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# **Off-farm Work by Census-farm Operators: An Overview of Structure and Mobility Patterns**

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## **Off-farm Work by Census-farm Operators: An Overview of Structure and Mobility Patterns**

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### **Executive Summary**

The purpose of this paper is to provide descriptive statistics on off-farm labour supply and farm/off-farm labour reallocation for Canadian farmers using cross-sectional data and cross-sectional panel data, respectively, obtained from the Canadian Census of Agriculture. This report is part of a larger study on the off-farm labour supply and labour mobility of farm operators (Swidinsky, 1997). The data indicates that a growing proportion of operators worked off-farm between 1971 and 1991. As well, operators who work off-farm have allocated greater amounts of time to the off-farm labour market. The share of census-farm operators reporting 97-228 days of off-farm work has risen from 11 percent to 15 percent, while the share working more than 228 days off-farm has increased from 13 percent to 16 percent of all operators from 1971 to 1991. There is also some mobility between the status of full-time and part-time farming, but a high proportion of both types of operators exit farming over a five-year period. Less than 15 percent of operators farming full-time change to part-time, while approximately 20 percent of operators farming full-time change to part-time. In contrast, approximately 25 percent of full-time operators exit farming, while 35 percent of part-time operators exit farming over a typical five-year period.

### **1. Introduction**

Policy analysts continuously monitor the distribution of operators across various structural groups to design and evaluate agricultural policy. One classification of interest is the full-time / part-time status of the farm operator. This paper is part of a larger study (Swidinsky, 1997) that analysed the off-farm labour function of farm operators and analysed the mobility between the status of full-time and part-time farmer. This paper presents a descriptive summary. A multivariate analysis is presented in the larger study (Swidinsky, 1997).

Variables used by Swidinsky (1997) to model off-farm labour supply and farm/off-farm labour reallocation decisions of Canadian farmers are summarised. The data captures human capital, farm and family characteristics, other income and labour market conditions. Furthermore, the unique nature of the data allows for operator mobility. The database links files between time periods, allowing for the entry and exit decisions of operators to be captured. The first section provides a description of the data source. Historical statistics to provide some background information is presented in the second

section. The third and fourth sections present summary data used to estimate off-farm labour supply and farm/off-farm labour reallocation, respectively.

The theory of off-farm labour supply is essentially a theory of the allocation of time. A model of off-farm labour supply was developed from home-production theory adapted for the farm household. A farm operator is assumed to maximise utility which depends on consumption goods and leisure subject to a budget constraint constructed from other income, the marginal revenue product from farm production, and the market wage rate. Determinants of off-farm labour supply are identified as the wage rate, prices of farm output, purchased goods and farm inputs, along with human capital, farm and family characteristics, and levels of other income.

Operators can change their working status (i.e. farm/off-farm labour reallocation) by reallocating their labour between farm and off-farm work. Operators working full-time on farm can change to part-time farming or exit farming. Likewise, operators working part-time on farm can change to full-time farming or they can exit farming. A theoretical framework to explain farm/off-farm labour reallocation was developed from farm-household production theory. Changes in farm/off-farm labour reallocation are determined by changes in the real wage rate and the real marginal revenue product of farm labour. Since changes in these variables are not observable, human capital, farm and family characteristics, other income and labour market conditions are used as proxy variables.

One way to summarise these relationships is by considering a kinked demand curve for labour (for example, see Bollman (1979a, 1979b)). The operator faces a downward sloping demand for on-farm labour and a horizontal demand for off-farm labour. The intersection of the kinked demand curve with the operator's supply of labour determines whether the operator participates in off-farm work (if the curves intersect to the right of the kink), or works only on the farm (if the curves intersect to the left of the kink). If the horizontal demand for off-farm labour intersects the vertical axis above the downward sloping demand for on-farm labour curve, the individual is not farming. Shifts in these three curves determine changes in the status of part-time farming, full-time farming and "farming" (where entry and exit are the change in the status of "farming").

## **2. Data Source**

The data used to analyse off-farm labour supply are from Statistics Canada's Agriculture-Population Linkage Database of census-farm operators, linking files from the Census of Population for 1986 (the long questionnaire, Form 2B, which is a 20 percent sample) to the Census of Agriculture questionnaire. The farm/off-farm labour reallocation model uses the same data source, but for 1991 in addition to 1986. A census-farm operator who is on the file in 1986 census period, but not in 1991 census period may be

classified as an "exiter". Likewise, a census-farm operator who is not on the file in 1986 census period, but is on the file in 1991 census period is classified as an "entrant". This allows an analysis of operator mobility. The sample consisted of 53,143 census-farm operators.

A census-farm operator is the person responsible for the day-to-day decisions made in running a census-farm. Only one operator is designated for each census-farm. For the 1986 Census of Agriculture, a census-farm was defined as an agricultural holding with sales of agricultural products of \$250 or more during the past 12 months. Variables from the 1986 Census of Population (20 percent completed the long questionnaire, Form 2B) are added to this database to form the Agriculture-Population Linkage Database. Variables from the Census of Population provided information which was not available in the Census of Agriculture such as age, education and income by source for the operator and spouse.

The proportion of operators not working off-farm has decreased from 65 percent in 1971 to 62 percent in 1991 (Table 1). Those participating in off-farm work are tending to work more off-farm. The share of census-farm operators reporting 97-228 days of off-farm work has risen from 12 percent to 15 percent while the share working more than 228 days off-farm has increased from 12 percent to 15 percent of all farms from 1971 to 1986.

**Table 1. Distribution of Census-farm Operators by Days of Off-Farm Work, Canada, 1971-1991**

Year	Number of days of off-farm work									
	None		1 - 96		97 - 228		> 228		Total	
	no.	percent	no.	percent	no.	percent	no.	percent	no.	percent
1971	235,259	65%	45,551	13%	41,447	11%	42,000	12%	364,257	100%
1976	221,805	66%	30,898	9%	39,697	12%	43,414	13%	335,814	100%
1981	194,312	61%	35,627	11%	43,208	14%	44,155	14%	317,302	100%
1986	175,265	60%	31,979	11%	41,863	14%	41,375	14%	290,482	100%
1991(1)	171,023	62%	21,131	8%	40,618	15%	42,177	15%	274,949	100%
1991(2)	240,874	63%	30,797	8%	57,149	15%	55,390	14%	384,211	100%

Source: Statistics Canada. Censuses of Agriculture, 1971-1991.

Note: Only operators of proprietorship, partnership and family corporations are included.

(1) First-listed operator.

(2) All operators.

Operators under the age of 35 have increased as a proportion of all farmers reporting 1-96 and 97-228 days of off-farm work, while remaining relatively constant in other working categories (Table 2). Although operators 35-54 years of age have

generally declined as a percentage of all operators, they still account for almost one half of total farmers in each working category. The proportion of operators aged 55 and over increased for those working full-time, but remained relatively constant for the various categories of those working off-farm. In general, those working off-farm tend to be younger.

**Table 2. Distribution of Census-farm Operators by Age within each class of Days of Off-Farm Work, Canada, 1971-1991**

Year	Number of days of off-farm work											
	None			1-96			97-228			> 228		
	Age of Operators											
	< 35	35-54	55 +	< 35	35-54	55 +	< 35	35-54	55 +	< 35	35-54	55 +
	*** number and percent of census-farm operators ***											
1971	27,539	113,152	94,568	9,309	24,891	11,351	9,109	24,605	7,733	9,246	26,030	6,724
	12%	48%	40%	20%	55%	25%	22%	59%	19%	22%	62%	16%
1976	33,290	102,888	85,616	8,206	15,325	7,365	10,782	21,600	7,309	10,923	25,777	6,709
	15%	46%	39%	27%	50%	24%	27%	54%	18%	25%	59%	15%
1981	42,580	88,905	62,827	8,190	16,665	10,772	9,372	21,379	12,457	9,197	22,511	12,447
	22%	46%	32%	23%	47%	30%	22%	49%	29%	21%	51%	28%
1986	26,091	71,721	77,453	9,006	15,423	7,550	10,525	23,570	7,768	10,181	24,177	7,017
	15%	41%	44%	28%	48%	24%	25%	56%	19%	25%	58%	17%
1991(1)	21,847	70,587	78,023	4,906	11,131	5,094	8,503	24,574	7,541	9,197	25,504	7,476
	13%	41%	46%	23%	53%	24%	21%	61%	19%	22%	60%	18%
1991(2)	41,025	100,752	99,098	8,507	16,095	6,195	13,536	34,508	9,105	13,399	32,957	9,034
	17%	42%	41%	28%	52%	20%	24%	60%	16%	24%	59%	16%

Source: Statistics Canada. Censuses of Agriculture, 1971-1991.

Note: Only operators of proprietorship, partnership and family corporations are included.

(1) First-listed operator.

(2) All operators.

As expected, average sales, land and capital decline with off-farm work, since less of the operators time is allocated to the farm (Tables 3, 4 and 5). Differences between working categories have increased over time, particularly between operators not participating in the off-farm labour market and other working categories.

Year	Number of days of off-farm work				All
	None	1 - 96	97 - 228	> 228	
*** average gross farm revenue (\$) ***					
1971	13,308	10,178	5,526	4,108	10,970
1976	N/A	N/A	N/A	N/A	N/A
1981	63,758	44,590	19,688	17,569	49,177
1986	89,738	55,303	29,437	22,747	67,715
1991(1)	107,126	66,956	37,919	36,270	82,945
1991(2)	118,442	76,068	46,905	42,968	93,524

**Source: Statistics Canada. Censuses of Agriculture, 1971-1991.**

**Note: Only operators of proprietorship, partnership and family corporations are included.**

**(1) First-listed operator.**

**(2) All operators.**

Year	Number of days of off-farm work				All
	None	1 - 96	97 - 228	> 228	
*** average total farm area (acres) ***					
1971	512	436	310	192	443
1976	570	461	295	184	477
1981	588	515	309	210	489
1986	652	560	356	225	538
1991(1)	672	617	390	273	565
1991(2)	683	647	439	315	591

**Source: Statistics Canada. Censuses of Agriculture, 1971-1991.**

**Note: Only operators of proprietorship, partnership and family corporations are included.**

**(1) First-listed operator.**

**(2) All operators.**

Table 5. Average Farm Capital by Days of Off-Farm Work, Canada, 1971-1991

Year	Number of days of off-farm work				All
	None	1 - 96	97 - 228	> 228	
*** average farm capital (\$) ***					
1971	71,260	63,556	47,325	42,311	64,235
1976	188,433	160,762	114,073	102,725	166,018
1981	471,501	411,822	261,829	228,946	402,495
1986	432,608	340,027	243,948	204,941	362,799
1991(1)	530,535	422,963	316,928	306,679	456,372
1991(2)	568,102	460,296	356,279	334,448	494,268

**Source: Statistics Canada. Censuses of Agriculture, 1971-1991.**

**Note: Only operators of proprietorship, partnership and family corporations are included.**

**(1) First-listed operator.**

**(2) All operators.**



Table 6. Redistribution of Census Farm Operators by Working State, Canada, 1971-1991<sup>a</sup>

Second Period	Working State	First Period		Total
		1971		
		Full-Time	Part-Time	
1976	Full-Time	12340 (61%)	3584 (29%)	15924
	Part-Time	1734 (9%)	4460 (36%)	6194
	Exit	6095 (30%)	4317 (35%)	10412
	<b>Total</b>	<b>20169 (100%)</b>	<b>12361 (100%)</b>	

Second Period	Working State	First Period		Total
		1976		
		Full-Time	Part-Time	
1981	Full-Time	12005 (62%)	2447 (22%)	14452
	Part-Time	2668 (14%)	4928 (45%)	7596
	Exit	4540 (24%)	3671 (33%)	8211
	<b>Total</b>	<b>100% (19213)</b>	<b>100% (11046)</b>	

Second Period	Working State	First Period		Total
		1981		
		Full-Time	Part-Time	
1986	Full-Time	10372 (62%)	2492 (21%)	12864
	Part-Time	1931 (12%)	5199 (44%)	7130
	Exit	4330 (26%)	4206 (35%)	8536
	<b>Total</b>	<b>16633 (100%)</b>	<b>11897 (100%)</b>	

Second Period	Working State	First Period		Total
		1986		
		Full-Time	Part-Time	
1991	Full-Time	9431 (63%)	2665 (23%)	12096
	Part-Time	1646 (11%)	4612 (40%)	6257
	Exit	3870 (26%)	4349 (37%)	8219
	<b>Total</b>	<b>14946 (100%)</b>	<b>11626 (100%)</b>	

Statistics Canada. Census of Agriculture Match, unpublished data

<sup>a</sup>Percentages are reported in parentheses.

<sup>b</sup>10% sample of census farm operators.

Note: Full-time refers to operators with zero days of off-farm work in the previous year.  
Part-time refers to operators with one or more days of off-farm work in the previous year.

The proportion of operators continuing to farm full-time and part-time have remained relatively stable (Table 6). Approximately 60 percent of full-time operators remained full-time in the next period. Since 1976, approximately 40 percent of part-time farmers remained part-time in the next period. Less than 15 percent of operators farming full-time change to part-time, while approximately 20 percent of operators farming part-time change to full-time farming. An increasing proportion of operators farming full-time and part-time has exited farming. Approximately 25 percent of full-time operators exit farming over five years, while 35 percent of part-time operators exit farming over a five-year period. The differences in transition probabilities depend on the working category of the operator. It is important to consider the previous working category when examining the labour reallocation decisions of the operator.

Table 7 Redistribution of Census Farm Operators by Working State Classified by Age, Canada, 1971-1991<sup>a</sup>

Second Period		Full-Time				Part-Time			
Working State	<35	35-54	>55	Total	<35	35-54	>55	Total	
1976	(15%)	7527 (61%)	2962 (24%)	12340 (100%)	860 (24%)	2115 (59%)	609 (17%)	3584 (100%)	
	(23%)	1110 (64%)	243 (14%)	1752 (100%)	1026 (23%)	2944 (66%)	491 (11%)	4461 (100%)	
	(10%)	2743 (45%)	2743 (45%)	6096 (100%)	820 (19%)	2418 (56%)	1079 (25%)	4317 (100%)	
				20188				12362	
Full-Time									
Part-Time									
Second Period		Full-Time				Part-Time			
Exit	<35	35-54	>55	Total	<35	35-54	>55	Total	
1981	(17%)	6843 (57%)	3121 (26%)	12005 (100%)	636 (26%)	1272 (52%)	538 (22%)	2446 (100%)	
1851		1521 (57%)	480 (18%)	2668 (100%)	1380 (28%)	3006 (61%)	542 (11%)	4928 (100%)	
Total	(25%)	1952 (57%)	1861 (18%)	4494 (100%)	954 (26%)	1982 (54%)	734 (20%)	3670 (100%)	
610	(15%)	1952 (43%)	1861 (41%)	4494 (100%)	954 (26%)	1982 (54%)	734 (20%)	3670 (100%)	
				19167				11044	
First Period									
Full-Time									
Second Period		Full-Time				Part-Time			
Exit	<35	35-54	>55	Total	<35	35-54	>55	Total	
1986	(18%)	5705 (55%)	2800 (27%)	10372 (100%)	648 (26%)	1271 (51%)	548 (22%)	2467 (100%)	
2041		1062 (55%)	309 (16%)	1931 (100%)	1612 (31%)	3067 (59%)	520 (10%)	5199 (100%)	
Age of Operator	(29%)	1775 (55%)	1689 (16%)	4330 (100%)	1304 (31%)	2187 (52%)	757 (18%)	4248 (100%)	
Total	(20%)	1775 (41%)	1689 (39%)	4330 (100%)	1304 (31%)	2187 (52%)	757 (18%)	4248 (100%)	
681				16633				11914	
First Period									
Full-Time									
Second Period		Full-Time				Part-Time			
Exit	<35	35-54	>55	Total	<35	35-54	>55	Total	
1991	(17%)	4904 (52%)	2924 (31%)	9431 (100%)	667 (25%)	1333 (50%)	667 (25%)	2666 (100%)	
1867	(25%)	889 (54%)	346 (21%)	1646 (100%)	1338 (29%)	2813 (61%)	461 (10%)	4612 (100%)	
Age of Operator		1548 (54%)	1703 (21%)	3870 (100%)	1131 (29%)	2392 (61%)	827 (19%)	4349 (100%)	
Total	(16%)	1548 (40%)	1703 (44%)	3870 (100%)	1131 (26%)	2392 (55%)	827 (19%)	4349 (100%)	
866				14946				11626	

Statistics Canada. Census of Agriculture Match, unpublished data  
 Percentages are reported in parentheses.  
 First period of census farm operators.  
 Note: Full-time refers to operators with zero days of off-farm work in the previous year.

Exit

Part-time refers to operators with one or more days of off-farm work in the previous year.

1604

Age of Operator

619

First Period

1006

Since operators 35-54 years of age are the largest group it is not surprising that they make up a large proportion of each redistribution between working state (Table 7). A greater proportion of operators age 55 and over continue farming full-time compared to those under the age of 35. However, equal proportions of operators of each age group change from part-time to full-time farming. A greater proportion of operators under the age of 35 change from full-time to part-time farming relative to those age 55 and over. Few operators age 55 and over continue farming part-time compared to those under the age of 35. Exit from farming is positively correlated with age for operators farming full-time, while the proportion of part-time operators age of 35-55, exiting farming is greater relative to those age 55 and over. In general, full-time operators who exit farming are more likely to be older, while part-time operators who exit farming are more likely to be younger.

Table 8. Average Gross Farm Sales (\$) by Change in Operator Working State, Canada, 1971 to 1991<sup>1</sup>

Second Period	Working State	First Period		
		1971		
		Full-Time	Part-Time	Total
1976	Full-Time	16717	9919	15187
	Part-Time	12959	6182	8079
	Exit	12699	5075	9538
	<b>Total</b>	<b>15180</b>	<b>6879</b>	

  

Second Period	Working State	First Period		
		1976		
		Full-Time	Part-Time	Total
1981	Full-Time	-	-	-
	Part-Time	-	-	-
	Exit	-	-	-
	<b>Total</b>	<b>-</b>	<b>-</b>	<b>-</b>

  

Second Period	Working State	First Period		
		1981		
		Full-Time	Part-Time	Total
1986	Full-Time	83760	46642	76569
	Part-Time	55600	23427	32140
	Exit	54213	17510	36128
	<b>Total</b>	<b>72799</b>	<b>26198</b>	

  

Second Period	Working State	First Period		
		1986		
		Full-Time	Part-Time	Total
1991	Full-Time	114671	58046	102195
	Part-Time	92246	32240	48021
	Exit	68626	22448	44190
	<b>Total</b>	<b>100281</b>	<b>34493</b>	

Statistics Canada. Census of Agriculture Match, unpublished data  
 \*10% sample of census farm operators

Note: Full-time refers to operators with zero days of off-farm work in the previous year.  
 Part-time refers to operators with one or more days of off-farm work in the previous year.

<sup>1</sup> Respondents in the 1976 Census questionnaire were asked to check a box to indicate the size class of their gross farm revenue - thus, a point estimate was not obtained to allow an average to be calculated.

Table 9. Average Farm Land (acres) by Change in Operator Working State, Canada, 1971 to 1991

Second Period	Working State	First Period		Total
		1971		
		Full-Time	Part-Time	
1976	Full-Time	630	445	588
	Part-Time	437	293	333
	Exit	417	240	343
	Total	549	319	

Second Period	Working State	First Period		Total
		1976		
		Full-Time	Part-Time	
1981	Full-Time	706	426	659
	Part-Time	561	305	395
	Exit	445	206	338
	Total	624	299	

Second Period	Working State	First Period		Total
		1981		
		Full-Time	Part-Time	
1986	Full-Time	733	517	691
	Part-Time	547	328	388
	Exit	427	218	323
	Total	632	329	

Second Period	Working State	First Period		Total
		1986		
		Full-Time	Part-Time	
1991	Full-Time	826	557	767
	Part-Time	676	406	477
	Exit	481	249	358
	Total	720	382	

Statistics Canada. Census of Agriculture Match, unpublished data  
 \*10% sample of census farm operators.

Note: Full-time refers to operators with zero days of off-farm work in the previous year.  
 Part-time refers to operators with one or more days of off-farm work in the previous year.

Table 10. Average Farm Capital (\$) by Change in Operator Working State, Canada, 1971 to 1991

Second Period	Working State	First Period		
		1971		
		Full-Time	Part-Time	Total
1976	Full-Time	84420	65164	80086
	Part-Time	67519	48867	54088
	Exit	64334	41808	54994
	Total	76897	51127	

Second Period	Working State	First Period		
		1976		
		Full-Time	Part-Time	Total
1981	Full-Time	222576	159572	211908
	Part-Time	191814	126609	149512
	Exit	158450	99167	131946
	Total	203151	124792	

Second Period	Working State	First Period		
		1981		
		Full-Time	Part-Time	Total
1986	Full-Time	572023	418229	542230
	Part-Time	444027	286138	328899
	Exit	393289	220973	308382
	Total	510634	290768	

Second Period	Working State	First Period		
		1986		
		Full-Time	Part-Time	Total
1991	Full-Time	529581	347864	489545
	Part-Time	442655	263508	310621
	Exit	319727	194169	253285
	Total	465680	256906	

Statistics Canada. Census of Agriculture Match, unpublished data  
10% sample of census farm operators.

Note: Full-time refers to operators with zero days of off-farm work in the previous year.

Part-time refers to operators with one or more days of off-farm work in the previous year.

As anticipated, operators farming full-time have greater average sales, land and capital compared to part-time operators and those exiting farming (Table 8, 9 and 10). Operators who continue to farm full-time have greater sales, land and capital than part-time operators who change to full-time farming. Perhaps part-time farmers who change to full-time farming acquire assets overtime. Likewise, full-time operators who change to part-time farming have greater sales, land and capital than operators who continue to farm part-time. Perhaps these full-time operators were unable to dispose of their assets after changing to part-time farming. Within each work category, those exiting farming are the smallest operators in terms of average sales, land and capital.

#### **4. Summary statistics of operators who work off-farm**

Off-farm labour supply has remained relatively constant over time. Thus, the supply of off-farm labour in 1986 is representative of past periods. Here we present additional information to compare the characteristics of operators who work and who do not work off-farm. In addition, a separate column is included with the value of the test statistic used to test the hypothesis of equal means for each independent variable between the two types of operators. For most variables there were significant differences between operators without and with off-farm employment. There were 53,143 census farm operators in the sample, of which 23,251 participated in the off-farm labour market.



Table 11. Summary Statistics of Characteristics by Labour-Market Participation, Canada, 1986<sup>a</sup>

Variable	Participation Decision		Z-test
	Not Working Off-Farm	Working Off-Farm	
<b>Human Capital Characteristics (H)</b>			
Age (years)	47.17 (11.58)	42.51 (10.89)	-46.67*
Education (years)	10.16 (2.98)	11.40 (3.38)	42.91*
Farm Experience:			
Entered before 1966 (yes=1)	0.437 (0.496)	0.193 (0.395)	-59.24*
Entered 1966-1971 (yes=1)	0.103 (0.304)	0.067 (0.250)	-14.40*
Entered 1971-1976 (yes=1)	0.152 (0.359)	0.158 (0.365)	1.92
Entered 1976-1981 (yes=1)	0.114 (0.317)	0.196 (0.397)	26.34*
Entered 1981-1986 (yes=1)	0.195 (0.396)	0.385 (0.487)	48.75*
<b>Farm Characteristics (E)</b>			
Gross farm sales (\$)	100281.15 (243499.20)	34492.88 (94002.99)	-95.95*
Farm Type:			
Dairy (yes=1)	0.183 (0.387)	0.040 (0.195)	-50.38*
Cattle (yes=1)	0.199 (0.399)	0.274 (0.446)	20.38*
Hogs (yes=1)	0.054 (0.226)	0.035 (0.184)	-10.21*
Poultry and Eggs (yes=1)	0.019 (0.137)	0.023 (0.150)	2.99*
Wheat (yes=1)	0.167 (0.373)	0.148 (0.355)	-5.81*
Other field crops (yes=1)	0.236 (0.424)	0.251 (0.434)	4.10*
Fruit and Vegetable (yes=1)	0.035 (0.183)	0.050 (0.217)	8.55*
Other farm types (yes=1)	0.108 (0.311)	0.180 (0.384)	23.57*

## Type of Organisation:

Private or Individual (yes=1)	0.792 (0.406)	0.851 (0.356)	17.63 <sup>*</sup>
Partnership (yes=1)	0.132 (0.338)	0.115 (0.319)	-5.71 <sup>*</sup>
Corporation (yes=1)	0.076 (0.265)	0.033 (0.179)	-21.14 <sup>*</sup>

**Family Characteristics (F)**

Son in agri. occ. (yes=1)	0.143 (0.350)	0.076 (0.265)	-24.30 <sup>*</sup>
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## Working Spouse:

No spouse (yes=1)	0.182 (0.386)	0.139 (0.346)	-13.39 <sup>*</sup>
Spouse in agri. occ. (yes=1)	0.332 (0.471)	0.171 (0.377)	-41.94 <sup>*</sup>
Spouse in non-agri. occ. (yes=1)	0.249 (0.432)	0.425 (0.494)	42.87 <sup>*</sup>
Other spouse (yes=1)	0.237 (0.425)	0.265 (0.442)	7.62 <sup>*</sup>

**Other Income (V)**

Spouses earned income (\$)	3991.96 (8130.06)	6012.31 (10111.43)	32.12
Other family income (\$)	3102.42 (11231.92)	2187.82 (26249.07)	-15.23 <sup>*</sup>
Net farm income (\$)	11234.49 (24740.77)	2168.54 (15323.48)	-73.01 <sup>*</sup>
Family and Farm Income (\$)	19813.53 (29096.90)	13309.65 (35071.50)	-41.76 <sup>*</sup>
Government farm support (\$)	21854.58 (43978.63)	7753.37 (26088.26)	-86.37 <sup>*</sup>

**Labour Market Conditions (M)**

Population density (person per km <sup>2</sup> )	33.60 (98.14)	35.85 (92.84)	-0.44
Male unemployment rate (percentage)	9.60 (4.46)	10.13 (4.57)	14.76 <sup>*</sup>

## Region:

British Columbia (yes=1)	0.055 (0.228)	0.093 (0.290)	16.90 <sup>*</sup>
Prairie provinces (yes=1)	0.529 (0.499)	0.496 (0.500)	-7.62 <sup>*</sup>
Ontario (yes=1)	0.216 (0.412)	0.259 (0.438)	11.47 <sup>*</sup>

Quebec (yes=1)	0.168 (0.374)	0.111 (0.314)	-18.83*
Atlantic provinces (yes=1)	0.032 (0.175)	0.042 (0.200)	6.39*
Observations	29892	23251	

Statistics Canada. Census of Agriculture Match, unpublished data  
20% sample of census farm operators.

\*Standard deviations are reported in parentheses.

\*Significant difference between population means at the 5% significance level.

Human capital characteristics are captured by the age of the operator, years of education for the operator and farm experience, using time of farm entry as proxy variables. Operators not working off-farm are approximately 5 years older than operators who do, while the latter group has one more year of education (Table 11). Labour market participants possess the human capital necessary to earn higher returns working off-farm. Operators not working off-farm tended to have entered farming earlier than operators who participate in the off-farm labour market. For example, 44 percent of non-participants entered farming prior to 1966, while only 19 percent of off-farm participants entered farming during the same period. Likewise, 20 percent of operators not working off-farm entered farming between 1981 and 1986, while 39 percent of off-farm labour participants entered farming during this period.

There were significant differences in the farm characteristics associated with the two types of operators. The average gross farm sales of operators not working off-farm were more than twice as large as for labour-market participants. A greater proportion of non-participants were dairy producers, compared with operators working off-farm, while the latter is true for cattle and other types of enterprises. Approximately 79 percent of operators not working off-farm operated proprietorship farms, compared to 85 percent of operators who worked off-farm. Partnerships and corporations accounted for 13 and 8 percent, respectively of enterprises run by non-participants as compared to 12 and 3 percent for off-farm labour market participants.

Family characteristics are captured through work attributes of the son and spouse. The share of operators having a son working in an agricultural occupation is greater for those working full-time on the farm compared to off-farm work participants. The same is true for operators having no spouse. Approximately 33 percent of operators not working off-farm have a spouse working in an agricultural occupation, compared to 17 percent of participants. The opposite is true for operators having a spouse working in a non-agricultural occupation. Approximately 25 percent of operators not working off-farm have such a spouse, compared to 43 percent for off-farm participants.

Other income has been broken down into the spousal earnings, other family income, net farm income and government farm support. Average spousal earnings for operators working off-farm are greater than that for spouses of non-participants. Since a large share of participants have spouses working off-farm this result is anticipated. The other income variables are greater for operators not working off-farm compared to operators who do. Operators not working off-farm have on average more than five times the amount of net farm income than operators working off-farm. Average family income, including net farm income, was greater for non-participants, implying that participants needed wage earnings to make up for this shortfall in household income. This suggests income inequities between participants and non-participants. Similarly, non-participants receive on average three times the level of government farm support than participants.

The population density of the census sub-division (municipality or township) was used to measure labour market conditions. There was no significant difference found between the average population density for operators who participated and for operators who did not participate in the off-farm labour market. The male unemployment rate in census divisions was significantly different for the two types of operators, with a higher unemployment rate associated with operators working off-farm. This result is opposite to the anticipated result. The majority of both types of operators resided in the Western provinces. Operators not working off-farm were more likely to be in the Prairie provinces or in Québec. Operators working off-farm were more likely to be in British Columbia or Ontario. These regions have the most developed non-farm sectors and the resulting increased job opportunities may explain the higher off-farm labour participation in these regions.

Of the 23,251 census farm operators in the sample who participated in off-farm work, 17,947 reported wage earnings, which are necessary to compute a wage rate. If the operator does some custom work he may report some days of off-farm work, but no wage earnings. Instead, the operator reports this earned income as net farm income (Bollman, 1979). The average daily wage rate of this latter group was \$220.51. Perhaps this unexpectedly high wage rate is due to the fact that the days worked off-farm came from the Census of Agriculture questionnaire, while the wage earnings came from the Population Census questionnaire. An alternative explanation is that operators have high salaries, which translate into high wage rates, when assuming a 260 day work year.

## **5. Summary statistics of operators by type of mobility pattern**

The mobility patterns of operators among working state has remained relatively consistent across time periods. Thus, the transition of operators between 1986-1991 should be representative of this redistribution. Here we present additional information on human capital, farm and family characteristics, other income and labour market conditions to allow further analysis of the transition patterns of operators.

The summary statistics of some 1986 independent variables used in the estimation of farm/off-farm labour reallocation are reported in Table 12 for operators who farmed full-time in 1991, part-time in 1991 and exited farming in 1991. Since no information in 1991 is recorded for operators who exited farming, only operator characteristics in 1986 can be used in describing working status in 1991. Empirical analysis of farm/off-farm labour reallocation assumes that the operator is in disequilibrium with regards to working status in 1986, but in working status equilibrium in 1991. The number of days that the operator worked off-farm in 1991 and whether an operator in 1986 was still farming in 1991 were used to construct these categories. Operators are full-time if they stayed in farming and worked no days off-farm in 1991. Those operators who stayed in farming and worked some days off-farm in 1991 are classified as part-time.

Operators who left farming in 1991 have exited. There were 53,143 census farm operators in the sample, of which 24,192 were full-time, 12,514 were part-time and 16,437 exited farming. The sample is restricted to operators less than 65 years of age since those who exited farming are assumed to enter the nonfarm labour market. The values of the variables for full-time and part-time operators are different from those found in Table 11 since the operator's working status is determined in 1991, while their characteristics are defined in 1986.

In addition, three separate columns are included with the values of the test statistic used to test the hypothesis of equal means for each independent variable between the three types of operators. The first column (1), provides the test statistic between full-time and part-time operators (FT-PT). Similarly, the second column (2), gives the test statistic between part-time and exiting farmers (PT-E), while the third column (3), provides the test-statistic between full-time and exiting operators (FT-E). For most variables there were significant differences between operators farming full-time, part-time and exiting farming.

Table 12. Summary Statistics of 1986 Characteristics by Working State in 1991, Canada<sup>a</sup>

1986 Variable	Full-Time	Part-Time	Exited	Z-test		
				(1)	(2)	(3)
				PT-E	FT-E	
<b>Human Capital Characteristics (H)</b>						
Age (years)	46.36 (11.40)	41.76 (10.23)	45.88 (12.10)	-37.59*	*	*
Education (years)	10.28 (2.90)	11.45 (3.22)	10.76 (3.54)	34.01*	-30.23	* -3.08 *
Farm Experience:					18.48	12.79
entered before 1966 (yes=1)	0.449 (0.497)	0.226 (0.418)	0.235 (0.424)	-41.89*		-44.01*
entered 1966-1971 (yes=1)	0.108 (0.311)	0.082 (0.274)	0.060 (0.238)	-8.13*	-1.84	* *
entered 1971-1976 Working State in 1991 (yes=1)	0.162 (0.369)	0.191 (0.393)	0.116 (0.320)	-6.74*	7.08	* -16.73 *
entered 1976-1981 (yes=1)	0.118 (0.323)	0.196 (0.397)	0.160 (0.367)	19.91*	17.62	* -13.05 *
entered 1981-1986 (yes=1)	0.162 (0.368)	0.306 (0.461)	0.428 (0.495)	32.21*	7.85	* 12.06 *
Off-farm work (days)	29.94 (75.74)	134.14 (114.91)	100.21 (119.28)	99.71*	-21.22	* 59.45 *
<b>Farm Characteristics (E)</b>					28.43	69.38
Gross Farm Sales (\$)	102195.49 (193040.92)	48020.95 (156890.87)	44189.96 (218252.96)	-63.85*		* *
					22.86	-86.86

## Farm Type:

Dairy (yes=1)	0.191 (0.393)	0.047 (0.211)	0.072 (0.259)	-37.55*	*	*
Cattle (yes=1)	0.216 (0.412)	0.274 (0.446)	0.221 (0.415)	12.41*	-8.98	* -33.55
Hogs (yes=1)	0.054 (0.225)	0.038 (0.191)	0.040 (0.196)	-6.72*	10.53	1.06 -6.32*
Poultry and Eggs (yes=1)	0.017 (0.128)	0.018 (0.133)	0.029 (0.168)	0.84*	-0.95	* *
Wheat (yes=1)	0.165 (0.372)	0.171 (0.377)	0.138 (0.345)	1.41*	-6.14	* 8.41 *
Other field crops (yes=1)	0.239 (0.427)	0.272 (0.445)	0.225 (0.418)	6.91*	7.73	* -7.44 *
Fruit and Vegetable (yes=1)	0.031 (0.173)	0.045 (0.208)	0.053 (0.225)	7.04*	9.23	* -3.30 *
Other farm types (yes=1)	0.087 (0.282)	0.135 (0.341)	0.221 (0.415)	14.27*	-3.15	* 11.38 *
Type of Organisation:					-18.84	38.17
Private or Individual (yes=1)	0.787 (0.409)	0.845 (0.362)	0.843 (0.364)	13.21*		14.05*
Partnership (yes=1)	0.138 (0.345)	0.119 (0.323)	0.109 (0.312)	-5.22*	0.40	* *
Corporation (yes=1)	0.075 (0.263)	0.037 (0.188)	0.048 (0.213)	-14.34*	2.48	* -8.57 *
<b>Family Characteristics (F)</b>					-4.59	-10.91
Son in agri. occ. (yes=1)	0.154 (0.361)	0.092 (0.288)	0.072 (0.258)	-16.67*		* *
					6.20	-24.98



## Working Spouse:

No spouse (yes=1)	0.156 (0.363)	0.122 (0.327)	0.206 (0.404)	-8.82*	*	*
Spouse in agri. occ. (yes=1)	0.352 (0.478)	0.208 (0.406)	0.170 (0.376)	-28.31*	-18.87	12.95 * -40.18
Spouse in non-agri. occ. (yes=1)	0.263 (0.440)	0.421 (0.494)	0.347 (0.476)	30.86*	8.39	* 18.19 *
Other spouse (yes=1)	0.230 (0.421)	0.249 (0.432)	0.278 (0.448)	4.13*	12.87	* 11.02 *
<b>Other Income (V)</b>					-5.51	
Spouses earned income (\$)	4141.67 (7972.60)	5900.93 (9697.53)	5176.14 (10062.36)	22.19*	*	*
Other family income (\$)	2988.80 (10381.28)	2180.22 (32582.80)	2677.98 (15413.22)	-13.14*	14.39	6.57 -14.83*
Net farm income (\$)	11590.17 (25598.68)	3428.02 (17001.50)	3830.03 (16603.23)	-49.37*	1.40	* -53.17 *
Family and Farm Income (\$)	20297.02 (29741.70)	14263.69 (40296.10)	14127.12 (27298.65)	0.34	-4.12-30.39*	* -34.29 *
Government farm support (\$)	22585.94 (36213.06)	11026.70 (34917.46)	9074.85 (40617.20)	-55.95*	*	* -80.65 *
<b>Labour Market Conditions (M)</b>					23.23	
Population density (person per km <sup>2</sup> )	30.23 (83.89)	30.89 (71.51)	43.80 (123.84)	-2.86*	*	*
Male unemployment rate (percentage)	9.56 (4.39)	9.72 (4.28)	10.31 (4.81)	4.42*	-11.41	* 10.71 *
Region:					-9.19	15.26
British Columbia (yes=1)	0.046 (0.210)	0.078 (0.269)	0.104 (0.305)	12.60*	*	* 22.38 *
					-7.35	

Prairie provinces (yes=1)	0.552 (0.497)	0.548 (0.498)	0.433 (0.496)	-0.83*	*	*	-23.55
Ontario (yes=1)	0.205 (0.404)	0.245 (0.430)	0.270 (0.444)	8.74*	19.31	*	*
Quebec (yes=1)	0.165 (0.371)	0.089 (0.284)	0.153 (0.360)	-20.03*	-4.69	*	*
Atlantic provinces (yes=1)	0.031 (0.173)	0.040 (0.195)	0.041 (0.198)	4.45*	-16.25		-3.39 5.34*
Observations	24192	12514	16437				-0.44

Statistics Canada. Census of Agriculture Match, unpublished data  
20% sample of census farm operators.

\*Standard deviations are reported in parentheses.

\*Significant difference between population means at the 5% significance level.

(1) Z-test between full-time and part-time operators.

(2) Z-test between part-time and exiting operators.

(3) Z-test between full-time and exiting operators.

Note: Full-time refers to operators with zero days of off-farm work in the previous year.

Part-time refers to operators with one or more days of off-farm work in the previous year.

Human capital characteristics of the operator are captured using the age, education, farm experience and days worked off-farm. Operators farming full-time are approximately 5 years older than part-time operators, while those exiting farming are generally of the same age. Part-time operators have 11.5 years of schooling, while operators farming full-time and exiting have approximately a year less of education. Farm experience is captured using time of farm entry as proxy variables. The share of operators entering farming in earlier periods was higher for full-time operators. In contrast the share of operators entering farming in later periods was higher for part-time operators and those exiting farming. Full-time operators in 1991 worked approximately 30 days off-farm in 1986, while part-time farmers worked 134 days, and operators exiting farming by 1991 worked 100 days off-farm in 1986.

There were significant differences in the farm characteristics associated with the three types of operators. The average gross farm sales for operators farming full-time was more than twice as large as for part-time and exiting operators. Compared to operators exiting farming, part-time farmers had slightly greater average gross farm sales. The share of farmers operating a dairy enterprise was higher for full-time farmers, while the share of farmers managing cattle enterprises was higher for part-time and exiting farmers. The share of operators of other types of farms was significantly higher for farmers exiting the industry. Approximately 84 percent of part-time and exiting farmers ran their operations as proprietorships, compared to 79 percent of full-time farmers. A higher proportion of full-time operators ran enterprises organised as partnerships and corporations, compared to the other types of operators.

Family characteristics are captured through the work attributes of the son and spouse. Approximately 15 percent of full-time operators had a son working in an agricultural occupation, compared to 9 and 7 percent of part-time and exiting farmers, respectively. The share of operators having no spouse was higher for exiting farmers, while the share of operators having a spouse working in an agricultural occupation was higher for full-time operators. Approximately 42 percent of part-time operators had a spouse working off the farm, compared to 26 and 35 percent of full-time and exiting operators, respectively.

The operator's other income is divided into the earnings of the spouse, other family income, net farm income and government farm support. The average earnings of the spouse are greater for part-time farmers, followed by operators exiting farming. Other family income is greater for full-time operators, followed by exiting farmers. As anticipated, full-time operators have more than three times the amount of net farm income compared to the other types of operators. However, operators exiting farming have slightly more net farm income than part-time operators. Average family income, including net farm income, was significantly greater for full-time operators. Operators who farmed part-time or exited farming may have done so to make up for this shortfall in household income. The average level of government support provided to full-time operators is more than twice the

amount given to part-time operators, while operators exiting farming are provided with significantly less support.

Labour market conditions are captured by the population density in the census sub-divisions and the male unemployment rate in the census division. The average population density and unemployment rate is significantly greater for operators who exited farming than for part-time and full-time operators. The share of operators exiting farming is greater in British Columbia and Ontario, while the share of operators in full-time and part-time farming is greater in the Prairie provinces. A lower proportion of operators in part-time farming reside in Quebec, compared to the other types of operators.

## **6. Conclusion**

The purpose of this paper was to provide descriptive statistics on off-farm labour supply and farm/off-farm labour reallocation for Canadian farmers using data obtained from the Canadian Census of Agriculture. The data captures human capital, farm and family characteristics, other income and labour market conditions. Furthermore, the unique nature of the data allows for analysis of operator mobility. The data indicates that an increasing proportion of operators work off-farm, and have allocated greater amounts of time to the labour market. Participants in off-farm work tend to be younger and more educated than non-participants. On average, participants operate smaller, proprietorship farms, compared to non-participants. A large proportion of operators working off-farm have a spouse participating in the labour market. Compared to non-participants, operator's working off-farm have less unearned income, suggesting income inequities. Furthermore, a greater proportion of off-farm work participants reside in Ontario and Quebec, relative to operator's not working off-farm.

There is some mobility between the status of full-time and part-time operators. However, an increasing proportion of both types of operators have exited farming. Full-time operators are older, while operators farming part-time are more educated. Part-time operators work more off-farm, followed by operators exiting farming. Operators farming full-time have larger farms, compared to the other types of operators. A large proportion of operators exiting farming have no spouse. Operators having a spouse working in an agricultural occupation was greater for full-time farmers. The share of operators having a spouse working off-farm was greater for part-time operators. On average, unearned income was higher for full-time operators. The population density was greater in census divisions where full-time operators were farming. A large proportion of operators exiting farming reside in British Columbia and Ontario, while a large share of full-time operators live in the Western provinces.

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