

# THE AGING OF AGRICULTURE AND THE INCOME INSTABILITY OF YOUNG FARMERS IN KOREA

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## ABSTRACT

*One of the biggest problems of Korean agriculture is the aging of farmers. Only 14.8% (173,622) of all farms (1,177,318) have operators whose age is less than 50. Although the government has tried to substitute younger farmers for older farmers, the result has been not so successful. The income instability of farm household has been supposed as one of the major causes that hinder the rejuvenation of the agriculture. So far, it is not so certain that a younger farmer's household income is more unstable than an older farmer's since a younger farmer can stabilize the household income by earning the better part of his(her) household income from non-farm activities. In the paper, using a panel survey data we show that a younger farmer's household income is more unstable than older farmer's.*

Key Words: aging of agriculture, income instability, panel survey data

## INTRODUCTION

According to the agricultural census in 2010 the average age of Korean farm operators is 62.3 and the largest age group stands at the interval of 70-75. The aging of agriculture causes serious problems such as the decrease of rural population, the reduction of farm size and farm income.

Although many policies have been used to encourage young people to participate in agricultural production, the number of farms operated by young farmers is decreasing every year. Income instability is one of the major causes that make young people turn away from agriculture. In this paper, we try to understand how the income instability causes the aging of Korean agriculture by examining the relationship between the income instability and farm operators' age.

First, we look into the aging process of Korean agriculture by briefly going over the history of the economy. Second, we present some tables that show the current situation of farms operated by younger farmers such as the distribution of farms by operator's age and the size of land, the distribution of farm households by farm revenues and crops. Third, using a panel

survey data, we study the relationship between the income instability of the farms and the age of farm operators.

## ECONOMIC GROWTH AND THE AGING OF KOREAN AGRICULTURE

### Take-off of the Economy (1962-1976)<sup>1</sup>

The Korean economy recorded a rapid growth in 1960's and 1970's. GDP jumped from 2 billion dollars in 1961 to 25 billion dollars in 1976. The share of agricultural production in total GDP dropped from 40.2% to 24.8% and the share of agricultural employees dropped from 65% to 45% during the period. While the total population increased from 26 million in 1962 to 36 million in 1976, the farm household population decreased from 15 million to 13 million (Fig. 1.). During the period, farmland area stayed around 2.2 million ha and the agriculture still could support about 36% of the population (Fig 2.).

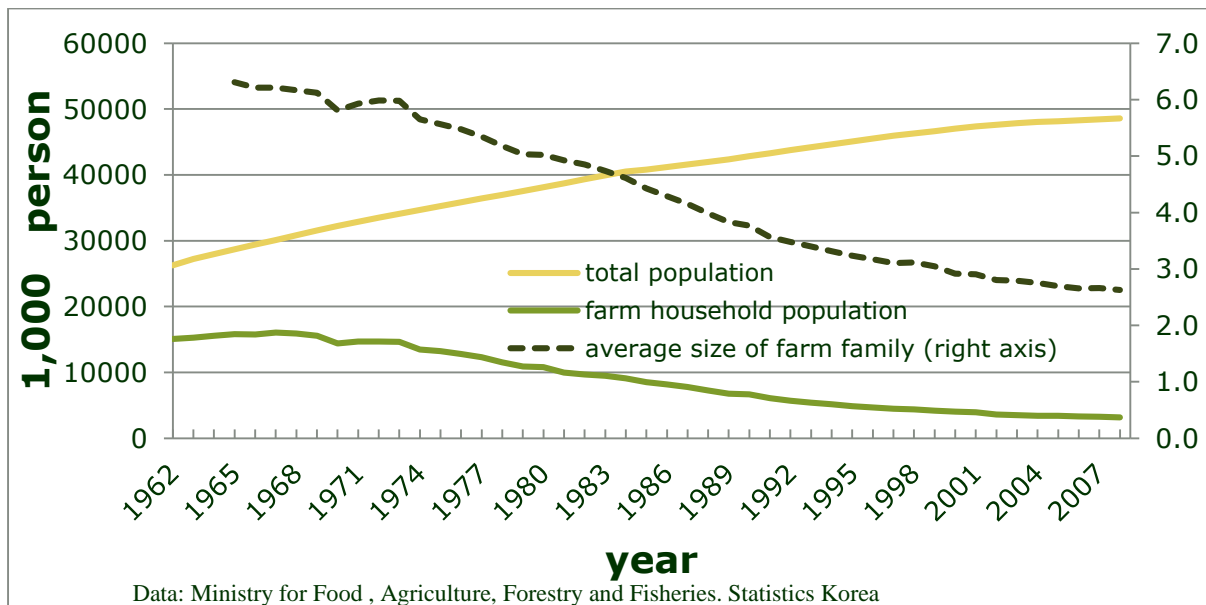


Fig. 1. Farm household population

<sup>1</sup> Lee(2010)

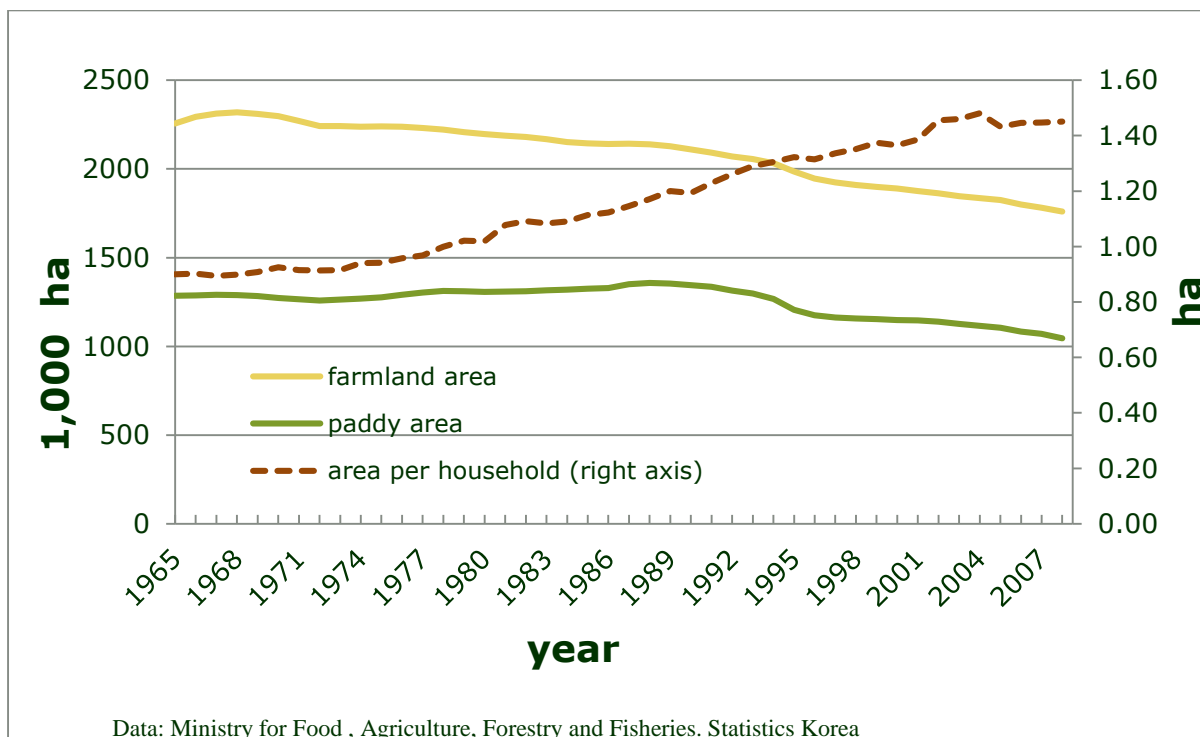


Fig. 2. Farmland area

### Industrialization (1977-1994)

In this period, GNP grew 8.4% per year, but the growth of agricultural sector slowed down to 1% per year. At the end of the period the share of agricultural sector in total GDP was down to 5%. The rural/urban household income ratio stayed around 100%. The farmland area began to show decreasing tendency. However, the farmland size of a farm household increased from 0.97ha to 1.3ha since the number of farm households decreased faster than the farmland area.

The ratio of rural population decreased from 36% to 11%. The average of farm family size decreased from 5.3 to 3.3. The aging of agriculture accelerated. The ratio of farm household member over age of 49 exceeded 50% (Fig. 3). Due to the scarcity, labor productivity increased faster than land productivity (Fig. 4).

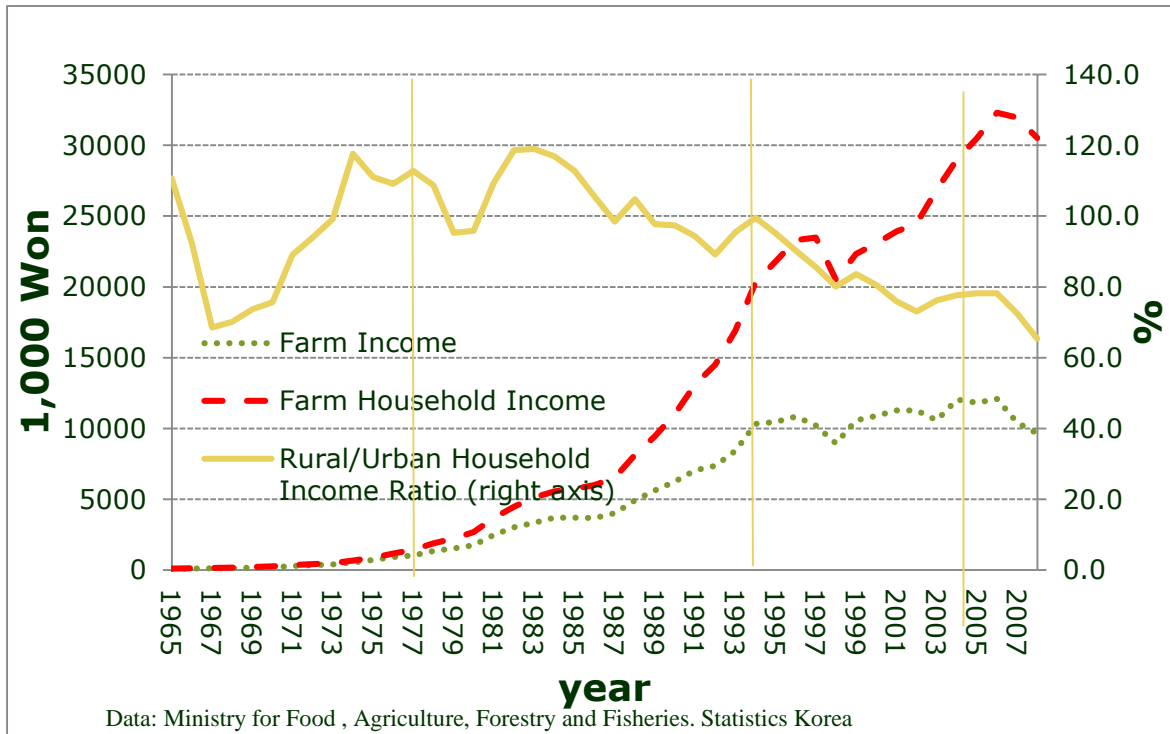


Fig. 3. Farm household income

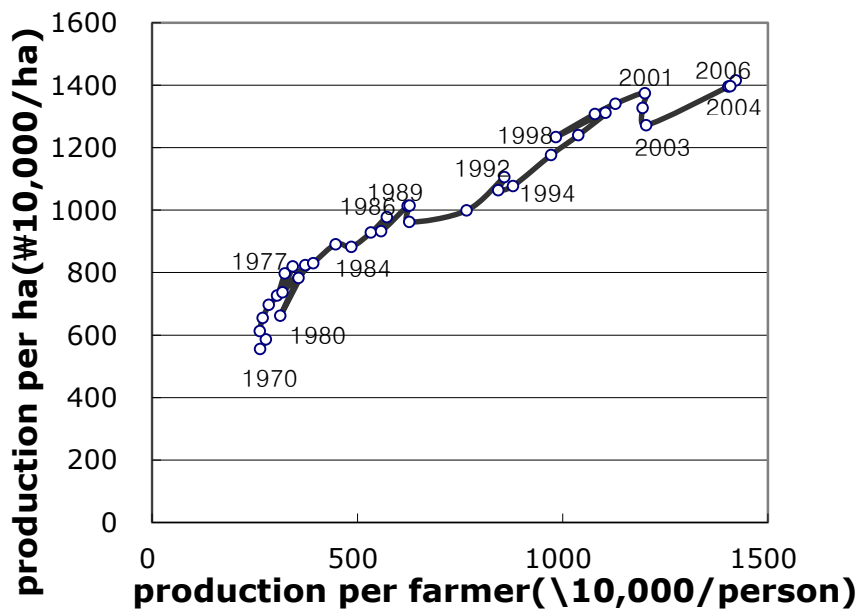


Fig. 4. Path of the growth of agricultural productivity

### Globalization (1995- )

After the launch of WTO (World Trade Organization) in 1995 the import of agricultural products (including forestry and fishery products) increased from 10 billion dollars to 35 billion dollars (Fig. 5). Furthermore, Korea opened agricultural products market by signing FTA (Free Trade Agreement) with many major agricultural products producing countries such as ASEAN, Australia, Canada, China, EU, and US.

The market opening policy made the future of Korean agriculture very uncertain so that the younger generation turned away from the agriculture. To get the competitive power, the farmers tried to enlarge their farm size. Small farm operators who could not have chance to enlarge their farm size found new sources of income in sideline jobs and non-farm activities. Distribution of farms by revenue began to be bipolarized. The ratio of farms with agricultural revenue less than ₩5 million (≈\$4,500) and the ratio of farms with agricultural revenue over ₩30 million (≈\$27,000) began to increase. And the ratio of farms with agricultural revenue between ₩5 million and ₩30 million began to decrease (Table 1).

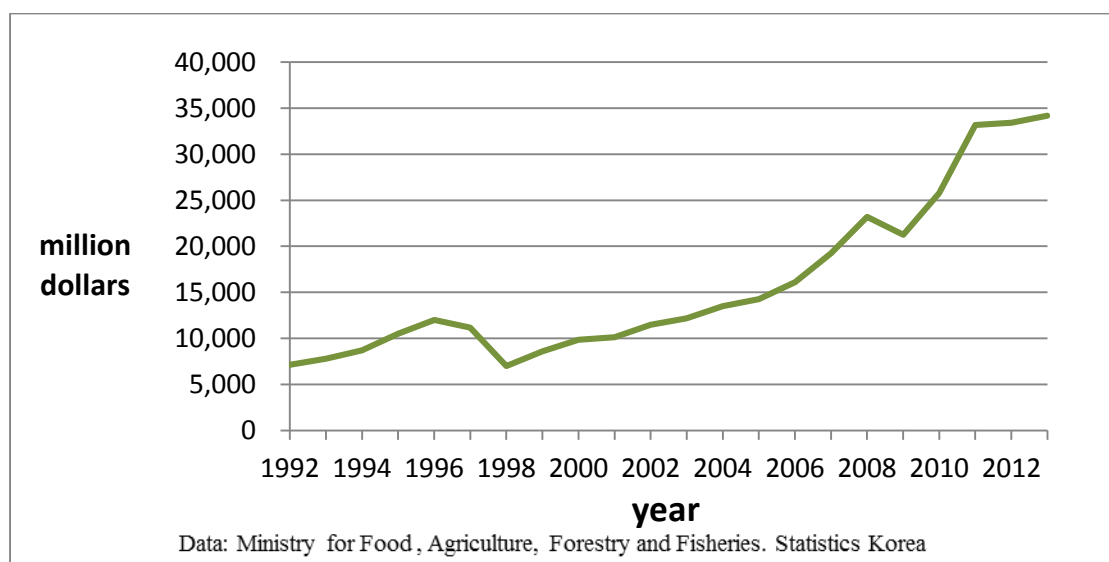


Fig. 5 The rise of the import of agricultural products (forestry and fishery products included)

Table 1. Bipolarization of farms by revenue (unit: %)

year	less than ₩1 mil.	₩1-5 mil.	₩5-10 mil.	₩10-20 mil.	₩20-30 mil.	₩30-50 mil.	₩50-100 mil.	₩100-200 mil.	over ₩200 mil.	Number of farms (1,000)	% of farms less than ₩5 mil.	% of farms over ₩30 mil.
1995	20.50	26.79	23.56	17.53	7.16	3.58	0.71	0.14	0.04	1,501	47.29	4.46
2000	22.04	26.19	21.04	16.35	7.85	4.30	1.67	0.42	0.13	1,383	48.23	6.53
2005	23.69	27.99	16.61	13.61	7.83	5.75	3.23	0.88	0.41	1,273	51.68	10.27
2010	23.22*	29.90*	14.73	11.96	7.28	6.17	4.54	1.48	0.74	1,177	53.12	12.92

\*In 2010, 1.2 million is used as the class boundary instead of 1 million.

Data: Ministry for Food , Agriculture, Forestry and Fisheries. Statistics Korea

### The aging of agriculture

The aging of agriculture progressed rapidly. In 1970, less than 5% of the population was over 65. But in 2008, the ratio of farm household population over 65 approached 35% (Fig. 6). In 2010, the average of farm operator’s age reached 62. Fig.7 shows the distribution of farm by operator’s age in 2010. The mode of the age distribution belongs to the interval of 70-75. Farms with operators under the age of 40 are almost nonexistent (2.8% to be exact). Only 14.8% (173,622) of all farms (1,177,318) have operators whose age is less than 50. Now, in Korean agriculture, a ‘young’ farmer means a farmer under the age of 50.

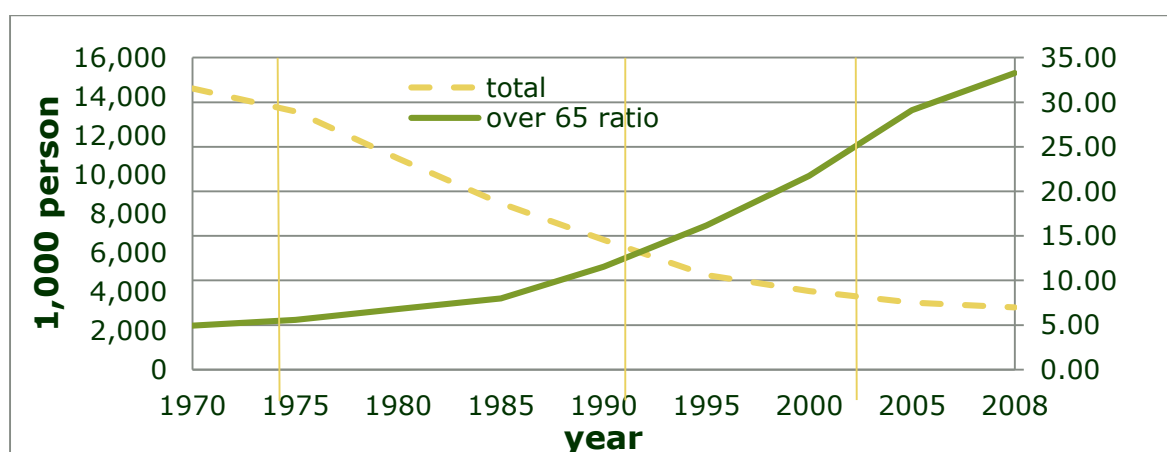


Fig. 6 Ratio of farm household population over 49

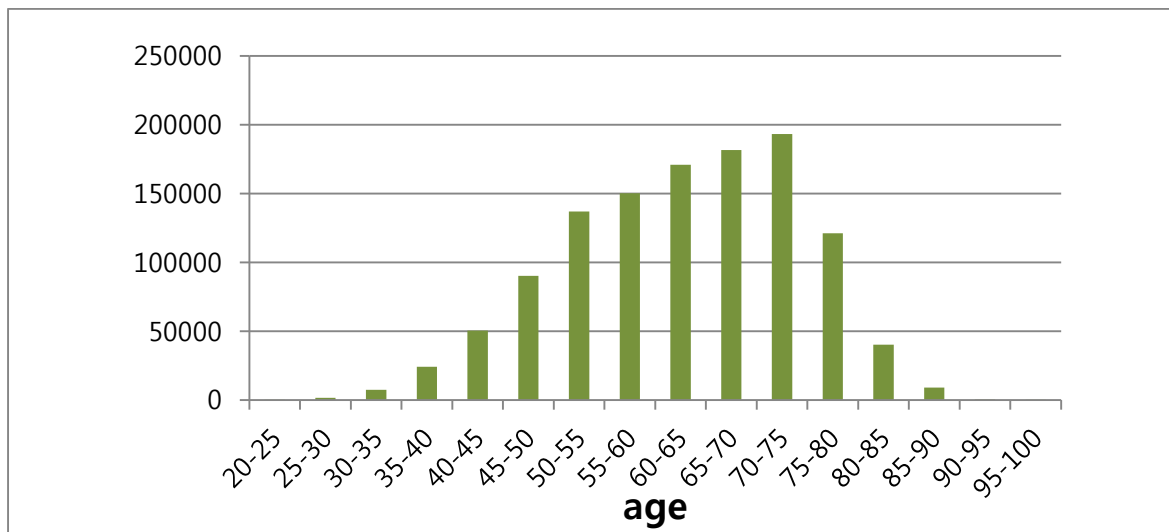


Fig. 7 The distribution of farms by operator's age in 2010  
Data: Agricultural Census, Statistics Korea, 2010

### THE INCOME INSTABILITY OF YOUNG FARMERS

Table 2 shows the relationship between farm operator's age and area of the farms. In the case of farms larger than 5.0 ha, the ratio of farms operated by young farmers (=25.4%) is much higher than the average (=14.7%).

Table 2. The distribution of farm households by operator's age and farmland size: 2010

	< 0.5ha	0.5-1.0	1.0-2.0	2.0-5.0	5.0ha ≤	total	ratio(%)
20 - 24	55	23	20	11	6	115	0
25 - 29	813	282	211	189	86	1,581	0.1
30 - 34	3,761	1,454	1,007	750	382	7,354	0.6
35 - 39	11,799	5,086	3,515	2,492	1,201	24,093	2.1
40 - 44	23,072	10,782	7,850	5,885	2,765	50,354	4.3
45 - 49	37,833	19,290	15,217	12,164	5,621	90,125	7.7
50 - 54	52,774	28,623	24,988	21,377	9,174	136,936	11.6
55 - 59	56,151	33,077	29,570	23,439	7,966	150,203	12.8
60 - 64	62,519	39,810	37,208	25,267	6,005	170,809	14.5
65 - 69	69,284	46,901	40,899	21,131	3,403	181,618	15.4
70 ≤	168,152	102,367	68,055	22,574	2,982	364,130	30.9
total	486,213	287,695	228,540	135,279	39,591	1,177,318	100
ratio(%)	41.3	24.4	19.4	11.5	3.4	100	
ratio of young farmers (%)	15.9	12.8	12.2	15.9	25.4	14.7	

Data: Agricultural Census, Statistics Korea, 2010

As shown in Table 3, Korean agriculture is the agriculture of small farms. The annual farm revenue of 53.1% of farms are less than ₩5 million (≒\$4,500). The ratio of farms that sell over ₩30 million (≒\$27,000) of farm products in a year is only 12.9%. Greenhouse farms and livestock farms keep relatively larger sales amount than rice farms or outdoor crop farms. The ratios of greenhouse farms and livestock farms that sell over ₩30 million are 49.9% and 36.5% respectively.

Table 4 shows that most of the farms' major crop is rice or outdoor crops. Not so many farms (155,532 out of 1,177,318) produce high revenue agricultural products such as greenhouse crops and livestock. Young farmers are taking the lead of high revenue crop production. 22.1% of greenhouse crop farms and 19.7% of livestock farms are operated by young farmers.

Table 3. The distribution of farm households by farm revenues and crops: 2010

	< ₩5 mil.	₩5-10 mil.	₩10-20 mil.	₩20-30 mil.	₩30-50 mil.	₩50-100 mil.	₩100 mil.≤	total	ratio of farms under ₩5 mil. (%)	ratio of farms over ₩30 mil. (%)
rice	324,445	87,508	56,490	25,598	16,831	9,617	2,664	523,153	62.0	5.6
outdoor crops other than rice	278,095	66,588	59,843	37,909	30,611	19,333	6,254	498,633	55.8	11.3
green - house crops	6,758	7,065	11,200	12,207	15,630	15,160	6,357	74,377	9.1	49.9
livestock	16,079	12,246	13,226	9,981	9,551	9,291	10,781	81,155	19.8	36.5
total	625,377	173,407	140,759	85,695	72,623	53,401	26,056	1,177,318	53.1	12.9

Data: Agricultural Census, Statistics Korea, 2010



Table 4. The distribution of farm households by operator's age and crops: 2010

	< 30	30-40	40-50	50-60	60-65	65-70	70-80	80 ≤	total	ratio of young farm households (%)
rice	607	12,577	54,527	110,298	72,471	84,711	162,698	25,264	523,153	12.9
outdoor crops other than rice	642	13,302	59,486	122,159	72,867	77,043	130,544	22,590	498,633	14.7
greenhouse crops	136	2,844	13,490	26,412	12,616	9,477	8,804	598	74,377	22.1
livestock	311	2,724	12,976	28,270	12,855	10,387	12,357	1,275	81,155	19.7
total	1,696	31,447	140,479	287,139	170,809	181,618	314,403	49,727	1,177,318	14.7

Data: Agricultural Census, Statistics Korea, 2010

### Income structure of young farmers

Table 5 shows that younger farmers' average household income is higher than older farmers'. And, according to Table 6, younger farmer's ratio of farm income to household income is lower than older farmers. Therefore we could conclude that younger farmers depend on non-farm income more heavily than older farmers. Younger farmers could earn considerable amount of income from activities other than farming. Money from side line jobs such as lodging, yard selling, food processing and wage from part-time jobs are the better part of their household income.

From Table 5 and Table 6, we could know that a farm with larger land earns more farm income and has higher ratio of farm income to household income on average. However, in the case of farms operated by young farmers under age of 50, a larger farm size does not guarantee higher household income. For example, while the household income of farms in the land size interval 1.0-1.5 ha is ₩ 44.22 million, the household income of farms in the land size interval 2.0-3.0 ha is only ₩ 31.16 million. A young farmer under 50 could earn the better part of his (her) income from out-of-farm labor. For him (her), labor is more important income source than land.

Table 5. Average household income by operator's age and land size

(unit: million won)									
	<50	50-55	55-60	60-65	65-70	70-75	75-80	80≤	average
<0.5ha	28.15	28.36	22.66	23.70	14.65	14.58	7.70	5.48	18.70
0.5-1.0	27.55	31.50	25.25	18.82	17.15	12.28	9.03	7.25	17.86
1.0-1.5	44.22	30.89	24.65	24.89	18.35	21.29	10.57	8.66	21.65
1.5-2.0	43.36	29.87	36.06	25.42	18.52	24.69	13.71	14.68	24.77
2.0-3.0	31.16	29.69	28.51	25.09	21.49	19.68	16.30	14.35	23.13
3.0-5.0	36.02	35.69	48.42	28.52	29.45	23.64	20.55	16.58	31.49
5.0ha≤	45.81	47.94	53.17	57.94	44.34	31.17	28.01	22.20	46.95
average	32.05	31.19	28.78	25.37	19.30	17.47	10.69	8.07	22.40

Data: The Survey of Registered Farms, Ministry of Agriculture, Food and Rural Affairs, 2014

Table 6. The ratio of farm income to household income by operator's age and land size

(unit: %)									
	<50	50-55	55-60	60-65	65-70	70-75	75-80	80≤	average
<0.5ha	16.46	15.90	16.39	13.74	18.05	14.57	22.39	25.07	16.41
0.5-1.0	24.89	20.20	24.36	29.15	28.36	34.83	39.28	43.06	27.95
1.0-1.5	24.25	32.61	40.30	35.57	43.10	31.50	54.78	56.65	36.55
1.5-2.0	33.18	48.04	38.18	47.68	56.03	37.71	55.27	44.70	43.71
2.0-3.0	57.90	60.62	61.83	61.99	62.28	57.56	60.57	59.48	60.56
3.0-5.0	66.63	70.88	48.81	73.65	63.32	65.84	64.63	70.44	62.95
5.0ha≤	82.79	81.73	71.56	58.36	79.74	72.48	68.87	73.45	72.62
average	30.81	33.77	36.77	37.00	43.54	36.11	45.67	44.47	35.93

Data: The Survey of Registered Farms, Ministry of Agriculture, Food and Rural Affairs, 2014

Table 7. The ratio of transfer income to household income by operator's age and land size

(unit: %)									
	<50	50-55	55-60	60-65	65-70	70-75	75-80	80≤	average
<0.5ha	1.47	1.47	5.61	37.11	42.78	59.41	54.99	54.49	22.15
0.5-1.0	2.02	1.92	5.07	19.81	41.42	39.98	38.78	37.70	18.52
1.0-1.5	2.09	3.74	5.35	18.67	31.88	31.20	30.50	27.06	16.92
1.5-2.0	2.00	5.85	31.81	24.90	24.88	53.48	27.91	43.94	27.04
2.0-3.0	10.81	3.66	6.73	15.93	20.59	31.34	31.00	28.76	17.21
3.0-5.0	13.25	3.53	38.07	10.40	27.52	24.39	26.36	18.34	22.66
5.0ha≤	6.98	6.46	20.06	35.59	14.03	16.38	24.29	15.40	18.97
average	3.32	2.87	13.49	26.61	32.19	41.91	37.43	38.85	19.88

Data: The Survey of Registered Farms, Ministry of Agriculture, Food and Rural Affairs, 2014

Table 7 shows that the ratio of transfer income<sup>2</sup> to household income is higher for older

<sup>2</sup> The major part of transfer income is composed of public subsidies from the government and private subsidies from family members.

farmers. The average ratio of transfer income to household income for young farmers under 50 is only 3.32%. On the other hand, the average ratio of transfer income to household income for older farmers over 65 exceeds 30%.

### **Income instability of young farmers**

So far, we have discussed conflicting facts about younger farmers' household income instability. Those are as follows. First, younger farmers tend to cultivate larger land than older farmers and farm income is more unstable than non-farm income. Second, younger farmers' non-farm income ratio to household income is higher than older farmers' and non-farm income is more stable than farm income. Since household income is a summation of farm income and non-farm income, we cannot determine whether younger farmers' household income is more stable than old farmers' or not.

By investigating the panel data of the 'farm household economic survey', we could determine which one is more stable. The numbers in Table 8 and Table 9 are the group averages of the CV (Coefficient of Variation) of farm income<sup>3</sup> and household income respectively. As we expected, the CV of household income in Table 9 is much smaller than the CV of farm income in Table 8. That is, non-farm income is much more stable than farm income.

**Table 8. The farm income CV's by operator's age and land size (2008-2012)**

	<50	50-55	55-60	60-65	65-70	70-75	75-80	80≤	average
<0.5ha	4.27	2.97	2.90	1.86	2.13	1.89	1.54	1.20	2.08
0.5-1.0	1.99	2.00	4.06	1.28	1.09	1.75	1.08	1.05	1.57
1.0-1.5	1.85	4.60	1.61	1.63	0.85	0.73	1.03	2.06	1.37
1.5-2.0	0.64	1.50	1.45	2.09	0.96	0.82	0.60	0.23	1.11
2.0-3.0	1.26	1.38	1.27	0.89	0.97	0.77	0.89	–	1.02
3.0-5.0	1.90	1.19	1.36	0.98	1.08	2.57	0.52	1.21	1.32
5.0ha≤	2.20	1.63	1.53	0.73	1.49	1.02	–	–	1.51
average	2.22	2.12	2.08	1.40	1.20	1.35	1.10	1.28	1.49

Data: Farm Household Economy Survey, Statistics Korea, 2013

<sup>3</sup> The coefficient of variation is calculated from 'Farm Household Economy Survey' (Statistics Korea, 2013) which is a 5 year panel data from 2008 to 2012. The sample size of the survey is around 3,000 each year.

In Table 8, we could see that the average farm income CV is very high (=2.08) for farms with farm land smaller than 0.5 ha. And the CV goes down as the size of farm grows larger. However, on average, once the size of farm gets bigger than 3.0 ha (or 2.0 ha for young farm operators under 50) the instability of farm income is beginning to grow again. When the size of farm grows over 3.0 ha the farm begins to be commercialized and exposed to many risk factors of the market. Hence, in terms of farm income, a mid-size farm whose size is between 1.5 ha and 3.0 ha is the most stable one.

Table 9. The household income CV's by operator's age and land size (2008-2012)

	<50	50-55	55-60	60-65	65-70	70-75	75-80	80≤	average
<0.5ha	0.55	0.39	0.66	0.77	0.43	0.42	0.40	0.36	0.49
0.5-1.0	0.65	0.64	0.48	0.47	0.43	0.36	0.44	0.37	0.45
1.0-1.5	0.47	0.45	0.47	0.49	0.47	0.42	0.46	0.29	0.45
1.5-2.0	0.56	0.53	0.47	0.63	0.48	0.41	0.34	0.26	0.47
2.0-3.0	0.56	0.60	0.58	0.71	0.51	0.43	0.58	—	0.56
3.0-5.0	0.67	0.69	0.67	0.71	0.49	0.45	0.38	0.43	0.62
5.0ha≤	0.62	0.74	0.73	0.50	0.45	0.34	—	—	0.61
average	0.59	0.58	0.57	0.61	0.46	0.40	0.43	0.35	0.49

Data: Farm Household Economy Survey, Statistics Korea, 2013

Table 9 clearly shows that younger farmers' household income is more unstable than older farmers'. Younger farmers' farm income is so much more unstable than older farmers' that it makes their household income more unstable than older farmers' even though their ratio of farm income to household income is lower than older farmers'. In Table 8, while the farm income CV of farmers under 60 is greater than 2.0, the farm income CV of farmers over 60 is less than 1.4. Why the farm income of younger farmers is far more unstable than older farmers'? We could think of at least three reasons as follows. First, many younger farmers cultivate high income but high risk crops such as livestock and greenhouse crops as we have seen in Table 4. Second, younger farmers like to try new, relatively risky technologies. Third, many younger farmers who do farming as a side line job do not care much about farming.

In Table 10 are the CV's of household income calculated from the 'farm household economy survey' data (2003-2007). Table 10 shows almost the same results as in Table 9.

Table 10. The household income CV's by operator's age and land size (2003-2007)

	<50	50-55	55-60	60-65	65-70	70-75	75-80	80≤	average
<0.5ha	0.46	0.47	0.42	0.38	0.38	0.37	0.34	0.34	0.40
0.5-1.0	0.52	0.50	0.40	0.40	0.38	0.41	0.36	0.36	0.41
1.0-1.5	0.51	0.41	0.44	0.40	0.44	0.36	0.31	0.42	0.41
1.5-2.0	0.58	0.52	0.42	0.44	0.38	0.38	0.34	0.39	0.43
2.0-3.0	0.53	0.46	0.50	0.37	0.40	0.40	0.15	0.23	0.44
3.0-5.0	0.53	0.49	0.49	0.36	0.40	0.28	0.77	–	0.45
5.0ha≤	0.47	0.51	0.43	0.40	0.54	0.37	–	–	0.47
average	0.51	0.48	0.44	0.39	0.40	0.38	0.34	0.36	0.42

Data: Farm Household Economy Survey, Statistics Korea, 2008

## CONCLUSION

As pointed out above, younger farmers' household income is more unstable than older farmers'. This instability is one of the major causes that keep younger farmers from entering farming business.

Also we have learned that, in the case of younger farmers, the ratio of transfer income to household income is very low and mid-size (1.5-3.0 ha) farms' household income is the most stable. Base on these, we could propose a couple of policy measures as follows.

First, we suggest a farmland plan through which the government supplies farmland for younger farmers so that they could build mid-size farms. For example, a land bank for younger farmers.

Second, we suggest an income transfer plan through which the government could subsidize younger farmers' so that they could lower the ratio of farm income to household income. For example, a direct payment<sup>4</sup> scheme for younger farmers.

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<sup>4</sup> We prefer a direct payment scheme that is inversely proportional to land size. The income stabilization effect of a direct payment proportional to land size is limited since a small farm gets only a small portion of direct payment.

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