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Valuing Wellbeing Impacts with the General Social Survey

Xavier Lemyre, Joelle Mader, and Marke Ambard[1]

Abstract

The Three-Stage Wellbeing Valuation approach is used to value the impacts of participation in activities such as going to the theater on life satisfaction. The method measures the amount of money that would be necessary to make an activity participant as well off in the absence of his participation as when participation occurs. Due to issues of endogeneity, the approach relies on an instrumental variable framework to measure income's effects on wellbeing. Moreover, the approach estimates activity and income effects on life satisfaction in separate stages and uses different datasets for separate stages.

Key Words: Wellbeing Valuation; Impact Measurement; General Social Survey; Arts, Culture and Sports.

1. Introduction

Participation in the arts and culture has been linked to community empowerment, increased feelings of belonging and skills building (Matarasso, 2003). These impacts can be quite elaborately defined, but they are also difficult to measure empirically (Ruiz, 2004). Key weaknesses of empirical models have resulted in debates regarding feasible approaches to social impact measurement. Insufficient quantitative data, small sample sizes, reliance on self-reported data and debates on definitions complicate measurement methodologies (Reeves, 2002). Empirical models of quality of life measures, for example, have been found to generate varied results depending on the definition of quality of life retained for analysis (Galloway, 2006).

This study aims to assess the feasibility of the methodology used by Fujiwara, Kudrna and Dolan (2014) in Canada, considering the data sources available, and to apply the wellbeing valuation method in the Canadian context. Using data from Statistics Canada's General Social Survey, the current research also seeks to ascertain whether such an approach in Canada would yield useful and interesting results for the arts, culture and sports sectors.

2. The Three-Stage Wellbeing Valuation

The Wellbeing Valuation approach assesses impacts of arts and culture participation on wellbeing, looking at a number of different variables (factors) related to the arts and culture, then deriving values for them for use in Cost Benefit Analysis and policy-making more generally (Fujiwara, 2013). The advantage is that the Wellbeing Valuation approach can be undertaken using any dataset that includes measures of wellbeing, an array of control variables and responses to questions concerning participation in arts and culture activities (Fujiwara, 2013).

The Three-Stage Wellbeing Valuation Approach (3S-WV) relies on the principles of utility theory to express the relationship between Compensating Surplus (CS) and activity participation. More specifically, this method attempts to measure the amount of money that would be necessary to make an activity participant as well off in the absence of his participation as he is when he participates. For example, this study asks how much money would be required to increase an individual's life satisfaction as much as her life satisfaction is improved by going to the theater. The

[1]Xavier Lemyre, Canadian Heritage, 25 Eddy Street, Gatineau, Canada, K1A 0M5 (xavier.lemyre@canada.ca); Joelle Mader, Statistics Canada (with Canadian Heritage during development of paper), 100 Tunney's Pasture Driveway, Ottawa, Canada, K1A 0T6 (joelle.mader@canada.ca); Marke Ambard, Canadian Heritage, 25 Eddy Street, Gatineau, Canada, K1A 0M5 (marke.ambard@canada.ca)

estimation method used in the context of Wellbeing Valuation relies on Ordinary Least Squares. The 3S-WV approach builds from the following single-equation model, where LS_i stands for life satisfaction, M_i represents the respondent's income, Q_i is a vector of arts and sports engagement variables, X_1 is a vector of determinants of life satisfaction, β_1 measures the impact of income on subjective wellbeing, and β_2 measures the impacts of activities on subjective wellbeing.

$$LS_i = \alpha + \beta_1 M_i + \beta_2 Q_i + \beta_3 X_i + \varepsilon_i \quad (1)$$

The vector below represents a level of utility given prices level, participation in arts and sports, and an income level. The superscript 0 signifies the level of utility before a particular participation in Q, and the superscript 1 signifies the level of utility once Q has been participated in.

$$v(p^0, Q^0, M^0) = v(p^1, Q^1, M^1 - CS) \quad (2)$$

The right hand side of the equation includes $M^1 - CS$, which represents the income level of a respondent, minus the compensating value, the willingness to pay for a positive change or willingness to pay for a negative change (in dollars) associated to an arts or sports activity. The CS then represents the "value" of a particular activity. We input values from regression results in (1) for elements of Q_i separately into equation (3) such that:

$$LS_i(\alpha + \beta_1 M_i^0 + \beta_2 Q_i^0 + \beta_3 X_i^0 + \varepsilon_i) = LS_i(\alpha + \beta_1 (M_i^1 - CS) + \beta_2 Q_i^1 + \beta_3 X_i^1 + \varepsilon_i) \quad (3)$$

And finally, we solve the following equation to obtain a compensating surplus for each activity:

$$CS = M^0 - e^{\left[\ln(M^0) - \frac{\beta_2}{\beta_1}\right]} \quad (4)$$

To estimate the Compensating Surplus (4), we need unbiased estimates of β_1 and β_2. But β_1 (impact of income) suffers from endogeneity problems due to reverse causality and selection bias, as well as suffering from measurement error. The combined effect of these biases has been found to lead to a downward bias in the income coefficient (β_1), which leads to an upward bias in compensating surplus estimates of arts, culture and sports activities (since β_1 is the denominator in equation (4)).

To overcome these problems, Dolan, Fujiwara and Metcalfe (2011) use an Instrumental Variable (IV) approach where the impact of income on life satisfaction (β_1) is estimated in a separate model. Fujiwara (2013) uses income changes due to lottery wins (among lottery winners) as an IV. However, data on lottery playing and winning is not documented in Statistics Canada surveys such as the General Social Survey. Other IVs have been suggested to eliminate the correlation between unobservable elements and income and hence reduce endogeneity problems. These include Spouse's income, Industrial sector of the individual's job and Education level (Angrist and Pischke, 2010), though a later study has demonstrated that these instruments generate results that are very similar to those obtained through simple Ordinary Least Square methods (Pischke, 2011) and there are question marks as to the validity of these instruments in terms of whether they comply with the key assumptions of exogeneity and the exclusion restriction. In the two-stage least squares income model that follows, X_{1i} is a vector of determinants of life satisfaction, X_{2i} is a vector of variables that are required to ensure that the IV is exogenous, and Z_i is the Instrumental Variable, in binary form.

$$LS_i = \pi + \beta_1^* \ln(M_i) + \beta_2 X_{2i} + \varepsilon_i \quad (5)$$

$$\ln(M_i) = \pi + \gamma Z_i + \delta X_{2i} + \vartheta_i \quad (6)$$

We can calculate the Compensating Surplus with parameters by substituting the biased β_1 estimated parameter from equation (1) with its counterpart β_1^* from the income model in equation (5).

$$CS = M^0 - e^{\left[\ln(M^0) - \frac{\beta_2}{\beta_1^*}\right]} \quad (7)$$

The instrument sought is a variable exogenously correlated with household income, but uncorrelated with life satisfaction beyond its effect through household income (exclusion restriction). Equations (5) and (6) are estimated using whether a Partner Works as an instrumental variable Z_i, which is equal to one if the respondent has a partner that works, and equal to zero if s/he does not. Whether a partner works has been used as an IV before under the assumption that a partner's employment increases one's income and is exogenous. This latter assumption, however, may be problematic as partner's employment status may not be truly exogenous and there are question marks regarding whether the exclusion restriction holds. That is, would a partner's employment status only impact on one's wellbeing through household income. If a partner who wants to work is unemployed this would likely cause stress in the household which would impact on wellbeing. This effect, nevertheless, can be expected to attenuate over time as individuals experience adaptation or habituation (Kahneman and Krueger, 2006). Another potential pitfall concerns the possibility that the instrument is only weakly correlated with the endogenous regressor, which is to say if the spouse's income represents a negligible share of the household income; this would lead to a bias in the estimation (Angrist, and Krueger, 2001).

3. The General Social Survey

Equation (1) is estimated using Statistics Canada's General Social Survey, Cycle 24 (GSS-24), Time-Stress and Well-Being (2010). This large-sample Canadian survey asked respondents about their arts, culture and sports participation, as well as a subjective wellbeing question and a series of demographic questions that were used as control variables to generate meaningful estimates of the wellbeing impacts of arts, culture and sports participation. The measure used for wellbeing in this study is self-reported life satisfaction (0-10 point scale). While the whole sample of this survey is comprised of 15,390 observations, respondents were asked demographic questions as well as one of two series of questions. Approximately half of the respondents were asked a series of questions pertaining to arts and culture participation, while the other half were asked a series of questions regarding sports participation. Thus the GSS-24 survey responses are split into two sub-samples.

Participation in cultural activities is defined as attending a cultural music, theater or dance performance, attending other cultural performances, visiting a public museum or gallery, visiting another type of museum, visiting a historic site, a zoo or aquarium, or visiting a conservation or nature park. Therefore, participation in cultural activities is here characterized by having reported to have taken part in at least one of the cultural activities included in the GSS-24. Similarly, participation in a sports team is defined here as having participated in recreational or competitive badminton, baseball, basketball, ball hockey, football, hockey, rowing, rugby, soccer, softball, tennis or squash, volleyball, curling, or bowling. Thus, participation in a team sport is defined as having participated in at least one of the team sports included in the GSS-24. Individual sports include boxing, cycling, equestrian, figure skating, golf, swimming, weightlifting, sailing, cross-country ski, triathlon, martial arts, alpine ski, and snowboarding. Lastly, a general sports participation question asked respondents whether they regularly participate in any sport. In the context of this survey question, regularly is defined as at least once a week during the season or for a certain period of the year.

A total of 26 control variables are used in the base model. Controls include the log-household income of respondents, their age, as well as demographic dummy variable pertaining to respondents' gender, employment, health status, geographical location, friends, marital status, education, and homeownership. Moreover, six empirical specifications for equation (1) were necessary due to two data-related considerations. Firstly, this study aims to test the statistical significance of the relationship between life satisfaction and different definitions of arts, culture and sports participation. Due to issues of multicollinearity, a model cannot include permutations of a variable to also be included. Secondly, due to the split sample nature of the GSS-24, different models had to be developed for analyses including arts and culture variables, and those that included sports variables.

Equations (5) and (6) are estimated using Statistics Canada's General Social Survey, Cycle 25 (GSS-25), Family (2011). This second survey is comparable to the GSS-24, but also included a detailed series of questions about the occupation and characteristics of the respondent's spouse, from which the income model could be computed. The GSS-25 also presented the benefit of a larger sample size (number of obs. = 17,551) that could be analyzed in full.

5. Initial Results

Values for the Compensating Surplus were calculated only for statistically significant relationships between activities and self-declared wellbeing. All estimates are generated using heteroscedasticity-robust standard errors.

5.1. Wellbeing Impacts of Arts Culture and Sports

Table 5.1-1 presents the coefficients for activity variables (β) as well as the associated t-statistic, sample size and model R-squared.

Table 5.1-1
Summary of Regression Coefficients for Activity Models

Activity	β	(t-stat.)	Sample size	R^2
Any Culture	0.243***	(3.18)	5,632	0.13
Golf	0.236**	(2.30)	5,626	0.15
Sports Regularly	0.160***	(3.10)	5,632	0.15
Any Sport	0.148***	(2.77)	5,607	0.15
Any Team Sport	0.134**	(2.11)	5,607	0.15
Cultural Music Theater Dance	0.131**	(2.36)	5,579	0.14
Historic Site	0.120**	(2.29)	5,579	0.14
Zoo Aquarium	0.120***	(2.46)	5,579	0.14
Other Cultural	0.096*	(1.67)	5,579	0.14
Theater	0.080*	(1.59)	5,582	0.13

*** p<0.01; ** 0.01<p<0.05; * 0.05<p<0.10

As the table above shows, statistically significant associations to life satisfaction were identified for going to the theater, attending a cultural, music or dance performance, attending other cultural types of performances, visiting a historic site, visiting a zoo or aquarium, engaging in sports regularly, playing ball hockey, playing golf, sailing, and practicing martial arts. The composite variables Any Culture, Any Team Sports, and Any Sport were also found to be statistically significant. A statistically significant associations was also found for Ball Hockey, however a small participation rate (0.4%) resulted in only 30 respondents reporting participation in Ball Hockey. Due to the small number of respondents, valuation estimates are not reported for this activity.

5. 2. The Effects of Income on Subjective Wellbeing

Results from the two-stage income model are provided in the following table. The estimated coefficient for the causal impact of income on wellbeing (β_1^*=1.146) is consistent with the results obtained by Fujiwara, Kudrna and Dolan (2014) (β_1^*=1.1) and suggests that the Partner Works IV works adequately well for the purpose of our study. Additionally, the R-squared obtained through regression of log (Household Income) directly on the Partner Works IV is 0.20, which provides support for the argument that the instrument used is reasonably relevant.

Table 5.2-1
Income model results

Dependent Variable	log(Household Income)		Life Satisfaction	
	β	t-stat.	β	t-stat.
Predicted log(Household Income)			1.146***	19.87
Partner Works (IV)	0.457***	45.24		
Gender	0.155***	16.69	-0.253***	-10.20
Employed	0.374***	26.00	-0.084*	-1.88
Health	0.181***	18.92	0.695***	26.26
Retired	0.019***	5.77	0.075***	8.28
Rural	-0.161***	-15.21	0.304***	10.63

Dwelling Owned	0.611***	49.82	-0.189***	-3.61
Age	-0.011***	-6.08	-0.055***	-13.33
Age Squared	0.00003*	1.61	0.0007***	15.73
University Degree	0.315***	30.24	-0.206***	-6.80
constant	10.337***	252.9	-3.870***	-6.59
Number of obs.	17,654		17,503	
R-squared	0.46		0.15	

*** p<0.01; ** 0.01<p<0.05; * 0.05<p<0.10

5.3. Compensating Values

The results that follow were obtained by using $40,000 as M^0 (the approximate sample average personal income) and β_1^*=1.146 (the estimate for the effect of income on wellbeing estimated through the income model). The following table presents the results from equation (7) in 2010 Canadian dollars.

Table 5.3-1
Estimated value of Participation (per person)

Activities	Coefficient	Value Per Year	Value Per Week
Any Culture	0.243***	7,642.77	146.98
Golf	0.236**	7,444.52	143.16
Sports Regularly	0.160***	5,212.32	100.24
Any Sport	0.148***	4,846.13	93.19
Any Team Sport	0.134**	4,414.05	84.89
Cultural Music Theater Dance	0.131**	4,320.77	83.09
Historic Site	0.120**	3,976.65	76.47
Zoo Aquarium	0.120***	3,976.65	76.47
Other Cultural Activities	0.096*	3,214.28	61.81
Theater	0.080*	2,697.09	51.87

*** p<0,01; ** 0,01<p<0,05; * 0,05<p<0,10

Participating in cultural activities was associated with higher wellbeing. This participation was valued at $7,642 per person per year, or $146 per person per week. Engaging in sports regularly was also found to be associated with higher wellbeing. Regularly engaging in sports was valued at $5,212 per person per year, or $100 per person per week. A statistically significant association was also found between participating in team sports and wellbeing. Team sports participation was valued at $4,414 per person per year, or $85 per week.

Estimates of the value of wellbeing impacts were performed for variables that were significant at the 10% level, but those significant at the 1% level warrant higher confidence. The values derived in this study are of higher, yet similar magnitudes as those obtained by Fujiwara, Kudrna and Dolan (2014). For instance, this study estimates a value of $4,414.05 per year for team sports for Canadians, while the UK study obtained a value of £1,127 per year (approx. $1,872 per year in 2010 Canadian dollars). Moreover, this study estimates the wellbeing value of theater attendance at $2,697.09 per year for Canadians, while the UK study obtained £999 per year (approx. $1,659 per year in 2010 Canadian dollars).

6. Conclusion and Next Steps

The 3S-WV methodology was implemented through the combined use of the GSS cycle 24 and the GSS cycle 25. This study relies on an instrument suggested by the literature (whether the respondent has a partner that works) in order to estimate causal relationships. Moreover, positive statistically significant associations to life satisfaction were also identified for the following specific activities: going to the theater, attending a cultural, music or dance performance, attending other cultural types of performances, visiting a historic site, visiting a zoo or aquarium, playing golf.

This study would benefit from data that contains precise income measures and a suitable instrument within the same dataset. The General Social Survey on Canadians at Work and Home, cycle 30 (2016) links income data from tax derived files through the use of administrative data from the Canada Revenue Agency, which would offer a higher level of detail and confidence.

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