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A Review of the Literature on Regrettable Expenditures and Implications for the Index of Economic Well-being

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A Review of the Literature on Regrettable Expenditures and Implications for the Index of Economic Well-being

I. Introduction

Gross Domestic Product (GDP) is one of the most widely used and recognized measures of economic well-being. In recent decades, however, economists have acknowledged the shortcomings of GDP in accurately measuring economic welfare. GDP only considers productive factors attached to a monetary value and includes the costs of welfare-reducing activity. Consequently, economists have increasingly turned to alternate measures, such as the Genuine Progress Indicator (GPI). Developed in 1989, the GPI was one of the first alternatives to GDP as a measure of economic well-being. Unlike GDP, the GPI reflects non-monetized transactions that enhance welfare, such as the value of unpaid household work, and subtracts expenditures that reduce welfare, such as the cost of pollution (Talberth, Cobb, & Slattery, 2006).

The GPI, however, is far from the perfect indicator of economic well-being. Many economists have criticized GPI's methodology for using seemingly arbitrary and subjective expenditure categories and calculation methods. In particular, one category—regrettable or defensive expenditures—has drawn much criticism for its subjective nature. Regrettable expenditures do not increase economic well-being. They represent expenditures that detract from economic well-being, prevent negative outcomes, or compensate for side-effects from economic activity. Based on this general definition, deciding which costs are regrettable expenditures is controversial and problematic (Neumayer, 2003).

The Centre for the Study of Living Standards (CSLS) has also developed its own indicator of economic welfare called the Index of Economic Well-being (IEWB). Similar to the GPI, the IEWB defines regrettable costs as necessary expenditures that “ameliorate undesirable outcomes” (Thomas & Ugucconi, 2016). Unlike the GPI, however, the IEWB measures regrettable expenditures on a per capita basis.¹ The IEWB's regrettable expenditures focus on private costs rather than public or social costs. Four types of private costs comprise the IEWB's regrettable expenditures: commuting, crime, household pollution abatement, and automobile

¹ This report includes values from several GPI studies from different jurisdictions. The data in this report are total values, not per capita.

accidents. Similar to the GPI, the IEWB's choice of costs and calculation methods for regrettable expenditures requires close consideration and justification, due to this component's subjectivity.

This report aims to recommend an updated, more accurate version of the IEWB's regrettable expenditures. This report recommends that the IEWB continue to incorporate regrettable expenditures in its calculations and to maintain its original definition. However, new costs should be added, and the methodology for calculating regrettable costs should be revised. By improving the costs and methodology used to calculate regrettable expenditures, the IEWB's accuracy in measuring genuine welfare will be enhanced.

This report includes four sections. First, it provides a literature review on the GPI and its methodologies. Second, this report proposes recommendations to improve the IEWB's analysis of regrettable expenditures. Third, it suggests revisions to the IEWB's methodology in calculating regrettable expenditures. Lastly, the report offers a discussion on a future research agenda and concluding remarks.

II. Literature Review

The U.S. Genuine Progress Indicator defines regrettable expenditures as necessary costs that offset past negative economic externalities or prevent future negative outcomes. The 2004 U.S. GPI includes four components of regrettable expenditures: the cost of crime, commuting, household pollution abatement, and automobile accidents (Talberth, Cobb, & Slattery, 2006).² However, the 2004 U.S. GPI omits the cost of family breakdown, which previous GPIs had included. Based on the 1998 and 2004 U.S. GPI calculations, the following definitions are commonly used for each component of regrettable costs (Talberth, Cobb, & Slattery, 2006; Anielski, 1998):

- Cost of commuting: Includes direct costs of vehicle/public transit and indirect costs of time lost from commuting.
- Cost of crime: Includes the cost to victims (out-of-pocket medical/legal expenses, the value of stolen goods/damaged property, lost wages from work leave) and cost of household security prevention (locks, alarms).
- Cost of household pollution abatement: Includes the cost of equipment purchased to reduce pollution on a household level (air/water filters).

² Talberth, Cobb, & Slattery (2006) updated the GPI methodology in 2006 but used data from 2004 to calculate the U.S. GPI. Thus, this report refers to their GPI as the 2004 U.S. GPI.

- Cost of automobile accidents: Includes the cost of motor vehicle accidents (medical/legal/funeral expenses, insurance costs, wage losses).
- Cost of family breakdown: Includes the cost of divorce (out-of-pocket legal fees, counseling, cost of establishing separate residences).³

Many recent GPI studies for other countries use the same cost components of regrettable expenditures as the 1998 and 2004 U.S. GPIs. The Australia GPI incorporates similar types of costs, namely the cost of family changes, crime, commuting, and motor vehicle crashes (Kenny et al., 2019). The California GPI more closely resembles the 2004 U.S. GPI by defining defensive expenditures as the cost of motor vehicle accidents, crime, commuting, and household pollution abatement. They choose not to include the cost of family breakdown, due to its “subjective definition” (Brown & Lazarus, 2018). Finally, the 1994 Canada GPI includes the same regrettable costs as the U.S. GPI (Messinger, 1997).⁴ These studies’ inclusion of similar costs as the U.S. GPI suggests that the IEWB’s original cost components for regrettable expenditures do not require revision.

Likewise, several studies that omit regrettable expenditures still include costs commonly considered to be regrettable. GPI studies on Hong Kong and Singapore, for example, include the cost of crime and family breakdown, though both studies do not discuss regrettable expenditures or define these costs as regrettable (Deland & Yu, 2015). However, as these studies focus primarily on public or government expenditures, their methods of calculation go beyond the scope of the IEWB’s regrettable expenditures and are not useful to this report. Nevertheless, their inclusion of these costs reinforces how the IEWB should maintain its four cost components for regrettable expenditures.

Although the IEWB’s original cost components for regrettable expenditures are relevant, additional costs could be included to represent Canadian regrettable expenditures more accurately. The Alberta GPI incorporates more unconventional components, such as the cost of substance abuse and gambling, which more realistically reflect the average person’s lifestyle. However, they neglect to explain how these costs are calculated, and some components are vaguely defined (Anielski, 2001a). For example, the Alberta GPI considers the cost of obesity

³ The 1998 GPI defines the cost of family breakdown as a general social cost to well-being (Anielski, 1998). Thus, in addition to the cost of divorce, the authors included the social cost of TV viewing and the cost of divorce per child affected (counseling for the child, costs associated with difficulties at school/personal relationships) under this component. This report has omitted the social cost of TV viewing and cost per child affected, as they cannot be defined as regrettable expenditures on a personal expenditure level. Nevertheless, the methodology used to calculate the cost of divorce remains useful for our objective.

⁴ The report by Messinger (1997) indicates the estimated values for the Canada GPI. However, it does not specify methodology or sources of data. Thus, this report is mostly based on the U.S. GPI.

and unhealthy lifestyles as regrettable, yet determining what to include in the calculation of these costs is subjective. While these additions are debatable, several studies that diverge from “traditional” GPI studies do include reasonable components, which the IEWB should consider. A GPI study on the U.S., Maryland, and Baltimore broadens its definition of regrettable expenditures by including the cost of medical care, insurance, and legal services (Talberth & Weisdorf, 2017). Similarly, the Brazil GPI considers health and education costs as defensive expenditures (Andrade & Garcia, 2015). Although these studies focus on defensive expenditures on a public level, several of these components—namely out-of-pocket private healthcare expenses—impact many Canadians’ private expenditures and thus should be reflected in the IEWB’s regrettable costs.

In addition, many studies calculate regrettable expenditures by using several cost methods and categories. For example, rather than taking the average cost of total auto accidents, many studies sum the average costs of different types of accidents. For the California GPI, Brown and Lazarus (2018) discuss their methods of calculation for certain cost indicators, which could serve as the basis for calculating IEWB’s regrettable expenditures:

Table 1: Calculation Methodologies for Various Cost Components Used by the California GPI (2018)

Cost	Method of Calculation
Vehicle accidents	Total accidents from five categories × Cost valuations for each category
Crime	Total crimes from seven categories × National average costs for each category
Commuting	Direct costs + Indirect costs Direct costs = Personal expenditures for transportation services × Proportion of transport on public transit for commuting + Average spending on motor vehicles × Proportion of private vehicle travel for commuting Indirect costs = Average hours commuting to work × Number of work days × 0.78 factor for commuting as leisure × Average state wage

Source: Brown and Lazarus (2018)

Revising the methodology for calculations based on these current studies and trends will help the IEWB’s regrettable expenditures attain more accuracy.

III. Recommendations

Based on past and recent GPI studies, the IEWB should maintain its original definition of regrettable expenditures but include additional cost components and update its calculation methods.

A. Maintain Definition for Regrettable Expenditures

This report recommends upholding the IEWB’s original definition of regrettable expenditures: necessary private costs that ameliorate, prevent, or result from negative outcomes (Thomas & Ugucioni, 2016). Based on the existing literature, studies that include regrettable expenditures maintain a similar definition. Controversy surrounds what cost components should be included, not the definition of regrettable expenditures. Although we could omit regrettable expenditures, as many studies have done, this cost category has its advantages for researchers and policymakers. By including regrettable expenditures, we can determine how much Canada spends on defensive costs at the individual level and at what proportion these expenditures reduce economic well-being.

B. Add New Regrettable Costs

For the updated regrettable expenditures, this report recommends including the following types of costs: commuting, crime, household pollution abatement, auto accidents, divorce, and medical expenses. These costs were chosen to reflect the regrettable expenditures that the average Canadian must face. Although many other private expenditures may constitute as regrettable, these broad cost categories represent the most significant types of regrettable costs for the general Canadian population. New costs, divorce and medical expenses, were included to reflect Canadian regrettable expenditures more accurately.

C. Update Methodology

This report also recommends an updated methodology for calculations based on GPI literature and recent data. Detailed calculation methods and sources of data for each cost component can be found below under “Methodologies”.

To improve the methodology further, the IEWB should continually update how each regrettable cost is defined and calculated. For example, the IEWB includes expenditures on public transport for commuting costs; to reflect current times, personal expenditures from ride-sharing services could also be considered once the data becomes available. By continually revising what is included in calculating each cost component, we can represent modern Canadian society more realistically.

Although this report recommends an updated methodology based on recent literature, there are gaps in the available Canadian data, which may impede the ability to follow other GPI

studies' calculation methods. As shown below under “Methodologies”, this report uses modified or simplified methods due to the lack of existing Canadian data.

IV. Methodologies

For each cost below, the report summarizes the detailed methodologies used in GPI literature. The following methodologies will primarily be based on the 1998 U.S. GPI Methodology Handbook (Anielski, 1998), as most studies follow similar methods for calculations. The report then offers a discussion on the methodology, including potential limitations, recommendations for improvement, and suggestions for applying the methodology to the IEWB. The discussion section also reports potential cost values and statistics that can be used to calculate regrettable expenditures.⁵

A. Cost of Commuting

Methodology:

The 1998 U.S. GPI divides commuting costs into direct out-of-pocket expenses and indirect time expenses.

$$\textit{Total Commuting Costs} = \textit{Direct Costs} + \textit{Indirect Costs}$$

i. Direct Costs

Direct costs are defined as private transportation costs for the commuter, including the amount spent to operate a vehicle or to use transit (in this case, by bus or train). The 1998 U.S. GPI considers direct costs as a function of the cost of private transport used for commuting, the cost of depreciation of private vehicles, and the private cost of public transportation used for commuting.

To calculate the direct costs for commuters who drive to work, they estimate the share of total annual private expenditures on user-operated transportation (i.e. private vehicles) spent towards commuting. Based on the National Income and Product Accounts (NIPA), they determine that the depreciation of vehicles accounts for 30% of private transportation costs, so they only include 70% of total private expenses in the calculation. They also find that 30% of

⁵ The values presented in this report range over several years. Some are expressed in current prices or constant prices from different years. Converting these values into constant prices of a specific reference year goes beyond the scope of this report. However, at the end, this report discusses potential solutions for future calculations.

non-commercial vehicle miles are used for commuting. Therefore, they multiply 0.7 (to account for depreciated vehicles) and 0.3 (to account for vehicles used for commuting) by the total private cost of user-operated transportation.

To calculate the direct costs of commuters who use transit, they use the same method. They determine that 30% of the private costs of using local transit (i.e. bus or train fare) counts towards commuting. Therefore, they multiply 0.3 by the total private-user costs of transit.

Formula Used by the 1998 U.S. GPI: $Total\ Direct\ Costs = 0.7(0.3)A + 0.3B = 0.21A + 0.3B$

*A = Private annual expenditures of user-operated transportation; B = Private annual expenditures on public transit

ii. Indirect Costs

Indirect costs are defined as the value of time lost while commuting. To calculate the indirect costs of commuting, they multiply the total number of people employed each year by the annual number of hours spent commuting and the value of commuting time. The value of commuting time is calculated as the average hourly wage multiplied by 0.75 to account for people who value commuting as a leisure activity. As some people may enjoy commuting, the 1998 GPI considers 25% of commuting as leisure and 75% as a necessary nuisance; thus, only 0.75 of the hourly wage is considered. They determine these values from the National Personal Transportation Surveys conducted by the U.S. Department of Transportation.

Total Indirect Costs

$$= \text{Number of Employed} * \text{Annual Number of Hours Spent Commuting} * \text{Average Hourly Wage} * 0.75$$

Table 2: GPI Values for Commuting

	1998 U.S. GPI	2004 U.S. GPI	1994 GPI Canada
Total Cost	386 (in billions of constant 1992 US\$)	522.61 (in billions of constant 2000 US\$)	21.9 (in billions of constant 1986 CAN\$)
% of Total Personal Consumption	7.49%	6.88%	6.2%

Source: Anielski (1998); Talberth, Cobb, & Slattery (2006); Messinger (1997)

Discussion:

The methodology for direct costs should be revised for the IEWB. The 1998 GPI does not specify how the costs of private transportation are calculated, as they take the value from NIPA. However, NIPA defines this cost as personal consumption expenditures on transportation-

related goods and services, namely the costs of purchasing vehicles and paying for maintenance, including gas (Bureau of Transportation Statistics, 2018). To increase accuracy, we should also consider insurance costs and paid parking in the total private user-operated vehicle costs, as both affect the cost of operating a vehicle and, thus, commuting. In addition, the 30% depreciation rate of vehicles may be too high for present-day estimates, given the improvement in vehicle technology since the 1990s. Finally, the 1998 U.S. GPI designates only 30% of total private transit costs towards commuting, though the majority of riders primarily take public transit for commuting purposes. The percentage should be higher to reflect how public transit is predominantly used for commuting in Canada. For the updated IEWB, future research should be conducted to determine a more accurate depreciation rate for cars and proportion of total transit costs towards commuting.

To estimate direct commuting costs, the IEWB can determine the total expenditures of private cars and transit from Statistics Canada’s detailed household final consumption expenditures for 2018.

Table 3: Direct Costs of Commuting Expenditures for Canada (2018)

Costs for Private Vehicle Expenditures	Annual Cost (in millions of current 2018 CAN\$)
New passenger cars	17,501
(Vehicle) Fuels and lubricants	47,512
Maintenance and repair of vehicles	11,348
Parking	3,304
Insurance related to transport vehicles	7,668

Total Costs	Annual Cost (in millions of current 2018 CAN\$)
TOTAL for private vehicles	87,333
TOTAL for transit (Urban transit and interurban bus fare)	5,895

Source: Statistics Canada (2018)

Based on these figures, we can estimate total direct costs in current 2018 prices:

$$Direct\ Costs = 0.21(87,333) + 0.3(5,895) = 20,108.43 \text{ (in millions of 2018 CAN\$)}$$

For indirect costs, the 1998 U.S. GPI uses the total number of employed in its commuting cost calculations, but using this total may be misleading as not all workers commute. For example, the 2011 National Household Survey indicates that about 1.1 million people worked at home (Statistics Canada, 2011). In the IEWB’s calculations, the total number of commuters who drive or take public transit can be used as an alternate to the number of employed. Although the two values are likely similar, using the total number of commuters would be more precise.

The IEWB can use Statistics Canada’s 2011 National Household Survey and national employee wages for 2019. The National Household Survey reported that approximately 15.4 million Canadians commuted to work in 2011. Approximately 80% of Canadian commuters used private vehicles, and 12% took public transit (defined as bus, subway, light rail, or ferry). In sum, about 14.2 million Canadians commuted by private vehicle or public transit in 2011. The National Household Survey also determined that, on average, Canadians spent 25.4 minutes travelling from home to work. Although commuting times varied considerably by region, occupation, and mode of transportation, the average commuting time will serve the IEWB’s purposes in calculating indirect costs. Finally, the average hourly wage across all occupations in 2019 was \$26.92.

Table 4: Indirect Costs of Commuting Expenditures for Canada in 2011

Components of Indirect Costs	Value
Number of commuters (private vehicles and public transit)	14.2 million
Annual number of hours spent commuting	218.4 hours
Average hourly wage (2019)	\$26.92 (in current 2019 \$)

Source: Statistics Canada (2011 & 2019)

Based on these figures, we can estimate total indirect costs:

$$\begin{aligned}
 \text{Total Indirect Costs} &= 14,200,000 * 218.4 * 26.92 * 0.75 \\
 &= 62,614,843,200 \text{ (in current 2019 CAN \$)}^6
 \end{aligned}$$

As the commuting statistics are from 2011 and Statistics Canada has not updated this data, the above estimate for indirect costs is not accurate. We would have to multiply the values by some growth rate to approximate the statistics for 2019, which falls outside the purview of this report. Future work on the IEWB should determine an appropriate growth rate based on time series data from Statistics Canada.

B. Cost of Crime

Methodology:

The 1998 U.S. GPI separates the cost of crime into defensive costs and the direct costs to victims. They define defensive costs as the costs of household locks and alarms (home security and alarm systems), which they extrapolate from *Security Distributing and Marketing*. They define the cost of crime to victims as the losses from property theft or damage; the value of

⁶ This cost is much higher compared to the total cost of commuting for the 1994 Canada GPI, as shown in Table 2. However, this estimate uses more recent data and current 2019 prices, which likely explains the high value.

stolen property; the cost of replacing stolen property; monetary cash losses; medical expenses; and lost wages due to injury, court activity, police activity, or the time to repair or replace property. The 1998 U.S. GPI determines the cost of crime using data from the U.S. National Crime Survey. However, the U.S. National Crime Survey does not specify how they computed the total cost of crime to victims.

For the cost of crime to victims, we can use Brown & Lazurus’ (2018) and Kenny et al’s (2019) methodologies for the California GPI and the Australia GPI, respectively. Both studies multiply the number of incidents in a category of crime by the average cost to victims for that crime. Unfortunately, Brown & Lazurus (2018) use seven categories of crime but do not specify which crimes were used, and Kenny et al. (2019) also do not reveal their selected categories.

Table 5: GPI Values for Crime

	1998 U.S. GPI	2004 U.S. GPI	1994 GPI Canada
Total Cost	28.1 (in billions of constant 1992 US\$)	34.22 (in billions of constant 2000 US\$)	3.6 (in billions of constant 1986 CAN\$)
Percent of Total Personal Consumption (%)	0.55%	0.45%	1.02%

Source: Anielski (1998); Talberth, Cobb, & Slattery (2006); Messinger (1997)

Discussion:

The 1998 U.S. GPI includes numerous sub-components for the cost of crime that comprehensively and accurately reflect regrettable expenditures, so the IEWB can use a similar definition in its calculations. However, some costs may need to be excluded. Including losses from property theft or damage, the value of stolen property, and the cost of replacing stolen property may result in double counting; thus, only the cost of replacing stolen or damaged property should be included.⁷ We could also omit medical expenses, as Canada’s healthcare system covers basic medical care, and most individuals would not have to pay for treatment. Therefore, we could define the cost of crime to victims as the cost of replacing stolen or damaged property, monetary cash losses (from burglary), and lost wages due to injury.

For cost of crime to victims, we can choose categories of crime that affect the most Canadians. According to Statistics Canada’s police-reported crime statistics for 2014, the most common crime categories include homicide, assault, robbery, sexual assault, motor vehicle theft, and breaking and entering (Boyce, 2015). A report on the costs of crime by Public Safety Canada uses similar categories (Gabor, 2015), which supports the IEWB’s implementation of these six categories to calculate the cost of crime to victims.

⁷ The 1998 U.S. GPI does not include home insurance costs.

Table 6: Total Incidents per Crime Category for Canada (2014)

Crime	Total Incidents in Canada (2014)
Homicide	516
Sexual Assault	20,700
Assault	213,000
Robbery	21,000
Motor Vehicle Theft	74,000
Residential Burglary (Breaking and Entering)	151,900

Source: Boyce (2015)

However, no recent Canadian data is available for the cost of crime to victims for each crime category. As a potential solution, the IEWB can use estimated aggregate victim costs from a report on the costs of crime in Canada by the Department of Justice (Zhang, 2008). This report divides tangible victim costs into three sections: health care costs, productivity losses (i.e. lost wages), and the value of stolen and damaged property. The data is limiting; as they only present an aggregate value, we do not know from which crime categories they calculated these costs or their methodology. For the purposes of the IEWB, we could still use the report’s cost value to determine an estimate for the cost of crime to victims, though the result may not be as accurate.

Alternatively, we could use data from the report on the cost of crime by Public Safety Canada. They summarize the cost of crime to victims by averaging values from 84 studies around the world, mostly in the United States. Due to the lack of existing Canadian research, this data only reflects direct victim costs outside Canada. As most of this data originates from the United States, Canadian costs would be over-estimated. For example, American medical costs are much higher than Canada’s. Moreover, the Canadian healthcare system covers the costs of most medical procedures, so victim costs in Canada would not include these values. Table 7 shows overly high estimates for the victim costs of each crime per incident, particularly for homicide. These high values do not seem relevant to the cost of crime in Canada.⁸ However, we could multiply these costs by some percentage to approximate Canadian values more accurately, which would require additional research.

In their report, Public Safety Canada defines tangible victim costs as “direct economic losses to crime victims”, including the value of property loss or damage, lost wages, and medical costs (Gabor, 2015); this definition is identical (though slightly broader in scope) to the 1998 U.S. GPI, indicating that the report’s costs are suitable for the IEWB. As shown in Table 7, they also

⁸ Public Safety Canada claims that these high costs are driven by results from the United States, which reported, on average, \$1.1 million per crime incident. They estimate that this cost for the United States was more than twice the cost for the United Kingdom. Thus, these costs are grossly over-estimated for Canada.

include multiple categories of crime, so we would be able to use the same methodology found in recent GPI literature.

Table 7: Direct Victim Costs per Crime Category Averaged Across Various Countries (2014)

Crime (2014)	Average Cost per Incident (in current 2014 CAN\$)
Homicide	1,502,070
Sexual Assault	45,469
Assault	80,009
Robbery	66,975
Motor Vehicle Theft	6,676
Residential Burglary	1,857

Source: Gabor (2015)

For defensive costs, the IEWB could use data from a report on the cost of crime in Canada by the Fraser Institute (Easton, Furness, & Brantingam, 2014). They use multiple components to define the cost of personal security on an individual level, such as locks, alarms, self-defence classes, and guns. We can use locks/security bars and burglar alarms/motion lights, as these components are common regrettable expenditures and various GPI literature also include them. Additionally, the IEWB could consider incorporating home insurance costs, as homeowners pay these premiums as a defensive measure against burglary. According to Statistics Canada (2018), the annual household consumption of property insurance totaled to \$2,847 million (in current 2018 \$).

Table 8: Total Private Cost per Defensive Item in Canada (2009)

Type of Defensive Cost	Total Cost (in current 2012 CAN\$)
Locks/Security Bars	269,000,000
Burglar Alarms/Motion Lights	956,000,000

Source: Easton, Furness, & Brantingam (2014)⁹

⁹ To calculate each cost, they estimated the number of people who bought each type of defensive product and multiplied it by the per item cost. For example, they estimated 3,591,200 Canadians bought locks/security bars in 2009, which cost approximately \$75 each.

C. Cost of Household Pollution Abatement

Methodology:

Compared to other regrettable expenditure components, the cost of household pollution abatement has the most vaguely defined methodology in the recent literature. The 1998 U.S. GPI defines household pollution abatement costs as expenditures on equipment that alleviate the effects of pollution. Other than offering the examples of air and water filters, they do not define this cost further. They themselves do not calculate the cost of household pollution abatement; instead, they extrapolate the data from the 1996 Survey of Current Business, conducted by the Bureau of Economic Activity. The Survey of Current Business does not define what they included in the personal consumption for pollution abatement (Vogan, 1996). They indicate that expenditure on motor vehicle emission abatement devices was significant, but do not list other household pollution abatement costs. Other literature is just as ambiguous. The California GPI, for instance, includes this cost component without any definition or calculation methodology (Brown & Lazurus, 2018).

Table 9: GPI Values for Household Pollution Abatement

	1998 U.S. GPI	2004 U.S. GPI	1994 GPI Canada
Total Cost	11.8 (in billions of constant 1992 US\$)	21.26 (in billions of constant 2000 US\$)	1.3 (in billions of constant 1986 CAN\$)
% of Total Personal Consumption	0.23%	0.28%	0.37%

Source: Anielski (1998); Talberth, Cobb, & Slattery (2006); Messinger (1997)

Discussion:

As the GPI literature defines this cost unclearly, we would have to create our own definition of household pollution abatement costs. Choosing what constitutes as household equipment that abates pollution is subjective. Air purifiers and water filters are evidently equipment that improve indoor air quality, so they could uncontestedly be included. However, should investments in proper ventilation or expenditures on removing asbestos (a source of pollution) be considered? Because many factors could potentially fall under this cost component, we would have to limit the definition to only the most significant and obvious types of equipment.

Alternatively, the IEWB could circumvent calculating its own cost and simply extrapolate data as other GPI literature have done. Regrettably, no Canadian data on household pollution abatement expenditures exist. However, as shown in Table 9, we could use the 2004 U.S. GPI, which used the same survey as the 1998 U.S. GPI, and multiply the estimate by some

factor to approximate a Canadian value. Alternatively, we could use estimates from the 1994 Canada GPI and multiply them by some growth factor to approximate 2019 costs.

Another potential solution could be to eliminate this cost from the IEWB’s regrettable expenditures. The cost of household pollution abatement constitutes a small portion of the GPI compared to other regrettable expenditures, which signifies that we can forgo this cost.¹⁰ As shown in Table 9, household pollution abatement only constitutes 0.37% of total personal consumption for the 1994 Canada GPI. Moreover, most recent studies, such as the Australia GPI, no longer include this cost (Kenny et al., 2019). Although ideally the IEWB should include the cost of household pollution abatement for accuracy, this cost does not significantly impact total regrettable expenditures when compared to other costs.

D. Cost of Auto Accidents

Methodology:

The 1998 U.S. GPI estimates the cost of auto accidents by extrapolating data from the National Safety Council, but they do not explain the methodology or definition of this cost. The 2004 U.S. GPI defines this cost as wage losses, legal fees, medical costs, funeral expenses, and insurance administration costs for motor vehicle accidents causing injury or fatality. However, they do not include property damage (i.e. vehicle damage costs) due to gaps in the data.

The IEWB can follow the methodologies of the California and Australia GPI. Similar to the methodology for the cost of crime, the California GPI divides motor vehicle accidents into five categories: Death, Severe Injury, Non-in-capacitating Injury, Possible Injury, Property-Damage-Only Collisions. Each category is multiplied by its respective cost, which includes wage losses, medical expenses, administrative expenses, and property damage (Brown & Lazurus, 2018). The Australia GPI uses a similar method by multiplying the total number of motor vehicle crashes with the average cost for an injury or fatality (Kenny et al., 2019).

Table 10: GPI Values for Auto Accidents

	1998 U.S. GPI	2004 U.S. GPI	1994 GPI Canada
Total Cost	126.1 (in billions of constant 1992 US\$)	175.18 (in billions of constant 2000 US\$)	13.7 (in billions of constant 1986 CAN\$)
% of Total Personal Consumption	2.45%	2.31%	3.88%

Source: Anielski (1998); Talberth, Cobb, & Slattery (2006); Messinger (1997)

¹⁰ The California GPI’s cost of household pollution abatement is \$7.63 billion (in current 2011 US\$). Comparatively, its cost of commuting is \$86.62 billion, cost of crime \$65.88 billion, and cost of motor vehicle accidents \$24.69 billion (Brown & Lazurus, 2018).

Discussion:

The definition of this cost in recent GPI literature is problematic for the IEWB. Recent GPI studies only focus on the expenses associated with crashes causing injury or fatality. Another expense to consider would be out-of-pocket costs, defined by a Transport Canada report as any expense not covered by insurance, not claimed under insurance (due to low dollar value), and cases with uninsured drivers. Out-of-pocket costs for car accidents affect many Canadians. Transport Canada, for example, states that 52.1% of Ontarians incurred out-of-pocket expenses due to motor vehicle collisions in 1993, which is not an insignificant figure (Vodden, Smith, Eaton, & Mayhew, 2007).

Moreover, many expenses used by the GPI studies cannot be included, as they are not all private expenditures. These GPI studies did not calculate the cost of motor vehicle crashes with the intention of calculating regrettable expenditures on a personal level. For example, the California GPI considers administrative expenses, which includes the administrative cost of public and private insurance, police costs, and legal costs (Kenny et. al, 2019). Therefore, these GPI studies include the social and public cost of motor vehicle crashes, which are inadmissible for the IEWB's regrettable expenditures.

Finally, medical costs and property damage should also be exempted. As stated previously, Canada's universal healthcare system would likely cover the medical expenses of injured Canadians. Assuming that insurance covers property damage, individuals would not pay the costs of property damage directly, so most expenses for vehicle damage would not be considered a regrettable cost. Out-of-pocket property damage costs would be accounted for under out-of-pocket expenses. Thus, the IEWB can define the cost of auto accidents as legal fees (i.e. payments to lawyers for legal advice/representation), funeral expenses, and out-of-pocket expenses for motor vehicle accidents.

In a study on Canadian Motor Vehicle Traffic Collision Statistics in 2017, Transport Canada reported the number of collisions causing injury and fatal collisions, as shown in Table 11 (Transport Canada, 2017). This Canadian data is not as detailed as those in American studies, which classify accidents into many different categories. Unfortunately, these Canadian statistics do not report how many accidents caused property damage or required legal action. Moreover, Transport Canada and Statistics Canada have not conducted research on the costs of auto accidents (legal fees, funeral expenses, and out-of-pocket expenses) on a personal level. Thus, due to lack of data available, we would be unable to use the California GPI's methodology of multiplying each type of accident by its respective cost.

Table 11: Number of Collisions per Type of Motor Vehicle Collision in Canada (2017)

Type of Motor Vehicle Collision	Number of Collisions (2017)
Collision Causing Injury	112,479
Fatal Collision	1,679

Source: Transport Canada (2017)

Alternatively, we could use data from a collision cost study in Edmonton, Alberta conducted by the Capital Region Intersection Safety Partnership (CRISP) of Alberta (de Leur, 2018). Although these estimates were based on statistics in Edmonton, they could still provide insight on the average expenses of motor vehicle accidents in Canada and should not be discounted. They include out-of-pocket and funeral expenses, using similar definitions as this report’s recommendations to the IEWB. The study does not calculate legal costs on a personal level, so these costs cannot be included.¹¹

Table 12: Average Cost per Collision in Edmonton, Alberta (2017)

Type of Expense	Average Cost per Collision (in current 2017 CAN\$)
Out-of-pocket	\$648
Funeral Expenses	\$10,975

Source: de Leur (2018)

Unlike the cost of crime, we would not be able to extrapolate the cost of auto accidents from the existing GPI studies, such as the California GPI, to estimate a Canadian statistic. Their definition of the cost of auto accidents includes many public expenses that are unrelated to private regrettable expenditures. If these costs were used, the IEWB’s estimates for regrettable expenditures would be overestimated.

E. Cost of Divorce

Methodology:

The 1998 U.S. GPI includes the cost of family breakdown. For the purposes of the IEWB, this report focuses only on the cost of divorce. The 1998 U.S. GPI defines the cost of divorce as out-of-pocket expenses on legal fees, counseling, and establishing separate residences. They then multiply the average cost of divorce by the total number of divorces.

¹¹ They calculate “legal aid and prosecution costs” as a portion of policing costs, which suggests that these costs are considered on a public level (de Leur, 2018).

Table 13: GPI Values for Cost of Family Breakdown

	1998 U.S. GPI	1994 GPI Canada
Total Cost	58.7 (in billions of constant 1992 US\$)	4.2 (in billions of constant 1986 CAN\$)
% of Total Personal Consumption	1.14%	1.19%

Source: Anielski (1998); Messinger (1997)¹²

Discussion:

Few GPI studies in recent years include the cost of family breakdown or the cost of divorce. However, over 70,000 cases of divorce are reported every year in Canada (Statistics Canada, 2005). For many individuals, obtaining a divorce is a necessary expenditure that does not enhance economic well-being. As divorce affects much of the population, the IEWB should incorporate this cost as a regrettable expenditure.

We should define the cost of divorce more narrowly than the 1998 U.S. GPI. The costs of counseling and separating residences may be too ambiguous to include. Not all divorced couples receive counseling. Moreover, counseling may be an associated expense of divorce, but it is not a defining one. For the cost of separating residences, determining what expenses to include is also subjective. Would the cost of buying new housing, furniture, and appliances have to be considered? How would we determine that these expenses originated from divorce? To estimate a more straightforward cost of divorce, we should only consider legal fees. Although divorce requires many other expenses, focusing solely on legal costs allows for more objectivity, and legal fees are representative of the cost of divorce.

To calculate the cost of divorce, the IEWB could use divorce rates from Statistics Canada. However, Statistics Canada does not provide data on the cost of legal fees. Instead, we could use estimates from *Canadian Lawyer's 2015 Legal Fees Survey* (McKieman, 2015), which a report by the Department of Justice Canada (2016) cites. They estimate the average legal fees of uncontested and contested divorce for one party. Unfortunately, Statistics Canada (2005) does not differentiate between the two types of divorces in its report on divorce rates, only giving the total number of divorces as 71,269 in 2005 (Statistics Canada, 2005). To determine the cost of divorce on average, we should use the cost of the most common type of divorce. According to a report by Statistics Canada in 2009, most Canadian divorces are uncontested, so we should use the legal fees for uncontested divorces (Kelly, 2009).

¹² Both GPIs consider the cost of family breakdown, including the social cost of TV viewing. The percent of total personal consumption corresponding to cost of family breakdown will likely be overestimated, as the social cost of TV viewing should not be part of personal consumption.

Table 14: Legal Fees per Divorce in Canada

Type of Divorce	Legal Fees (in current 2015\$)
Uncontested	\$1845
Contested	\$13,638

Source: McKieman (2015)

F. Cost of Medical Expenses

Methodology:

The 1998 U.S. GPI does not consider private medical costs as regrettable. However, some recent studies have broadened their regrettable expenditures category to include healthcare expenditures. For example, a GPI study on U.S., Maryland, and Baltimore and the GPI Brazil consider the cost of medical care as part of regrettable or defensive expenditures (Talberth & Weisdorf, 2017; Andrade & Garcia, 2015). Neither study elaborates how they define the cost of medical care, but both include public expenditures, such as the cost of hospitals, which are irrelevant to the IEWB.

Discussion:

Although the 1998 and 2004 U.S. GPI do not include the cost of medical expenses, considering this cost as a regrettable expenditure may be useful and increase the accuracy of indicators of economic well-being. The IEWB already considers out-of-pocket medical expenses under its category for economic security and will not include this cost under regrettable expenditures. However, this section of the report will serve as a general discussion on how to incorporate Canadian out-of-pocket medical costs as regrettable expenditures.

According to a report by Statistics Canada, Canadians' spending on out-of-pocket medical expenses has increased, specifically on dental care, prescribed drugs, and insurance premiums (Sanmartin, Hennessy, Lu, & Law, 2014). These out-of-pocket expenses are regrettable expenditures: individuals must pay these costs to prevent negative health outcomes. Some recent GPI studies, such as the Brazil GPI, include medical expenses as regrettable expenditures, which justifies the inclusion of this cost. While these studies consider this cost from a public expenditure perspective, they still acknowledge the general cost of health care as a defensive expenditure.

Therefore, we can define the cost of medical expenses as out-of-pocket healthcare costs, which include dental services, prescription medications, and health insurance premiums.¹³ The report by Statistics Canada gives the average annual household cost of out-of-pocket medical treatment.

Table 15: Annual Out-of-Pocket Medical Costs per Household in Canada (2009)

Type of Out-of-Pocket Cost	Average Annual Household Cost (in current 2009 CAN\$)
Dental	384
Drugs	320
Health Insurance Premium	650

Source: Sanmartin, Hennessy, Lu, & Law (2014)

However, with these estimates, we assume that out-of-pocket expenditures are only comprised of three categories. Moreover, we also assume that every household pays for these out-of-pocket costs. These assumptions do not reflect all Canadians' situation in reality, but they are required to estimate the total cost of medical expenses for Canada in a general capacity.

V. Note for Future Calculations

The statistics and cost values used in this report range over several years and, in some cases, countries. First, much of the data must be multiplied by some growth factor to estimate values for 2019. For example, divorce statistics presented in this report are from 2005, as Statistics Canada has not updated these estimates. We should approximate these values for 2019 by using an appropriate growth rate. Future research for the IEWB should focus on determining these growth rates. Second, if we use data from the United States or another country, we must multiply those values by some proportion representing the statistic for Canada. For example, if we use the values for the cost of crime per incident (which were averaged over many foreign studies), we would have to take a portion of those values to represent Canadian crime costs more accurately. In other cases in which we must take the American value as given (such as the portion of vehicles used for commuting), we should acknowledge that the derived value was based on American data.

Finally, as the costs are expressed in prices from different years, we must convert these nominal values into constant dollar estimates. The 1998 U.S. GPI uses the 1992 chain-type deflator, adopted by the Bureau of Economic Analysis. For household and personal GPI components, they use the personal consumption expenditure chain-type price deflator. To

¹³ Statistics Canada reports that these are the largest categories of out-of-pocket health care expenditures for households (Sanmartin, Hennessy, Lu, & Law, 2014).

transform all current dollar values into chained-dollar estimates, they divide nominal estimates by the price index of the desired year for constant prices. We could use the same method for the IEWB's regrettable cost estimates.

VI. Future Research Agenda

This report suggests two areas of future research on regrettable expenditures to increase the accuracy of indicators of well-being:

A. Insurance

It is unclear how insurance is considered in many GPI studies. The cost of insurance affects many regrettable expenditures, such as the cost of crime, commuting, and auto accidents. Yet, in numerous GPI studies, insurance was not incorporated in the calculations of these regrettable expenditures. Other studies, such as the GPI for the U.S., Maryland, and Baltimore, consider insurance costs as a regrettable expenditure and create a separate cost category for insurance. However, they do not define insurance costs (e.g. car insurance, life insurance, property insurance, etc.) or state whether insurance costs were included in the calculation of other regrettable expenditures. Future studies could focus on determining whether to identify insurance costs as a separate regrettable expenditure and how to include insurance in other regrettable expenditures.

B. Theory of Regrettable Expenditures

Indicators of economic well-being, such as the GPI, face criticism for their subjective methodology. As shown in this report, GPI studies choose different costs as regrettable expenditures and justify their choices. Some GPIs vary drastically in what costs they have chosen to include. No standardized theory or method concerning regrettable expenditures exists, and current research on indicators of economic well-being have not focused on regrettable expenditures. Consequently, critics reject the value of these indicators, claiming that any cost could be defined as regrettable with the proper justification. Future research could address these concerns by developing a theory of regrettable expenditures that focuses specifically on methodology, including what costs should be chosen and how they should be measured. A developed theory would create more consensus on regrettable expenditures and diminish the subjectivity issue.

Conclusion

This report recommends that the IEWB should use its original definition of regrettable expenditures but revise its calculation methods and include additional cost components, namely the costs of divorce and medical expenses. The recommended methodologies are based on the methods of recent GPI literature, but most must be modified to suit the IEWB's regrettable expenditures. Many GPI studies did not create methodology for private regrettable expenditures specifically. Consequently, the definitions and calculations of their costs often include public expenditures or social costs. Moreover, the lack of existing Canadian data limits the ability to follow methodologies exactly. The recommended methodologies involve many assumptions and generalizations, such as using American data or defining costs more broadly. Once more Canadian data becomes available, we can revise methodologies again to follow the literature more closely.

Table 16: Summary of Regrettable Expenditures Included in GPI Studies

Type of Expenditure	1998 U.S.	2004 U.S.	Australia	Brazil	California	U.S., Maryland, Baltimore	Canada	Alberta
Commuting	X	X	X		X	X	X	X
Crime	X	X	X	X	X	X	X	X
Household Pollution Abatement	X	X			X	X	X	
Auto Accidents	X	X	X		X	X	X	X
Divorce	X		X	X		X	X	X
Medical Expenses				X		X		

Table 17: Summary of Total Regrettable Expenditure Values for the 1998 U.S. GPI, 2004 U.S. GPI, 1994 Canada GPI, & 1999 Alberta GPI

Type of Cost	1998 U.S. GPI (in billions of constant 1992 US\$)	2004 U.S. GPI (in billions of constant 2000 US\$)	1994 GPI Canada (in billions of constant 1986 CAN\$)	1999 GPI Alberta (in billions of constant 1998 CAN\$)
Commuting	386	522.61	21.9	4.41
Crime	28.1	34.22	3.6	1.83
Household Pollution Abatement	11.85	21.26	1.3	N/A
Auto Accidents	126.1	175.18	13.7	3.02
Divorce	8.3	N/A	4.2	0.15
Personal Consumption	5,153.30	7,600	353.2	52.84
GPI	1,762.2	4,419.08	262.1	36.99

Source: Anielski (1998); Talberth, Cobb, & Slattery (2006); Messinger (1997); Anielski (2001b)

Nevertheless, updating methodologies based on recent studies will improve the IEWB's calculation of regrettable expenditures. By increasing the accuracy in measuring regrettable expenditures, we will also be able to increase the IEWB's accuracy. In sum, revising the methodologies for regrettable expenditures will help create a more precise indicator of economic well-being.

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