studies in Maryland (McGuire et al. 2011), Ohio (Bagstad and Shammin 2012), Utah (Berik et al. 2011), and Northern Forest counties (Bagstad and Ceroni 2008). At the University of Vermont in December of 2011 a version of the Vermont GPI (Zencey et al., 2011) was presented to an audience including state legislators, leading to legislation passed in May 2012 commissioning the Gund Institute for Ecological Economics to continue to compile the state GPI for legislative and administration use. That month also saw a national conference on "Measuring What Matters" convened at the University of Vermont by the Gund Institute and Gross National Happiness USA;GPI work at the Gund was a central topic of discussion. A June 2013 "GPI in the States" summit organized by Demos and convened in Baltimore by the Governor of Maryland brought together 18 states with GPI accounts in place, under development or under consideration. Through collaboration between GPI researchers in Maryland and Vermont, a standard methodology for state GPI compilations evolved in 2012-2013 and came to be called "The Maryland-Vermont Model." Succeeding state comp01750170Tdacore. -373(d)5( )rife

To make its adjustment to PCE,

In a study of income inequality in New England, researchers at the University of New Hampshire found that between 1989 and 2004, Vermont moved from 47th to 2nd in the "most income inequality" category among states. Only Connecticut had a higher Gini Coefficient in 2004. This movement toward greater inequality was national in scope, but the New England region was exceptional in moving from average levels of income inequality to containing the states with the most unequal distribution of income. Gittell and Rudokas report that New England had three of the five states with the largest increase in disparity in the period under study.[17]

Census Bureau data now allow for compilation of Gini Coefficients by state, county and zip code. An organization titled "Policy Map" has done that compilation, summing the data for the years 2012 to 2016, and has mapped the results, reporting Ginis in five tranches from 0.37 or less to 0.48 or more.[18] The Vermont GPI Project cannot vouch for the accuracy of their numbers, but if the compilation is accurate the patchwork result offers insight into patterns of income inequality in the state.

The statewide Gini, averaged from 2012 to 2016, was 0.44, lower than the US Gini of 0.48 for that period. Vermont counties with the highest Ginis in in the state, 0.46 to 0.47, were Windsor and Bennington. While no Vermont county registered in the highest tranch, 0.48 and higher, many counties contain individual zip code areas that registered in that category. Most of the rural areas of the state had Gini Coefficients of 0.37 or less. Montpelier's Gini was in the 0.41 to 0.43 range, while that of neighboring Barre

reports an estimated Gini for Lesotho of 0.632, and it lists a total of five other countries--South Africa, the Central African Republic, Micronesia, Haiti and Botswana--whose Gini Coefficients edge over 0.60.)[24] Nor were the boundaries of the color-coded areas of the dial chosen arbitrarily. Economists are generally agreed that some income inequality is a stimulus to economic production, as productivity increases when effort is rewarded. Thus, the green color for values up to 0.30. A cautionary area leads up to the value of 0.40, a figure used by the World Bank and the UN as an alarm signal. According to the United Nations Research Institute for Social Development (UNRISD), above that value income inequality is associated with a variety of unwanted socio-economic outcomes, including increased crime, poorer health for lower-income citizens, increased teen pregnancy, and decay and subversion of democratic systems of government as political influence is wielded by the wealthy on their own behalf. Additional detrimental effects of income inequality in that upper range include loss of social cohesion necessary for governance and the migration of skilled labor to areas with less income inequality.[25]

While some political scientists and econometric historians have found a correlation between income inequality and the tenacity of civil wars within a country,[26] there is no clear line of demarcation beyond which a Gini measurement signals immanent social disruption. This is to say: different societies tolerate different levels of income inequality before becoming dysfunctional. How much income inequality Vermont could tolerate is not known. How much it *should* tolerate is a matter for political decision. Given the large deduction that income inequality takes from GPI (which Vermont has committed to raising), and given the correlation between rising income inequality and increases in numerous other phenomena that Vermont policy wisely seeks to reduce,068aWtth.9s63(h).65 576.7 Tm[(an) 522.07 Tr4a9yi7a9yi7a9yi7a9yncrea9isemlea

Vermont consumers made that year on durable goods, as reported by the BEA. The result is Net Services of Consumer Durables.

Note that this approach discourages rather than encourages planned obsolescence and the churning of consumer purchases. If GDP is taken as the measure of our economic wellbeing, then repeated and frequent purchase-and-disposal of consumer durables is taken as a good thing. In contrast, GPI increases when and as consumers follow that old Vermont frugality slogan: "use it up, wear it out, make it do."

In 2015, Net Durable Goods Services fell by 8.2%, from $1.22 billion to $1.12 billion. This amount is 5.7% of the state GPI, a large enough portion to suggest that significant improvement here would have meaningful effect on the GPI bottom line.

As Figure 12 shows, the cost of consumer durables and the service value of consumer durables have an evident inverse relationship. The net service value of consumer durables held by Vermonters peaked in 2009; the value that year was $1.84 billion in 2015 dollars. Not coincidentally, that was also the recent (post 2000) year that Vermonters spent the least on durables. Given the deep recession into which the nation and the state fell in 2008, it makes sense that Vermonters postponed purchasing durable goods, increasing these goods' length of service and hence their net service value. The ongoing decline in this item from 2009 to 2015 is driven by steadily increasing expenditure on durables in that period. That increase may register, in part if not in whole, the release of demand held in abeyance by the decline in income during the Great Recession.

GPI takes the average of the current and the previous six years' worth of expenditure on consumer durables as the value of the yearly services provided by the existing and newly purchased stock of durables. The assumption is that we get what we pay for--no more, no less.

The "double dip" recession that shows up in both GDP and GPI (though at slightly different times; see Figure 1) finds a parallel here in a "double peak" rise in unemployment--though the first peak, in 2003, does not correspond with a downturn in either GDP or GPI.

The Cost of Underemployment as registered by standard GPI methodology is the lost income that un- and underemployed people experience. This ignores several other kinds of costs that are very real--and very large.

Firstly, a long period of unemployment has been shown to have persistent downward effects on the unemployed person's future earnings; part of this can be explained through loss of "human capital" as skills and knowledge held by the unemployed person become outdated. This lost income not only depresses future Personal Consumption Expenditure by those people (and hence in the economy as a whole), it depresses tax revenues, limiting the ability of the public to purchase public goods (see note 14).

In addition, there are significant social costs of unemployment experienced by communities and psychic costs experienced by the un- and underemployed themselves. As far back as 1982 Liem and Rayman pointed out that prolonged unemployment is a serious threat to health and quality of life, and offered a review of research that finds correlations between the unemployment rate and such "indicators of strain" as psychiatric admissions, alcoholism and infant mortality.[29] This work by psychologists made little headway against economic orthodoxy which generally takes what Liem and Rayman characterize as a more "benign" view of unemployment (though this is changing with the gradual acceptance of "happiness studies" as a branch of Behavioral Economics). The more benign view is found in the work of economists who find functional value in the depressive effect that unemployment has on the ability of labor to advance wage and work-quality demands.[30]

Hollingsworth et al. (2017) find a strong link between unemployment rates and opioid abuse: "as the county unemployment rate increases by one percentage point, the opioid death rate per 100,000 [people] rises by ... 3.6% and the opioid overdose emergency department visit rate per 100,000 increases by 7.0%."[31] The authors didn't but could have pointed out that addiction to opioids tends to last long after economic conditions have improved enough to make

The psychic costs of long-term unemployment are not always as dramatic as opioid addiction. They are denominated in the coin of ennervating depression; in lost hope, lost confidence and lost self-esteem; in withdrawal from the sort of social networks and contacts that, studies show, tend to keep a person healthy both psychically and physically.[32] Other significant costs of unemployment include upward pressure on crime rates and the loss of tax revenues to state and local governments. (We exclude the Federal government because that entity has the option to expand the money supply--to print money--to cover revenue losses, though it will often choose not to do so for ideological reasons.)

When the full range of costs are totaled the sum can be significant. A 2002 study reported from Britain estimates that the full cost of long-term unemployment amounts, on average, to a figure between $22,000 and $34,500 per month per unemployed person in year 2002 dollars.[33] This far exceeds the value of $2,544 per month (160 hours times the average hourly earnings of $15.90) that the current GPI methodology assigns as the cost for each unemployed Vermonter. This suggests that a realistic assessment of the costs of unemployment in Vermont would be--

investment decrease through uncompensated depreciation.

Unfortunately, there are no reliable figures for net capital investment by state. The standard work-around for GPI studies is to use a "step-down" from national data, prorating

Chapter Three

change that is driven in part by climate change.) On a cost-per-capita basis, Vermont moves up in the standings, to fifth, behind Alaska (again), New Hampshire, Idaho, and New Mexico.[34]

In 2015, three of the nine environmental cost elements of the GPI indicator set increased; three remained level; and three decreased. Because they are cost items, reduction or at least stasis in these indicators is desirable. The total of Environmental Costs measured by GPI fell 1.4% or $180 million in 2015, yielding a total deduction of $12.92 billion charged against the GPI bottom line. Altogether environmental costs total 65.3% of GPI. Had these environmental costs been zero for the year, GPI would have been $32.69 billion, edging out Gross State Product at $30.35 billion.

A zero value for all environmental costs would be difficult to achieve, because some environmental costs cumulate from year to year and significant historical costs are carried forward into the present. This is done because the loss of economically valuable ecosystem services from (for example) the conversion of an acre of forest to another use imposes that loss not only in the year of the conversion but in all successive years. The carry-forward of such cumulative cost means that year-to-year changes in these indicators do not reflect the size of the deduction taken in the GPI accounts. To continue the example of Net Cost of Loss of Forest Cover: In 2015 Vermont added about 6000 acres of forest, with an ecosystem service value calculated to be $27.3 million. In the GPI accounts this sum was deducted from the ongoing cost of Vermont's loss of forestland, which totaled $857.7 million in 2014.

The GPI aims to be a measure of the net economic welfare produced by the economy. It is not a measure of the net *sustainable* economic welfare produced by the economy. Because Personal Consumption Expenditure is the foundation of the GPI calculation, and because the per-unit costs of pollution and environmental changes are set conservatively low, a rising GPI is possible even as the economy producing that GPI is unsustainable, i.e. it depletes the non-renewable resources on which it depends, or in other ways compromises, degrades or destroys its own preconditions for existence.[35] The challenge of deriving a set of sustainability indicators has occupied researchers for decades,[36] and compilation of a fully detailed set of sustainability indicators would represent a considerable investment in staff research time. There is, however, a relatively simple proxy measurement that is conceptually clear and justifiable within the framework of Ecological Economics, which sees the economy as a set of physical processes in

Together these developments raised the GPI bottom line by $246 million.

The three environmental cost indicators that rose were:

- Cost of Water Pollution,
- Cost of Noise Pollution and
- Cost of Climate Change.

These increases took an additional $90 million from the GPI compared to their values for 2014.

Total Environmental Costs reached a recent (post 2000) low point in 2011, when the Cost of Non-Renewable Energy Resource Depletion reached its own post-2000 low point. Please see the section on that indicator, below, for more on that phenomenon.

Figure 13: Total Environmental Costs, 2000-2015, in billions of year 2015 dollars

This year's GPI compilation uses a new, more realistic figure for the value of clean water to Vermonters, increasing the Cost of Water Pollution significantly.[39] (The higher valuation has been "backcast" to previous years, to ensure comparability of the figure from 2000 to 2015.)

All told, Vermonters lost $2.1 billion of economic value to water pollution in 2015. This represents an increase of $8

beholder and vary with mind set and context. But many of the costs of unwanted sound can be tabulated objectively by reference to the effects of noise on human health and wellbeing and the expenses we undertake to reduce our exposure to noise. The largest health and wellbeing effects of noise pollution come through sleep disturbance and environmentally induced stress. A burgeoning literature details those effects. They include impaired cognitive functioning; increased risk of cardiovascular disease; digestive problems; lost productivity; degraded mental health; and increased intolerance and aggressiveness toward others.[40]

Nor are the costs of noise pollution borne exclusively by humans. Among its effects on animal populations, humanly generated noise can impair growth; prevent communication and spatial orientation; constrict habitat range; degrade the ability to find food; lead to energy losses though panic and escape behavior, thereby diminishing reproductive success; and (as in humans) increase the incidence of stress-induced illnesses. These zoological effects can impose direct economic costs on humans through loss of ecosystem services

uin

proxy approach was used in previous Vermo

Wetlands provide a variety of economically valuable ecosystem services to Vermonters, and this indicator measures the cumulative value of

GPI acknowledges the value of farmland by deducting its loss as a cost charge against the economy's bottom line.

In GPI compilations the per-acre valuation of farmland is taken to be the dollar value of production from an average acre of farmland in a given year. As Figure 22 shows, Vermont farmers earn significantly more

Vermont is a deeply forested state, with over 4.5 million acres of forest—approximately 78% of its land area. As most of the state's schoolchildren learn, it wasn't always so. The land's aboriginal forests were first cut by European settlers to make way for agriculture

programs that endorse sustained-yield forestry; and a use-value appraisal program that reduces tax burdens on land left to "fallow" as forest.[43] Some of these measures reach back to the early 20th century, and find justification today in language that was unavailable to Vermonters then: forests provide valuable ecosystem services to humans, services that do not accrue solely to the land's deed holder. For instance: as Woodstock native George Perkins Marsh was the first to see, by retaining rainwater in spongey soils upland forests provide flood protection to downstream residents.[44] Then too, Insectivorous birds and bats live in forests and reduce pest burdens in nearby areas. Bees and some insect species provide free pollination services; and so on. Because these benefits are not captured by the forest's legal owner, but redound to the benefit of the general public and are part of every Vermonter's birthright, public support for forest maintenance makes economic sense—and it makes sense to count the loss of those ecosystem services as a charge against the economy when the economy converts forestland to other purposes.

This year's GPI compilation uses a new, more realistic number for the valuation of ecosystem services from forestland. Previo

Not all forest acreage is the same, as the GFF report documents. A more detailed, labor- and data-intensive methodology here might find the specific valuations for wildlife corridor forest parcel

This GPI compilation uses the figure of $220 per ton (in year 2015 dollars), well above the official number used by the U.S. of $36 per ton.[48,49] The higher number comes from a study that calculates costs overlooked in the EPA and other studies while accepting the normative framework and discount rates commonly used in carbon pricing studies.[50]

The stratospheric ozone layer functions as sunscreen for life on earth, absorbing significant amounts of ultraviolet light that would otherwise damage organisms. The effects of UV light on humans include instigation of skin cancers and cataracts and suppression of immune systems. It also damages, decays and otherwise prematurely ages a variety of human artifacts and property, including papers, paints, plastics, fabrics, and rubber items that are exposed to

solution gave hope that science-backed policy on other environmental issues, notably climate change, might receive a similar reception.

The ozone layer has begun to recover. Scientists at the National Oceanic and Atmosphere Administration report that the maximum size of the Antarctic ozone hole has been diminishing from year to year.[51] Even so, the consequences of past emissions of CFCs and ODSs are still with us. Thus, this element of the GPI; the ongoing damage traceable to these ozone-depleting chemicals is part of the otherwise uncounted environmental cost that our economy has imposed on us.

Following other state compilations of GPI, this compilation offers numbers for Vermont that are a step-down from national figures, which are computed as a national cost borne per capita. As Vermont population remains relatively stable while national population grows, under this methodology

All economic activity involves energy use, and all energy use entails a one-way flow from source to sink, from more useful (like gasoline) to less useful

cost yields a very conservative estimate of the Cost of Non-Renewable Energy Resource Depletion.

While $5.20 billion represents a sizeable portion of the GPI bottom line, the good news is that between 2014 and 2015 the Cost of Non-Renewable Energy Resource Depletion fell by a quarter of a billion dollars, a 4.7% drop. Ongoing implementation of the state's Comprehensive Energy Plan, with its goal of getting 90% of the state's energy from renewables by 2050, certainly played a role in producing this result.

Vermont's commitment to implementation of renewable energy recently earned it high marks from the Union of Concerned Scientists, whose 2017 study "Clean Energy Momentum: Ranking

Chapter Four

Social Costs and Benefits in Vermont's Genuine Economy

The third category of elements that the GPI weighs in coming to its assessment of economic well-being is a mixture of disparate elements. They range from "Personal Costs of Pollution Abatement"—the money we spend on such things as septic systems and catalytic converters, which reduce the environmental impact of our lives—to such economically valuable but unpriced goods and services as those provided by households to themselves (like cooking, cleaning, child- and elder-care) and volunteer work. Unlike the second category of GPI elements dealing with the environment, in which all the

Other indicators in this section saw undesirable changes. The Cost of Commuting rose by 6.2%, or half a million dollars; the Cost of Motor Vehicle Crashes, down for the decade by an impressive 41.42%, went against trend and rose between 2014 and 2015, deducting a total of $230 million from the GPI. Vermonters worked longer hours in 2015 than 2014, costing an additional $36 million in Lost Leisure Time. While the Cost of Crime rose by 3.1%, this did not have a large impact on GPI, since this indicator accounts for less than a quarter of a percentage point toward the final tally.

.

GDP measures goods and services that move through markets. Households provide a vast array of goods and services to themselves that

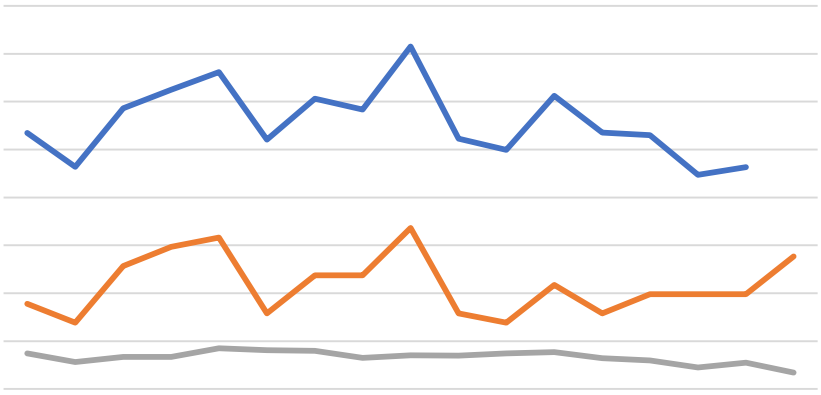
As to the first: when couples divorce, GDP records the dissolution as a happy time: lawyers are

cohesion that television viewing does. Again according to the Nielsen company, in 2016 Americans over the age of 18 spent almost as much time on other screens as they did watching television—40% of all media engagement time for those screens as opposed to 44% of media engagement time for television.[56] (The remainder was for radio.) This suggests that the actual cost of screen-based media engagement is nearly double that for television viewing alone. Future iterations of the GPI could be improved by taking this cultural shift into account and adjusting this indicator accordingly.

Crime costs us. Some of the costs are obvious: theft costs us money or property, aggravated assault imposes medical costs on us, murder costs us lives. But some of the costs not so easily counted. Victims experience pain and a variety of kinds of suffering, including anxiety, fear, depression, insecurity, anger. Along with physical pain, these emotional responses can affect the victim's health and earnings and quality of life, and therefore have concrete economic costs that can, in principle, be denominated in dollars. (Jury awards in civil suits do just that.)

There are other tangible costs to society as a whole. In the

Exactly how much does crime cost us? One recent, widely-cited review of the "crime-cost" literature (McCollister et al., 2010)[57] surveyed scholarship, reports on jury awards and various government estimates and came to the valuations given in Table 4. These values, when multiplied by the incidence of each crime in Vermont, give us the Cost of Crime for the state. These are new valuations for this year's compilation of the GPI, and they've been back-cast to earlier y



Since GDP measures nothing more complicated than the churn of money in the economy—the amount that gets spent in a given year on all final goods and services--it counts the money we spend dealing with pollution as a positive contribution to our wellbeing. This is another

In 2015, Vermonters spent $107 million in out-of-pocket expenses reducing the impact of their lives on the environment through catalytic converters, sewer and septic systems, and landfill tipping fees. This represents a slight decline over 2014's $109 million expense. Overall the data here exhibit a slight downward trend, with the notable exception of 2010, which may be an artifact of a problematic data point. (The number of new septic systems for 2010 is given as 4640, which is nearly five times the number for the preceding and succeeding year. Additional staff work might clarify this anomalous value.)

Another problem with the methodology for this indicator is that raw data on new motor vehicle registrations in Vermont (information that is needed to price our out-of-pocket expenditures to maintain air quality) are not readily available from public sources.[59] Absent such data, GPI compilations have inferred the number of new registrations from total vehicle registrations minus a figure for average annual losses to age-out of the rolling stock. But in a recession year, consumers make do with what they have, postponing or foregoing purchase of a new vehicle. Figure 35 shows that Vermonters reduced their purchases of new vehicles by 4,481 units in 2008, a decline not captured in the GPI methodology. (Unfortunately, data from this source

Like Domestic Production (indicator # 17), volunteer work is unremunerated work that is identical to work done for pay. It is part of the value-production of the economy; the services provided by volunteers contribute to our economic well-being. GPI estimates their value and adds that value to the bottom line.

In 2015, volunteer workers added $383 million in value to the Vermont economy,

public high school graduation rate;
public college graduation rate;
NAEP Math and Reading Test Scores;
Share of high school students getting credit through Advanced Placement exams; and
racial and gender gap

As is shown by any toll road, highways and streets provide a valuable service whose worth can in principle be denominated monetarily.

over these years. Vermont's miles of maintained highways remained fairly constant from 2000 to 2015, falling by 21 miles in that time period

Chapter Five

The Future of Vermont GPI Work

Past GPI studies have been issued through the Gund Institute for Ecological Economics, as was specifically directed by Act 113, the enabling legislation for the GPI (see Appendix 4). Reorganization of the Institute has given it a new name—the Gund Institute for the Environment—and brought staffing changes. Under the new Institute's rules for such matters, the Coordinator of the Vermont Genuine Progress Indicator Project is no longer a Fellow of the Institute. This is why this year's study is being issued through the Vermont Data Center, which is part of the Center for Rural Studies at the University of Vermont, where the Coordinator of the project is now a Fellow.

Where the work will be housed in the future is not certain at this writing, and depends on several factors. Looming large among relevant co

not had the resources—the staff time, the financial support—to allow it to implement the new methodology.

Briefly summarized, the changes that GPI 2.0 would implement are:

- Substituting Household Consumption Expenditures for Personal Consumption Expenditures as the more relevant indicator of material wellbeing;
- Deduction of Household Defensive Expenditures from Household Consumption Expenditures, including money spent on insurance, medical care, and legal expenses;
- Deduction of money spent on "welfare neutral" commodities such as tobacco and 25% of alcohol;
- Use of more sophisticated formulae for correcting Household Consumption Expenditures for income inequality;[70]
- Inclusion of new indicators for biomes that are common in other states: on- and off-shore marine environments, grassland/savannah, desert;
- Inclusion of a measure of the cost of water insecurity, water scarcity, and drought;
- Expansion of the measure of the Cost of Air Pollution to include all pollutants indexed and reported by the E.P.A.;
- Inclusion of the cost of severe weather events as part of the Cost of Climate Change;
- Expansion of Service Value of Streets and Highways to become Service Value of Public Infrastructure, which would include the service value of parks, schools, recreational facilities, performance spaces, and the like;[71]
- Inclusion of the Cost of Risks associated with hosting various parts of the nuclear power industry, from fuel processing to waste storage;

Personal Consumption Expenditure continues to be the dominant factor in GPI compilations, Vermont's included. The 2015 figure of $29.8 billion (as reported in Table 1) comprises 146% of the final GPI tally. The dominance of PCE in the metric is problematic, for changes in PCE are not especially indicative of the condition of the Genuine Economy. PCE tends to increase or decrease in step with GSP—the flawed metric that GPI seeks to correct.

A better gauge of the dynamic health of Vermont's Genuine Economy is the ratio between percentage change in PCE and percentage change in GPI. Between 2014 and 2015, PCE went up by 1.6%, while GPI went up by 7.0%. As a matter of logic, this gratifying result can trace to either or both of two circumstances: either environmental and other cost items in the GPI did not rise in tandem with PCE (suggesting that the economy became more environmentally efficient—the environmental cost per unit of consumption declined) or the non-market benefits tallied by GPI grew more rapidly than did Vermonters' consumption expenditures. Each of these, in turn, has various possible causes.

For the first: the failure of environmental and other costs to rise as rapidly as PCE could be due to:

A shift in consumption to lower-footprint goods and services;
An increase in the export of Vermonters' consumption footprint to other states and countries;
Success in reducing the environmental costs of the economy, as when renewable energy replaces fossil-fuel energy, reducing the charge for Cost of Non-

rose by 9.1%, adding $0.46 billion to the bottom line. The Value of Education also rose, by $0.28 billion (5.8%). Another riser was the Service Value of Streets and Highways, which added a $0.15 billion improvement to the bottom line. Altogether these three positive changes in benefits, totaling $0.89 billion, exceed the net increase in costs by $0.32 billion, accounting for much of the favorable disparity between rates of increase in GPI and PCE. The remainder of the disparity is most likely due to the first two listed causes—the causes that can't be isolated under current methodology.

The largest negative item in the GPI continues to be the adjustment for income inequality, which continued to rise, increasing 5.4% to $6.48 billion in 2015. While some of the dynamics that produce this rising income inequality are national in scope, and thus lie beyond the reach of state policy, nevertheless there are state-level policies that could mitigate the effects of

2.

unmeasured by GPI, costs that fall on the less powerful at home and on people in distant lands and distant futures. Genuine progress occurs through substituting renewable for non-renewable resources and through internalizing the full cost of economic activity into the price of the products of that activity. Without that internalization, markets cannot be efficient

A.C. Nielsen Co., “The Nielsen comparable metrics report: Q4 2016,” May 2017, accessed at http://www.nielsen.com/us/en/insights/reports/2017/the-comparable-metrics-report-q4-201

Anielski, M., and J. Rowe, J., *The Genuine Progress Indicator – 1998 Update*, Redefining Progress, San Francisco, CA, 1999.

Bagstad, Kenneth J., Günseli Berik and Erica J. Brown Gaddis, "Methodological Developments in US State-Level Genuine Progress Indicators: Toward GPI 2.0." *Ecological Indicators*, 45 (2014), 474–85

Cobb, C., Halstead, T. and J. Rowe, "The Genuine Progress Indicator," Redefining Progress, San Francisco, CA, 1995.

Kubiszewski, Ida, et al. "Beyond GDP: Measuring and Achieving Global Genuine Progress," *Ecological Economics*, 93, 57-68, 2013.

Kuznets, Simon. 1934. "National Income, 1929–1932". 73rd US Congress, 2d session, Senate document no. 124. Accessed Jan. 22, 2018 from https://fraser.stlouisfed.org/scribd/?title_id=971&filepath=/files/docs/publications/natincome_1934/19340104_nationalinc.pdf

Lawn, P.A., "A Theoretical Foundation to Support the Index of Sustainable Economic Welfare (ISEW), Genuine Progress Indicator (GPI), and Other Related Indexes," *Ecological Economics*, 44(1), 105-118, 2003.

Lawn, P.A., "An Assessment of the Valuation Methods used to Calculate the Index of Sustainable Economic Welfare (ISEW), Genuine Progress Indicator (GPI), and Sustainable Net Benefit Index (SNBI)," *Environment, Development and Sustainability*

National Safety Council, “Estimating the Cost of Unintentional Injuries, 2015,” accessed at http://www.nsc.org/NSCDocuments_Corporate/estimating-costs.pdf

Neumayer, E., "On the Methodology of ISEW, GPI and Related Measures: Some Constructive Suggestions and Some Doubt on the ‘Threshold’ Hypothesis," *Ecological Economics*, 34(3), 347-361, 2000.

Ostergaard-Klem, Regina, and Kirsten Olesen. *Environmental Council Annual Report: State of Hawai'i: Presenting the Genuine Progress Indicator Baseline, 2013.* Accessed Dec. 28, 2017 at http://oeqc2.doh.hawaii.gov/EC_Reports/EC-Annual-Report-2013.pdf

PolicyMap.org, “Gini Coefficients for Vermont, Zip Code Tabulation,” accessed Feb. 20, 2018 at https://www.policymap.com/2017/07/gini-index-inequality-now-policymap/

Public Assets Institute. “The State of Working Vermont 2017,” Public Assets Institute, Montpelier, VT, accessed at <http://publicassets.org/library/publications/reports/state-of-working-vermont-2017/>.

Remer, Scott. "Mind the Gap: The Danger of Income Inequality," *The Politic,* Feb. 27, 2014, online at http://thepolitic.org/mind-the-gap-the-danger-of-income-inequality/

Rosen, Rebecca J. "The Mental-Health Consequences of Unemployment," *The Atlantic,* June 8, 2014, accessed Jan. 31, 2018 from https://www.theatlantic.com/business/archive/2014/06/the-mental-health-consequences-of-unemployment/372449/

Saez, Emmanuel. 2017. “Income and Wealth Inequality: Evidence and Policy Implications,” *Contemporary Economic Policy* 35, no. 1, Jan. 2017, 7-25.

Samuelson, Paul and William Nordhaus. 2000. "GDP: One of the Great Inventions of the 20th Century," Bureau of Economic Analysis, *Survey of Current Business,* January 2000, accessed Jan. 22, 2018 from https://www.bea.gov/scb/account_articles/general/0100od/maintext.htm

Shapiro, Carl and Joseph Stiglitz, "Equilibrium Unemployment as a Worker Discipline Device," *American Economic Review,* Vol. 74, No. 3 (Jun4(en)1iscip4, No. el42l-5(.3(o)-5(rd)4(h)3(au6(p)3(l)li)3n)3(4(8 293.336ETBT1 0 0 1 4(

Talberth, John, "Legislative Impacts on the State's Genuine Progress Indicator for HB 295: Maryland Wage Act of 2014," Center for Sustainable Economy, accessed at https://sustainable-

Voigt, Brian, Julia Lees, and Jon Erickson, "An Assessment of the Economic Value of Clean Water in Lake Champlain." Lake Champlain Basin Program Technical Report No. 81

Vermont is justifiably proud of its tradition of town meeting, where citizens meet as equals to decide budgets and other policy matters for their polity. Behind that political equality is a deeper kind of cultural and social equality that allows Vermonters to live and work together in both freedom and unity, as the state motto puts it. That cultural and social equality is sorely strained by economic inequality--large disparities in the distribution of income and wealth. And those disparities have immediate, and negative, political consequences as well. As FDR's vice

distribution of income by the market. Averaging the two Ginis, then, seems like a way to have both elements (the structural inequality of the economy, and our attempts to mitigate some part of the effects of that structural inequality through policy) represented in the indicator.

Including the Post Tax and Transfer Gini in the calculation has the advantage of offering state-level policy makers another policy lever by which to affect this component of the GPI. Legislation raising the minimum wage would affect the Market Gini, through intervention in market systems. Legislation securing the social safety net would affect the Post Tax and Transfer Gini and raise GPI if this Gini were included in the calculation behind the compilation.

There are other innovations in the use of the Gini Coefficient that bear exploration and consideration by the group of state GPI practitioners who set the standard GPI methodology.

One such innovation is offered by World Bank economist Branko Milanovic. He argues that the upper limit of one in standard Gini measurements--the condition in which one person has all the income, and all others have nothing--is completely unrealistic, since those without income would die of starvation. More useful, he says, is to take as the upper limit of inequality a theoretical maximum in which all but one percent of the population has a bare subsistence level income. This distribution, Milanovic says, would be the "maximum feasible inequality" for a nation.

A level of income that supports a bare subsistence is a per capita measure: each person needs, at a minimum, income to cover food and some kind of shelter. This minimum doesn't vary even as the incomes of wealthier individuals rise or fall. Thus, the maximum feasible inequality rises with the total amount of income the economy produces.

A collection of points of maximum feasible inequality for different levels of income would, when charted, form an Inequality Possibility Frontier. At each level of total income it is possible to assess how close to that frontier the economy is operating. In 2013 Milanovic found that the U.S. economy was operating at 50% of its theoretical Maximum Feasible Inequality. In other words--words that are equally accurate but more troubling--in that year the U.S. was halfway to a condition in which 99% of Americans had a bare subsistence level of income.[78]

Milanovic proposes to call this ratio of actual to theoretically possible inequality the Inequality Extraction Ratio, or IER. It measures "how close...measured inequality [is] to the maximum inequality that can exist in a given society"--that is, society's maximum feasible inequality. It's derived in the same way as the Gini coefficient, but instead of using a floor of zero income for its lower bound, the floor is the income necessary for physiological subsistence.

---

[78] wBank The De Pa y(ea)11()-4G-3(m(c)3(tn)-3(h),8(ns)7(,"vTmr)7(r)-4y5(io)15 ic, ")-5(In)13(eq)12(ua)41( )ehality

Yet another approach to refining the income inequality adjustment in the GPI was offered by Michael Weisdorf in a working paper circulated to GPI compilers.[79] The proposal calls for applying the

There are any number of ways to value the clean-water assets of the state, with no single method recommending itself as definitive. Within the literature on GPI, the figure of $130 per person per year, in year 2000 dollars (which would be $179 in year 2015 dollars) echoes from study to study as the per capita value attached to clean waterbodies. The number traces to unspecified valuation efforts reported by the Maryland GPI—efforts that asked people how much they would spend to reduce or eliminate water pollution.[82]

Commendably grass-roots oriented as that method may be, it has numerous problems. People who make more money have more money to spend, and are therefore more likely to spend more money on any particular good they desire, including the public good of clean waterbodies; this means that the value of clean water to a community rises with the rising incomes and wealth of that community, and decreases with decreasing wealth and income. That result seems counterintuitive; we expect the value of water to be more stable than this method implies. In addition, this method makes the total dollar value of clean water in Vermont rise with population increase (a result that may or may not seem counterintuitive depending on how anthropocentric one's intuitions are).

The figure of $130 per person per year is generally recognized as being an exceedingly conservative estimate. At the other end of the scale is an entirely different approach. In some sense, a clean environment is part of the identity of Vermont and of the people who inhabit its landscapes. Since that identity is of near-infinite value to Vermonters, clean water, an integral part of that identity, would have a near-infinite value. (The most recent GPI report for Hawaii makes a similar point about the role clean fresh water plays for residents of that state, though the study ultimately accepts the widely used $130 per person per year valuation.)[83] It would be hard to accommodate a value of infinity in any system of ledger-keeping, and GPI understandably rejects that approach. And yet the concept of identity-valuation of clean waterbodies--the near-

Appendix Four: Vermont Act 113

Vermont Act 113 – An act relating to the genuine progress indicator

It is hereby enacted by the General Assembly of the State of Vermont:

Sec. 1. PURPOSE, DEFINITION, AND INTENT
(a) Purpose. The purpose of the genuine progress indicator ("GPI") is to measure the state of Vermont's economic, environmental, and societal well-being as a supplement to the measurement derived from the gross state product and other existing statistical measurements.

(b) Definition. The GPI is an estimate of the net contributions of economic activity to the well-being and long-term prosperity of our state's citizens, calculated through adjustments to gross state product that account for positive and negative economic, environmental, and social attributes of economic development.

(c) Intent. It is the intent of the general assembly that once established and tested, the GPI will assist state government in decision-making by providing an additional basis for budgetary decisions, including outcomes-based budgeting; by measuring progress in the application of policy and programs; and by serving as a tool to identify public policy priorities, including other measures such as human rights.

Sec. 2. GENUINE PROGRESS INDICATOR
(a) Establishment; maintenance.
(1) The secretary of administration shall negotiate and enter into a memorandum of understanding with the Gund Institute for Ecological Economics of the University of Vermont (the "Gund Institute") to work in collaboration to establish and test a genuine progress indicator (GPI). The memorandum shall provide the process by which the GPI is established and, once tested, how and by whom the GPI shall be maintained and updated. The memorandum shall further provide that in the establishment of the GPI, the secretary of administration, in collaboration with the Gund Institute, shall create a Vermont data committee made up of individuals with relevant expertise to inventory existing datasets and to make recommendations that may be useful to all data users in Vermont's state government, nonprofit organizations, and businesses.

(2) The GPI shall use standard genuine progress indicator methodology and additional factors to enhance the indicator, which shall be adjusted periodically as relevant and necessary.

(b) Accessibility. Once established, the GPI and its underlying datasets that are submitted by the Gund Institute to the secretary of administration shall be posted on the state of Vermont website.

(c) Updating data. The secretary of administration shall cooperate in providing data as necessary in order to update and maintain the GPI.

Sec. 3. PROGRESS REPORTS
By January 15, 2013 and once every other year thereafter, the secretary of administration shall report to the house committees on government operations and on commerce and economic development and the senate committees on government operations and on economic development, housing, and general affairs a progress report regarding the maintenance, including the cost of maintenance, and usefulness of the GPI.

Sec. 4. DATASETS
Any datasets submitted to the secretary of administration pursuant to this act shall be considered a public record under chapter 5 of Title 1.

Sec. 5. EFFECTIVE DATE
This act shall take effect on passage.

Approved: May 8, 2012