SURVEY MEASURES OF CHANGES IN HOUSEHOLD WEALTH AND BUYING EXPECTATIONS: A NOTE ON METHODOLOGY

John McNeil, Bureau of the Census

Since 1959, the Bureau of the Census has collected quarterly household survey data which are intended to help predict changes in consumer spending on durables.

In the portion of the survey dealing with expected automobile purchases, consumers are asked to estimate their chances of buying a car during the next 6, 12, and 24 months. Changes in responses to these questions are then used as indicators of probable changes in actual spending. If, for example, the seasonally adjusted mean probability for all households of buying a car within 6 months rises from one quarter to the next, then, the assumption is that, other things being equal, the actual level of car purchases will rise.

We determine whether a change in car buying chances has occured by measuring the level of probabilities in the first quarter, measuring them again in the second quarter, and subtracting one from the other. An alternative method of measuring change would be to ask during the second quarter if a household's chances of buying a car had increased or decreased since the first quarter.

In fact, both these methods, the subtraction of one level from another and the single change question, were used in interviews with a panel of households who participated in a special Census Bureau study of consumer anticipations.

From 1968 through 1970, the Census Bureau conducted a series of five interviews with a panel of approximately 3,500 households. The sample was not representative of U.S. households; it was a convenience sample of generally middle income, suburban households from three widely dispersed geographic areas.

The purpose of the operation was first, to test alternative methods of collecting data on consumer buying expectations, secondly, to test the feasibility of collecting anticipations data in areas other than that of cars and household durables, and thirdly, to provide data which would help in the interpretation of the national data which was being collected regularly each quarter.

This paper reports on the consistency of the two methods of measuring change. The alternative methods were used in measuring the change in the household's chances of buying a car and the changes in the amounts held by the household in savings accounts and U.S. Government bonds. The tests were built into the questionnaires used for the first two visits. During the first visit, in May 1968, households were asked to estimate their chances of buying a car within 6, 12, and 24 months. The procedure was the same as that used on the national sample - respondents were asked to select their answers from an 11 point scale with the numbers 0, 10, 20, and so on up to 100. Respondents were also asked about ownership of certain assets, amoung them, savings accounts, and U.S. Government bonds. If the respondent reported ownership of an asset, he or she was asked about the amount. The respondent was asked to indicate the amount by selecting a category from an answer sheet containing 15 categories of unequal intervals - under $250, $250 to $499, $500 to $999, $1,000 to $1,999, and on up to $50,000 and over. During the second visit, in November 1968 households were asked to estimate their chances of buying a car within 6 and 12 months by selecting an answer from the same 11 point scale as had been used previously. They were then asked if their chances of buying a car had increased or decreased since our May 1968 visit. Households were again asked the asset ownership and amount questions. If they reported ownership in November, they were asked if the amount was greater or less than it had been in May. If a respondent reported a change, he was asked to name the amount by using the 15 point scale.

The result of these sequences of questions was that we had two estimates each of the May to November change in three variables - (1) the subjective probability of buying a car, (2) the amount in savings accounts, and (3) the amount in U.S. bonds. As we have mentioned, the estimates of levels and changes in asset amounts were somewhat crude in that they were in terms of intervals rather than dollar amounts, but it was still possible to test for consistency in the two methods.

Tables 1 and 2 show the consistency of responses for the first variable - the household's subjective probability of buying a car. The November 1968 question on whether the probability of buying a car had increased or decreased was somewhat ambiguous because it did not specify a time or horizon. It is conceivable that a respondent's short-term probability would move in a different direction from his long-term prospects. We will review the consistency of the November 1968 change question with both the computed change in 6-month probabilities from May to November and the computed change in 12-month probabilities.

Table 1 shows that 803 households reported in November 1968 that their chances of buying a car had increased from May to November. The table further classifies these households by the alternative measure of change - the November probability of buying within 6 months minus the May probability of buying within 6 months. Only 461 of the households show an increase by the second measure; 187 show no change, and 155 show a decrease. Three hundred and forty two households out of the 803, or 43 percent, gave answers that were not consistent. The inconsistency rate for households which reported in November 1968 that their chances had not changed was 36 percent, the rate for those who had reported that their chances had decreased was 49 percent. The total number of households in table 1 is 3,489 and 1,383, or 40 percent, of those households gave inconsistent replies to questions about their chances of buying a car.

Table 2 repeats table 1 except that the alternative measure of change is defined as the difference between the November and May probabilities of buying a car within 12 months. The proportion of inconsistent replies rises to 48 percent using this definition.

The findings suggest that considerable measurement errors exist in at least one of the methods used to measure the change in the car buying probabilities of households. Since the single question method involves asking the respondent to compare his current chances with the chances of six months earlier, it is the most suspect method. Presumably, the shorter the recall period, the more accurate the response. It is possible to judge the relative accuracy of the two methods by looking at the actual car purchase behavior of the households.

Tables 3 through 5 show the percent of households buying a car between November 1968 and May 1969 for households classified by their response to the November 1968 change question and their responses to the May 1968 and November 1968 question on probabilities. Table 3 indicates that both the November change question and the computed May to November change succeed in placing respondents into categories with significantly different purchase rates. Neither measure eliminates the influence of the other; households who had a positive May to November change in their probability of buying were more likely to buy if they reported in November that their chances had increased than if they had reported no change or a decrease; households reporting no change or a decrease in November were more likely to buy if their computed change in probability was positive than if it were zero or negative. Tables 4 and 5 show that even when households are classified by their reported November 1968 probability, their likelihood of buying a car varies according to their responses to the November change question. For example, 13.8 percent of those households who reported in November 1968 that their chances of buying a car within 12 months was zero actually bought a car between November and May. When these households were classified by their response to the November change question, the purchase rates were 10.4 percent for those who said their chances had decreased, 10.8 percent for those who said their chances had not changed, and 31.0 percent for those who said their chances had increased.

Some regression results follow. The number of observations is the number of households for which reasonably complete data were obtained for the first four visits, about 3,500. The first result below shows the results of defining the dependent variable as the presence or absence of a reported car purchase during November 1968 - May 1969, and using the November 1968 six month probability, the May 1968 six month probability, the change between the two, and the November 1968 single change question as the independent variables:

(The latter variable was scaled as follows: one for increase, zero for no change or don't know, and minus one for decrease.)

$$\text{CARPUR (Nov. - May)} = .1267 + \underset{(.0020)}{.0087}\ \text{MAY PRB} +$$

$$\underset{(.0023)}{.0423}\ \text{NOV PRB} + \underset{(.0121)}{.0399}\ \text{NOV CHANGE} \qquad R^2 = .14$$

As is usually the case, the percent of total variation explained is small. The most important variable by far is the November 1968 probability of buying a car, but both the May 1968 probability and the November 1968 change question have "t" values above 3. The computed May to November change in probabilities is not significant. When the dependent variable was defined as the change in actual purchases from the period May 1968 - November 1968 to the period November 1968 - May 1969, the following results was obtained:

$$\triangle \text{CARPUR} = -.0276 + \underset{(.0036)}{.0161}\ \text{MAY PRB} +$$

$$\underset{(.0164)}{.2387}\ \text{NOV CHANGE} + \underset{(.0032)}{.0484}\ \triangle \text{PRB} \qquad R^2 = .21$$

In this test, both the computed May to November change in probabilities and the November 1968 change question are highly significant; each of the "t" values is approximately 15. The May 1968 probability variable is also significant with a "t" value of about 4. The performance of the November 1968 change variable is interesting. As we have mentioned earlier, the change in probability from May to November should be measured most accurately by subtracting one level from the other. The November 1968 change question should, in theory, be washed out by the more accurate computed change. The fact that the November change variable, scaled in a rather crude way, contributes as much as the computed change variable, is a measure of the unrealiability of many respondents' estimates of their probability of buying a car. For a substantial proportion of households, it suggests that computed changes in probabilities are not likely to be associated with changes in actual car buying behavior. It also suggests that the Census Bureau's program could be improved by the addition of a question on the order of the November 1968 change question.

Tables 6 and 7 show the relationship of the two methods for measuring changes in the holdings of assets. One thousand and eighty-five households reported in November 1968 that their holdings in savings accounts were higher than they had been in May 1968. When these are classified by the difference between the level category reported in May and the level category reported in November, we find that 577 reported a higher category in November, 278 reported the same category, and 320 reported a lower category. Because categories represent intervals, only the 320 can be considered to have given inconsistent replies. For the 1,284 households reporting that the amount they held in savings accounts had not changed, 316 reported a higher November category, and 554 reported the same category, and 414 reported a lower category. The 730 households reporting higher or lower categories gave inconsistent replies. Six hundred and seventeen households reported in

November that their holdings in savings accounts had decreased: 160 of these reported a higher November category, 133 reported the same, and 388 reported a lower category. The 160 reporting a higher category were inconsistent. For all households in table 5, 1,110 out of 2,986, or more than 35 percent, gave inconsistent replies. Table 6 shows the results for holdings in U.S. Government bonds, and the results are very similar. The percent of inconsistencies for all households in the table is again over 35 percent.

The differences in the two measures of asset change are striking. According to their response to the November 1968 change question, 617 households had a lesser amount in savings in November 1968 than in May 1968, but 1,122 households reported a lesser category in November than they had in May. Only 85 households reported in November 1968 that the amount they held in U.S. Government bonds had decreased since May, but 276 reported a lower category in November than they had in May.

Although it is not possible to measure the relative merits of the two measures of asset change, the degree of inconsistency serves to reinforce the evidence that survey data on the asset holdings of consumers will almost certainly contain very serious errors.

Table 1.--RESPONSE TO NOVEMBER 1968 QUESTION ON WHETHER THE CHANCES OF BUYING A CAR HAD INCREASED OR DECREASED BY COMPUTED MAY 1968 TO NOVEMBER 1968 CHANGE IN THE PROBABILITY OF BUYING A CAR WITHIN 6 MONTHS

Response to Nov. 1968 question on change and reported Nov. 1968 probability of buying a car within 6 months	All households	November 1968 6-month probability minus May 1968 6-month probability		
		Positive	Zero	Negative
Households reporting in Nov. 1968 that their chances had increased:				
Total.....	803	461	187	155
November 1968 6-month probability:				
0.....	206	-	118	88
10.....	19	15	1	3
20.....	102	68	17	17
30.....	14	10	-	4
40.....	6	5	-	1
50.....	93	68	6	19
60.....	12	9	-	3
70.....	24	18	-	6
80.....	123	94	22	7
90.....	32	25	-	7
100.....	172	149	23	-
Households reporting in Nov. 1968 that their chances had not changed:				
Total.....	2,142	381	1,365	396
0.....	1,581	-	1,297	284
10.....	93	62	8	23
20.....	210	134	29	47
30.....	16	12	-	4
40.....	12	7	-	5
50.....	68	48	7	13
60.....	5	4	-	1
70.....	12	9	-	3
80.....	74	54	10	10
90.....	12	6	-	6
100.....	59	45	14	-
Households reporting in Nov. 1968 that their chances had decreased:				
Total.....	544	78	226	280
0.....	457	-	216	241
10.....	20	5	1	14
20.....	35	16	3	16
30.....	1	-	-	1
40.....	3	3	-	-
50.....	8	3	1	4
60.....	-	-	-	-
70.....	3	3	-	-
80.....	9	4	2	3
90.....	1	-	-	1
100.....	7	4	3	-

Table 2.—RESPONSE TO NOVEMBER 1968 QUESTION ON WHETHER THE CHANCES OF BUYING A CAR HAD INCREASED OR DECREASED BY COMPUTED MAY 1968 TO NOVEMBER 1968 CHANGE IN THE PROBABILITY OF BUYING A CAR WITHIN 12 MONTHS

Response to Nov. 1968 question on change and reported Nov. 1968 probability of buying a car within 12 months	All households	November 1968 12-month probability minus May 1968 12-month probability		
		Positive	Zero	Negative
Households reporting in Nov. 1968 that their chances had increased:				
Total	803	469	172	162
November 1968 12-month probability:				
0	70	-	22	48
10	9	7	-	2
20	58	24	13	21
30	10	5	1	4
40	12	10	1	1
50	74	42	9	23
60	16	12	-	4
70	30	17	-	13
80	161	96	29	36
90	54	43	1	10
100	309	213	96	-
Households reporting in Nov. 1968 that their chances had not changed:				
Total	2,142	591	982	569
0	1,092	-	768	324
10	86	44	7	35
20	320	148	76	96
30	39	28	-	11
40	35	26	1	8
50	145	84	19	42
60	29	17	1	11
70	27	17	2	8
80	163	103	38	22
90	41	27	2	12
100	165	97	68	-
Households reporting in Nov. 1968 that their chances had decreased:				
Total	544	55	135	354
0	359	-	106	253
10	17	1	2	14
20	79	17	12	50
30	4	-	-	4
40	3	2	-	1
50	24	8	3	13
60	2	-	-	2
70	5	1	-	4
80	28	14	4	10
90	5	2	-	3
100	18	10	8	-

Table 3.—PERCENT OF HOUSEHOLDS BUYING A CAR BETWEEN NOVEMBER 1968 AND MAY 1969 BY NOVEMBER 1968 RESPONSE TO QUESTION ON WHETHER THE CHANCES OF BUYING A CAR HAD INCREASED OR DECREASED AND BY THE DIFFERENCE BETWEEN THE MAY 1968 AND NOVEMBER 1968 PROBABILITIES

Response to Nov. 1968 question on change	Total	Nov. 1968 Probability minus May 1968 Probability					
		Probability of buying a car within 6 months			Probability of buying a car within 12 months		
		Positive	Zero	Negative	Positive	Zero	Negative
All households	21.1	38.0	14.7	20.4	29.3	16.4	18.3
Households reporting that their chances had increased	39.1	47.7	24.1	47.6	38.8	47.1	29.0
Households reporting that their chances had not changed	16.2	28.1	11.9	19.9	22.0	11.6	18.3
Households reporting that their chances had decreased	14.3	26.3	12.8	13.9	23.6	12.6	13.6

Table 4.—PERCENT OF HOUSEHOLDS BUYING A CAR BETWEEN NOVEMBER 1968 AND MAY 1969 BY NOVEMBER 1968 RESPONSE TO QUESTION ON WHETHER THE CHANCES OF BUYING A CAR HAD INCREASED OR DECREASED AND BY MAY 1968 AND NOVEMBER 1968 PROBABILITIES OF BUYING A CAR WITHIN 6 MONTHS

Response to Nov. 1968 question on change and reported Nov. 1968 probability of buying a car within 6 months	Total	May 1968 six month probability (Number of chances in 100)				
		0	10-30	40-60	70-90	100
All households...	21.1	17.1	25.2	31.1	31.9	27.7
Nov. 1968 six month probability:						
0.....	12.4	10.9	16.1	19.8	17.8	13.7
10-30.....	21.2	20.3	20.5	20.7	19.1	42.9
40-60.....	31.4	33.7	26.2	36.4	24.1	21.7
70-90.....	46.6	43.2	54.9	26.1	54.0	50.0
100.....	64.7	59.8	48.5	86.4	73.9	67.5
Households reporting in Nov. 1968 that their chances had increased:						
Total.....	39.1	34.7	36.4	41.3	52.6	46.4
Nov. 1968 six month probability:						
0.....	17.0	11.9	26.9	6.3	29.6	26.3
10-30.....	29.6	32.9	24.1	33.3	11.1	33.3
40-60.....	32.4	28.6	25.0	45.5	53.8	28.6
70-90.....	49.7	47.6	55.6	23.1	56.3	57.1
100.....	66.3	65.2	42.9	88.2	77.1	65.2
Households reporting in Nov. 1968 that their chances had not changed:						
Total.....	16.2	13.3	21.6	24.0	25.8	31.4
Nov. 1968 six month probability:						
0.....	11.8	10.7	14.4	16.7	20.4	18.4
10-30.....	18.5	9.9	20.5	23.5	23.1	45.5
40-60.....	31.8	42.5	29.4	30.0	-	50.0
70-90.....	39.8	34.1	57.1	25.0	43.8	43.8
100.....	61.0	46.2	80.0	75.0	70.0	71.4
Households reporting in Nov. 1968 that their chances had decreased:						
Total.....	14.3	13.0	13.6	28.2	14.0	13.0
Nov. 1968 six month probability:						
0.....	12.3	11.6	14.3	31.0	11.8	6.9
10-30.....	16.1	15.8	13.3	-	16.7	50.0
40-60.....	18.2	20.0	-	-	-	50.0
70-90.....	53.8	50.0	-	50.0	100.0	50.0
100.....	57.1	50.0	-	100.0	-	66.7

Table 5.—PERCENT OF HOUSEHOLDS BUYING A CAR BETWEEN NOVEMBER 1968 AND MAY 1969 BY NOVEMBER 1968 RESPONSE TO QUESTION ON WHETHER THE CHANCES OF BUYING A CAR HAD INCREASED OR DECREASED AND BY MAY 1968 AND NOVEMBER 1968 PROBABILITIES OF BUYING A CAR WITHIN 12 MONTHS

Response to Nov. 1968 question on change and reported Nov. 1968 probability of buying a car within 12 months	Total	May 1968 12-month probability (Number of chances in 100)				
		0	10-30	40-60	70-90	100
All households...	21.1	13.8	21.3	23.6	29.9	32.7
Nov. 1968 twelve month probability:						
0.....	10.2	7.4	12.8	14.9	16.4	13.3
10-30.....	15.0	11.8	16.0	15.0	23.3	14.5
40-60.....	20.3	24.8	17.6	9.8	21.3	26.3
70-90.....	31.7	23.8	31.5	28.4	33.6	43.0
100.....	54.7	54.3	47.8	58.0	49.5	59.9
Households reporting in Nov. 1968 that their chances had increased:						
Total.....	39.1	31.0	35.0	38.0	40.4	54.9
Nov. 1968 twelve month probability:						
0.....	21.7	13.6	33.3	20.0	22.2	33.3
10-30.....	13.0	15.2	11.1	12.5	12.5	10.0
40-60.....	21.6	25.7	19.2	14.3	25.0	18.2
70-90.....	35.5	27.4	31.0	38.7	36.2	48.8
100.....	58.9	51.6	56.3	55.9	56.7	67.7
Households reporting in Nov. 1968 that their chances had not changed:						
Total.....	16.2	10.8	17.7	18.6	26.1	30.6
Nov. 1968 twelve month probability:						
0.....	9.5	6.9	14.1	11.3	18.4	19.5
10-30.....	15.3	11.1	16.5	18.4	27.7	12.5
40-60.....	20.1	24.6	17.9	9.7	18.9	30.0
70-90.....	26.8	22.0	26.8	21.9	29.7	34.3
100.....	47.9	60.7	31.6	61.5	35.1	51.5
Households reporting in Nov. 1968 that their chances had decreased:						
Total.....	14.3	10.4	14.8	15.9	19.6	14.2
Nov. 1968 twelve month probability:						
0.....	10.3	9.4	9.6	19.4	12.7	7.3
10-30.....	15.0	12.5	16.7	7.1	16.7	17.6
40-60.....	17.2	20.0	-	-	25.0	28.6
70-90.....	36.8	-	66.7	-	38.5	50.0
100.....	44.4	50.0	-	66.7	66.7	37.5

Table 6.--RESPONSE TO NOVEMBER 1968 QUESTION ON WHETHER THE AMOUNT HELD IN SAVINGS ACCOUNTS HAD INCREASED OR DECREASED BY COMPUTED MAY 1968 TO NOVEMBER 1968 CHANGE IN THE AMOUNT HELD IN SAVINGS ACCOUNTS

Response to Nov. 1968 question on change and reported Nov. 1968 amount held in savings		All households	November 1968 category minus May 1968 category		
			Positive	Zero	Negative
Households reporting in Nov. 1968 that their holdings had increased...		1,085	577	278	320
November 1968 amount:					
Interval	Category				
Under $250	1	75	27	31	17
$250 to $499	2	65	29	15	21
$500 to $749	3	72	39	14	19
$750 to $999	4	75	46	7	22
$1,000 to $1,999	5	161	56	59	36
$2,000 to $2,999	6	116	66	17	33
$3,000 to $3,999	7	90	57	18	15
$4,000 to $4,999	8	82	58	17	7
$5,000 to $7,499	9	93	49	29	15
$7,500 to $9,999	10	94	54	26	14
$10,000 to $14,999	11	66	37	19	10
$15,000 to $19,999	12	36	25	5	6
$20,000 to $24,999	13	22	13	6	3
$25,000 to $49,999	14	30	16	12	2
$50,000 or more	15	8	5	3	-
Households reporting in Nov. 1968 that their holdings had not changed		1,284	316	554	414
November 1968 amount:					
1		177	16	98	63
2		109	28	44	37
3		106	27	36	43
4		98	25	33	40
5		191	42	94	55
6		137	37	58	42
7		92	25	34	33
8		52	13	17	22
9		101	34	40	27
10		64	20	25	19
11		71	20	34	17
12		29	11	10	8
13		24	5	14	5
14		24	10	11	3
15		9	3	6	-
Households reporting in Nov. 1968 that their holdings had decreased..		617	160	133	388
November 1968 amount:					
1		98	5	34	59
2		75	6	16	53
3		68	15	8	46
4		43	6	9	28
5		86	15	15	56
6		61	9	12	40
7		42	9	7	26
8		29	3	4	20
9		49	7	16	26
10		19	6	3	10
11		23	9	3	11
12		12	4	2	6
13		4	1	-	3
14		10	2	4	4
15		-	-	-	-

Table 7.--RESPONSE TO NOVEMBER 1968 QUESTION ON WHETHER THE AMOUNT HELD IN U.S. GOVERNMENT BONDS HAD INCREASED OR DECREASED BY COMPUTED MAY 1968 TO NOVEMBER 1968 CHANGE IN THE AMOUNT HELD IN U.S. GOVERNMENT BONDS

Response to Nov. 1968 question on change and reported Nov. 1968 amount held in bonds	All households	November 1968 category minus May 1968 category		
		Positive	Zero	Negative
Households reporting in Nov. 1968 that their holdings had increased..	432	215	143	74
November 1968 amount:				
1	116	37	63	16
2	94	46	28	20
3	67	35	18	14
4	34	27	1	6
5	58	29	19	10
6	28	23	4	1
7	9	3	3	3
8	11	8	2	1
9	2	1	1	-
10	7	2	3	2
11	5	3	1	1
12	-	-	-	-
13	-	-	-	-
14	-	-	-	-
15	1	-	-	-
Households reporting in Nov. 1968 that their holdings had not changed	976	286	533	157
November 1968 amount:				
1	543	144	330	69
2	165	58	75	32
3	81	19	49	13
4	45	15	16	14
5	65	23	27	15
6	26	11	8	7
7	15	4	9	2
8	5	2	3	-
9	12	4	6	2
10	3	1	1	1
11	1	-	1	-
12	8	3	4	1
13	4	2	2	-
14	3	-	2	1
15	-	-	-	-
Households reporting in Nov. 1968 that their holdings had decreased..	85	15	24	45
November 1968 amount:				
1	39	3	16	20
2	18	6	5	7
3	7	2	1	4
4	8	-	-	8
5	5	1	1	2
6	4	1	1	2
7	-	-	-	-
8	2	1	-	1
9	1	1	-	-
10	1	-	-	1
11	-	-	-	-
12	-	-	-	-
13	-	-	-	-
14	-	-	-	-
15	-	-	-	-