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This paper reports the results of a preliminary investigation into the bias that results from nonresponse to the Canadian International Travel Survey (ITS). The primary purpose of the study is an initial evaluation of the error in selected estimates of trip characteristics resulting from a handout, mailback methodology which achieves on average a response rate of only 15%. There are five issues addressed in this paper: (1) the complexity of collecting international travel statistics (2) the level of response that can be achieved with mail and telephone follow-up (3) a comparison of selected trip characteristics reported by initial respondents with those reported by later respondents obtained through follow-up (4) an assessment of the impact of nonresponse on estimates of travel characteristics and (5) the further investigations and development that the study results warrant.

#### A BRIEF DESCRIPTION OF THE SURVEY

The ITS is a continuous survey of Canadian residents returning from trips to other countries and of residents of countries other than Canada and the U.S.A. visiting Canada (for simplicity the residents of countries other than Canada and the U.S.A. will be referred to as visitors). The survey provides a full range of statistics on the volume of travellers and detailed characteristics of their trips such as expenditures, places visited, length of stay, etc. The ITS survey provides the data for the receipts and payments on the travel account for the Canadian Balance of International Payments. Canadian Customs officers give questionnaires to returning Canadians and visitors as they enter Canada. The questionnaires are distributed on a sample basis at the major ports of entry into Canada and on a census basis at the smaller ports. The major ports are surveyed using a "stint" sampling methodology. This methodology involves a systematic method of selecting a start day following which a specified quantity of questionnaires are handed out on a continuous basis by the Customs officers. The collection methodology does not have a follow-up strategy for nonrespondents. The response rate of 15% is taken into consideration in determining the sample size of travellers who will receive questionnaires at

each port.

In 1986, approximately 668,000 Canadians received questionnaires and 363,000 visitors were given questionnaires. Of these approximately 116,000 (17%) of the Canadians and 29,600 (8%) of the visitors mailed back their questionnaires.

#### STUDY DESIGN

This preliminary study was designed as a test for an in-depth nonresponse study. As well as providing an initial evaluation of the nonresponse bias, the study was conducted to determine whether follow-up mechanisms could be instituted at Canada Customs ports and the degree to which response rates could be improved through such mechanisms. Although, the study is limited in scope to two ports and cannot be generalized to ports across Canada, the results give some indication as to the nature and impact of the nonresponse bias that may exist in the survey estimates.

In order to evaluate the nature and impact of nonresponse on ITS estimates, a telephone follow-up strategy was developed for the Canadian residents and a mail follow-up for visitors to Canada who did not respond to the survey.

The follow-up study was instituted at two locations during the first quarter of 1986, the first one being the Pacific Highway border crossing in British Columbia. For a sample of Canadians and visitors, Statistics Canada interviewers collected basic information such as the name and address of a representative of the travelling party (generally the driver of the vehicle). This information was later used to carry out a follow-up of nonrespondents. At the same time, the interviewer gave the Canadians an ITS questionnaire and asked them to complete and mail it to Statistics Canada. Visitors were given an ITS questionnaire and asked to keep and complete it just before leaving Canada. There were two "stints" at Pacific Highway during the first quarter of 1986, one in January and one in March.

It was not necessary to collect names and addresses of Canadians and visitors at the second port included in the study (Vancouver Airport, British Columbia). This information is already recorded for all travellers on Custom control cards (Custom declaration cards). Instead, a sample of these cards corresponding to the handout period was selected for

Canadians and visitors and these travellers were contacted during the follow-up. There were three "stints" at Vancouver Airport during the first quarter of 1986, one in each month.

The follow-up was conducted by telephone for returning Canadian residents. Interviewers attempted to contact and interview all persons who had not responded to the questionnaire approximately one month after the questionnaires had been distributed. The visitors were sent a follow-up letter and a questionnaire for self-completion.

#### 1) The Complexity of Collecting International Travel Data

Alternative collection methods which would improve the response rate were considered as part of this evaluation, but each method has its own drawbacks. The collection of international travel data for Canadians alone presents substantial operational problems and is a very costly undertaking. There are a number of alternative methodologies that could be used to collect this data. An exit/re-entry personal interview survey (visitors are interviewed as they leave Canada, Canadian travellers are interviewed as they re-enter Canada) would provide the data required, but could only be established at a prohibitive cost in light of the large number of ports across the country. Even a survey which involves a controlled handout, followed by a mailback of questionnaires with follow-up would still be very costly. A household survey could be used to collect the Canadian portion of international travel statistics. Although, this approach might ensure a high response rate, it would introduce difficulties of its own; the major ones being memory deterioration problems and "telescoping" of longer more memorable trips into a survey reference period. There are again higher costs associated with this method of data collection. In-flight surveys could be used to survey air travellers. Such an approach, however, requires the cooperation of all of the airlines involved and covers only one mode of travel.

The need to include all visitors as part of the survey population adds to the operational complexity of collecting international travel data. If each country were to conduct its own domestic travel survey, the possibility might exist for an exchange of data. Not all countries, of course, conduct domestic travel surveys and among those who do it is difficult to integrate the data to suit the needs of all countries concer-

ned. The level of detail of other countries' surveys does not always meet Canada's information requirements. Canadian travel is not as much of a concern in other countries' travel accounts for their Balance of International Payments. Thus, in the foreseeable future, it appears that each country must collect its own international travel statistics.

After an examination of the problems associated with alternative survey vehicles for the collection of travel statistics, it appears that the existing ITS is a cost effective, timely method of collecting data on international travel in that it makes use of a large existing infrastructure of Customs officers at ports throughout the country for the distribution of questionnaires. Therefore, any major changes to the existing methodology will not be made until a complete study has shown that the bias due to nonresponse has a significant effect on key survey estimates.

#### 2) Response Rates

The distribution of questionnaires at the Pacific Highway border crossing allowed for the measurement of response rates for the existing questionnaire distribution by Canadian Customs officers, for the study distribution method administered by Statistics Canada interviewers and for the telephone follow-up of returning Canadians. Table 1 shows the response rates that resulted from each of these three types of contact with travellers. Too few visitors entered Canada through the Pacific Highway during the "stints" to warrant a separate analysis of this group of travellers and therefore, Table 1 refers to returning Canadians only.

Since interviewers were not present for the distribution of questionnaires at Vancouver Airport, response rates are only available for the questionnaire distribution by Customs officers and for the telephone and mail follow-up. Tables 2 and 3 show the response rates that resulted from each of the three types of contact with travellers.

The following conclusions can be drawn from these results:

- i) The telephone follow-up methodology used in the study resulted in response rates of over 80%.
- ii) The mail follow-up methodology did increase response rates from 8.4% to 25%. This increase, although substantial, is not to the degree necessary to eliminate or substantially reduce a potential nonresponse bias.
- iii) The higher response rates were consistent from month to month

indicating that a consistently higher response can be achieved with follow-up throughout the year.

- iv) For the Pacific Highway, the response rates were raised to over 40% even before the follow-up was administered. This seems to indicate that response rates can be substantially improved by having Statistics Canada directly involved in the distribution of questionnaires and in the collection of names and addresses.

The study has shown that response rates can be substantially increased through the telephone follow-up of nonrespondents. It was also found that the refusal rate for telephone follow-up was small (overall less than 2%). The bulk of the nonresponse to the follow-up was due to an inability to trace or contact the respondent.

Lower response rates are generally to be expected in the case of a mail follow-up. Also influencing the response rates were visitors who may have had difficulties understanding English or French. Also, a small number of forms were Post Office returned due to incorrect addresses being picked up from the Customs control cards.

### 3) Respondents versus Nonrespondents

This section examines the differences between the respondent and nonrespondent populations for selected travel characteristics and the extent of the associated nonresponse bias. For this analysis, it is assumed that the travellers contacted during the follow-up are a representative sample of nonrespondents in the case of Pacific Highway and a representative sample of travellers in the case of Vancouver Airport. These late respondents to follow-up will be referred to as the Follow-up and the initial respondents will be referred to as the Main Survey.

#### (a) Distribution of Questionnaires

Canada Customs provides census counts of the number of travellers classified into specific categories including length of stay (one night and more than one night) and according to whether Canadians are returning directly from countries other than the U.S. or via the U.S. As a result, under the existing survey methodology, the sample is poststratified with respect to these categories. This procedure increases the precision of the estimates produced.

Tables 4 and 5 present the distribution of questionnaires and persons in the travel parties by length of stay (one night and more than one night).

The difference between the main survey and follow-up are not statistically significant at a 1% level of significance. While there is a statistically significant difference (at a 5% level of significance) in the distribution of questionnaires for returning Canadians, the actual extent of the difference is not very large and can likely be attributed to limitations in the study resulting from cost and time constraints. For example, it was not possible to obtain follow-up information from every traveller who received a questionnaire at Pacific Highway.

Canadians returning from countries other than the U.S. by air are poststratified according to whether they are returning directly or via the U.S. Tables 6 and 7 present the distribution of the questionnaires and persons in travel parties by direct and via U.S. travel. Again, there are no statistically significant differences between the main survey and follow-up.

This comparison of the main survey and the follow-up indicates that there are no major differences between the respondents and nonrespondents for the two poststratification variables.

#### (b) Average Expenditure (excluding fares) Per Person

Table 8 presents the average expenditure (excluding fares) per person (AEP) for returning Canadians for the two land port strata and the three airport strata. Statistical comparisons were carried out for each stratum between the follow-up and the main survey and between the combined response and the main survey. Except for strata three and five for differences between the follow-up and the main survey, the differences were not found to be significant (at a 5% level of significance).

Table 9 presents the percentage change of the average expenditure (excluding fares) per person (AEP) given in Table 8. It is important to note that the follow-up values of AEP are consistently lower than those experienced in the main survey. This may suggest that although the differences are not always statistically significant, some bias may nevertheless exist in either or both sets of values.

Table 10 presents the average expenditure and the percentage change for the follow-up, for the main survey and for the combination of the two for visitors. The figures are only presented for the U.K. and Japan residents visiting Canada as the number of visitors from other countries (other than the U.S.) was too small for separate analysis. It can be observed that the average expenditure per person is once again consistently

lower in the follow-up than it is for the main survey.

The consistently lower levels of expenditure in the follow-up could be related to the methods used for follow-up rather than an actual difference in the two populations' characteristics. It should be recognized that in the follow-up, information was collected by telephone about a month after questionnaires were originally distributed and in the case of the mail follow-up, questionnaires were received more than a month after the initial distribution. Memory deterioration of the details of the trip (e.g. specific expenditures) may have had an influence on the results. The ITS is carried out by self-enumeration and it may be argued that a change to a telephone interview for follow-up might have had an influence upon the quality of the information collected. One might speculate, for example, that respondents have less of an opportunity to reflect upon their trips or refer to bills or other documents when interviews are conducted on the phone rather than in a self-completion format. Alternatively, in the case of the mail follow-up, some travellers may better realize their actual expenses after receiving the bills and other charge statements once they have returned from their trip. Perhaps, as well, the fact that visitors receive ITS questionnaires upon entry into Canada and are asked to complete the questionnaire as they are leaving Canada may contribute to response errors in the reporting of expenditures. There are other possible explanations of these differences and therefore, further investigation is needed to better understand the basis of the difference observed.

#### (c) Average Length of Stay

The length of stay for Canadians travelling outside Canada was one of the questions asked by interviewers during the "stint". Therefore, it is interesting to compare the average length of stay for the main survey with the follow-up since this information was not collected at the time of the follow-up and is not therefore, subject to a potential recall bias.

Table 11 presents the average number of nights Canadians spent outside of Canada for the five strata. The results for the first stratum are self-explanatory. The average length of stay for the main survey is higher than for the follow-up for the remaining strata except for stratum 4. These findings are, for the most part, consistent with the results found for average expenditures and tends to support the finding of somewhat higher expenditures for initial

respondents to the ITS.

In the case of stratum 4, it is interesting to note that although the average length of stay for the follow-up is higher (by 5 days) than for the main survey and the average expenditure per person is marginally lower, the average expenditure per day per person is lower by more than \$10. Response errors in the reporting of expenditure may have contributed to this result. On the other hand while there is a statistically significant difference in the average expenditure (excluding fares) between the follow-up and the main survey (table 8) for the fifth stratum, there is only a two dollar difference in the average expenditure per day (table 11).

Table 12 presents the number of questionnaires received, the number of persons in the travelling parties and the average length of stay in Canada by visitors for the follow-up and the main survey. This table shows that the average length of stay for the follow-up is shorter than for the main survey, which is again consistent with the findings of lower average expenditures for the follow-up.

The average expenditure per day, on the other hand, is higher in the follow-up than for the main survey. This could again be due to the fact that some travellers may better realize their actual expenses after receiving the bills and other charge statements once they have returned from their trip.

Further investigation is needed to better understand the basis for this difference. If it is found, for example, that large differences exist in the distribution of average length of stay as reported by respondents to the main survey and what would be obtained for the general population of travellers, then a ratio adjustment which takes this into account may be incorporated into the estimation procedures to improve the quality of survey estimates. It should be noted that an alternate source for the length of stay can currently only be derived from the Custom control cards used at airports. Mechanisms would have to be established to acquire such information on a sample or census basis at the land ports across Canada.

#### (d) Other Characteristics

Other variables measured in the ITS include the purpose of the trip, the party size and the age and sex of the travellers. The distribution of these characteristics were compared for the main survey and the follow-up. While the distributions of various types of travellers with respect to purpose of trip tend not to be significantly different, more significant differences were

found with respect to party size, age and sex. Further testing and analysis is required to determine the degree to which such variables are correlated with trip expenditures and how such information may be used to improve the accuracy of survey estimates.

(e) Overall Impact of Follow-up on Total Weighted Expenditures

Table 13 presents the weighted estimates of total expenditure for the five strata and overall for returning Canadians at the selected ports. The overall difference between the main survey and the survey after follow-up is 5.4% (\$10,062,107) for the two selected ports.

4) An Assessment of the Impact of Nonresponse

The study indicates that instituting this type of follow-up procedure in the ITS can substantially increase response rates. The effect of follow-up on total expenditure estimates for returning Canadians at the two study locations is in the order of a 6% decrease.

The difference between the expenditure estimates in the follow-up and the main survey could on the one hand be due to nonresponse bias in the main survey or on the other hand to response errors attributed to recall bias in conjunction with the method of enumeration used in the follow-up.

5) Further Investigations and Development

To minimize possible recall bias survey questionnaires might be administered on site at border locations by Statistics Canada interviewers. Such a change to the methodology might be very expensive and perhaps unwarranted in terms of its impact on travel statis-

tics. A more promising alternative would be to carry out follow-up interviews within a shorter period of time than was done for this study.

The estimates for the current survey may also be improved (with or without follow-up) through changes to the estimation system. For example, a change can be made in the procedures for weighting overseas visitors. Presently, the overseas visitors are weighted at the Canada level by the country of residence. This may be changed to port of entry and country of origin. Also, information on the length of stay available from the Customs control cards may be used in conjunction with average daily expenditures to provide ratio estimates for total expenditures.

The study has been conducted only at two ports in British Columbia. To be in a better position to generalize the results and acquire more insights into the nature of the problem of nonresponse more extensive testing should be undertaken at different ports in Canada.

At the very least, periodic tests should be undertaken to monitor the effect of nonresponse as a continuing quality check of the survey results.

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References

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Table 1 Response Rates of Returning Canadians through Pacific Highway

Pacific Highway Border Crossing					
Period	Customs Distribution	Interviewer Distribution			
		Before follow-up		After follow-up	
		%	# quest.	%	# quest.
January	25 (427/1708)	45.5	(168/369)	82.9	(306/369)
March	24 (448/1867)	42.6	(133/312)	88.1	(275/312)
Total	24.5 (875/3575)	44.2	(301/681)	85.3	(581/681)

Table 2 Response Rates of Returning Canadians through Vancouver Airport

Vancouver Airport				
Period	Customs Distribution		Follow-up	
	%	# quest.	%	# quest.
January	16.9	(763/4500)	77.8	(545/700)
February	18.2	(657/3600)	85.8	(772/900)
March	13.2	(477/3600)	80.4	(804/1000)
Total	16.2	(1897/11700)	81.6	(2121/2600)

Table 3 Response Rates of Visitors entering through Vancouver Airport

Vancouver Airport			
Customs Distribution		Follow-up	
%	# Questionnaires	%	# Questionnaires
8.4%	580	25%	490

Table 4 Distribution of Questionnaires by Number of Nights Outside Canada for Returning Canadians

Pacific Highway (P. Hwy)						
Nights	Follow-up		Main Survey		Total	
	# Quest.	%	# Quest.	%	# Quest.	%
1	44	23	135	18	179	19
1+	147	77	629	82	776	81
Total	191	100	764	100	955	100

$$\chi^2 = 4.9$$

$$\chi^2_{1,0.99} = 6.63$$

$$\chi^2_{1,0.95} = 3.84$$

Table 5 Distribution of Persons in Travel Parties by Number of Nights Outside Canada for Returning Canadians

Nights	Pacific Highway (P. Hwy)					
	Follow-up		Main Survey		Total	
	# persons	%	# persons	%	# persons	%
1	81	21	290	18	371	19
1+	305	79	1291	82	1596	81
Total	386	100	1581	100	1967	100

$$\chi^2 = 1.22$$

$$\chi^2_{1,0.99} = 6.63$$

$$\chi^2_{1,0.95} = 3.84$$

Table 6 Distribution of Questionnaires by Returning Canadians from Overseas

	Vancouver Airport					
	Follow-up		Main Survey		Total	
	# Quest.	%	# Quest.	%	# Quest.	%
Dir	668	61	408	60	1076	60.7
Via	427	39	269	40	696	39.2
Total	1095	100	677	100	1772	100

$$\chi^2 = 0.135$$

$$\chi^2_{1,0.99} = 6.63$$

$$\chi^2_{1,0.95} = 3.84$$

Table 7 Distribution of Returning Canadians from Overseas

	Vancouver Airport					
	Follow-up		Main Survey		Total	
	# Persons	%	# Persons	%	# Persons	%
Dir	1323	60	690	60	2013	60
Via	864	40	453	40	1317	40
Total	2187	100	1143	100	3330	100

$$\chi^2 = 0.001$$

$$\chi^2_{1,0.99} = 6.63$$

$$\chi^2_{1,0.95} = 3.84$$

Table 8 Average Expenditure (Less Fares) per Person (AEP)  
of Returning Canadians (1st Quarter 1986)

Stratum	(1) Follow-up		(2) Main Survey		(3) Combined (1) and (2)	
	AEP	Standard Error	AEP	Standard Error	AEP	Standard Error
<u>P.Hwy</u>						
1 1 night	39.64	5.24	40.07	2.47	39.95	2.24
2 1+ nights	348.58	35.93	379.10	17.56	373.26	15.78
<u>Van. Airport</u>						
3 from U.S.**	694.11	14.77	805.68	15.66	752.42	10.84
4 Dir.from overseas	1027.39	31.25	1069.40	45.38	1041.79	25.76
5 Via U.S. from overseas**	1457.98	49.61	1679.30	66.61	1534.10	39.89

Table 9 Average Expenditure (Less Fares) Per Person  
of Returning Canadians Comparison (1st Quarter 1986)

Stratum	Follow-Up (1)	Main Survey (2)	% change	Combined (1)+(2)	% change
<u>P.Hwy</u>					
1 1 night	39.64	40.07	-1%	39.98	-0.2%
2 1+ nights	348.58	379.10	-8%	373.26	-1.5%
<u>Van. Airport</u>					
3 from U.S.	694.11	805.68	-13.8%	752.42	-6.6%
4 Direct from overseas	1027.39	1069.40	-3.9%	1041.79	-2.6%
5 Via U.S. from overseas	1457.98	1679.30	-13%	1534.10	-8.6%

Table 10 Average Expenditures (Less Fares) per Person of Visitors

Country	Follow-Up (1)	Main Survey (2)	% change	Combination of (1)+(2)	% change
U.K.	\$393.24	\$486.73	-18.6%	\$440.14	-9.6%
Japan	\$812.13	\$894.15	- 9.17%	\$851.50	-4.8%



Table 11 Average Length of Stay Outside Canada of Returning Canadians

Stratum	Follow-up (1)		Main Survey (2)		Combination (1) + (2)	
	Ave. Nights Stay	Ave. Exp./Day	Ave. Nights Stay	Ave. Exp./Day	Ave. Nights Stay	Ave. Exp./Day
1 P. Hwy 1	1	\$39.6	1	\$40.06	1	\$39.98
2 P. Hwy 1+	8.7	\$40.06	12.0	\$31.60	11.4	\$32.74
3 Van(U.S.)	12.2	\$56.89	13.2	\$61.30	12.8	\$58.78
4 Van(Dir.)	27.8	\$36.95	22.6	\$47.31	26.0	\$40.06
5 Van(Via.)	35.7	\$40.83	39.5	\$42.51	37.0	\$41.46

Table 12 Average of Length of Stay and Average Expenditure per Day of Visitors

	Follow-Up				Main Survey			
	#ques.	#pers.	Ave. stay /visit	Ave. Exp. /day/person	#ques.	#pers.	Ave. stay /visit	Ave. Exp. /day/person
U.K.	92	153	6.08	\$64.68	121	154	15.99	\$30.43
Jap.	64	104	4.10	\$198.08	64	96	9.96	\$89.77

Table 13 Comparison of ITS survey with and without follow-up  
(Weighted Data for the 1st Quarter 1986)

Stratum	Expenditure			
	Without follow-up	With follow-up	Difference	%
1 P. Hwy 1	\$ 1,169,254	\$ 1,125,164	\$ 44,090	3.8
2 P. Hwy 1+	\$34,108,657	\$33,604,116	\$504,541	1.5
3 Van(U.S.)	\$101,485,545	\$94,803,883	\$6,681,662	6.6
4 Van(Direct)	\$24,491,399	\$23,859,075	\$632,324	2.6
5 Van(via)	\$25,438,036	\$23,238,546	\$2,199,490	8.6
Total	\$186,692,891	\$176,630,784	\$10,062,107	5.4