Application Of The Friedman Test For Measuring Agricultural Financing By Commercial Banks In Haryana

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INTRODUCTION

Haryana is an agriculture dominant state of India and its 45.82 per cent workers are cultivators or are engaged in cultivation[1] as agriculture labourers as per cent to total workers (Census: 2001). The contribution of agriculture and allied activities in Net State Domestic Product (NSDP) of Haryana were ₹ 1600178 crore in 1999 / 2000, which increased to ₹ 2001282 crore in 2006 - 07, and in percentage terms, the contribution of agriculture and allied activities in total NSDP of Haryana was 21.40 per cent in 2006-07 (ASG: 2008). Thus, we can declare that agriculture is the lifeline of the economy of Haryana. The agricultural development is affected by several factors such as technology, infrastructure, natural climate, finance, etc. Out of these, finance is a major input for agricultural output/production. According to Jawaharlal Nehru, Former Prime Minister of India, *'everything can wait, but agriculture cannot wait'*. Thus, adequate, easy, low cost credit is important for sustainable agricultural development. Agricultural credit has become more of a burning issue after banking sector reforms as in the new banking environment, banks emphasize on assets quality [2], while the degree of risk is high in case of agriculture and allied activities[3]. So, banks do not feel better in giving agricultural credit. Agricultural policies in India have been reviewed from time to time to maintain pace with the changing requirements of the agriculture sector, which forms an important segment of the priority sector lending of Scheduled Commercial Banks [4] (SCBs) , and a target of 18 per cent of net bank credit [5] has been stipulated for agriculture. The Approach Paper to the Eleventh Five Year Plan set a target of 4 per cent for the agriculture sector within the overall GDP growth target of 9 per cent [6]. In this context, the need for affordable, sufficient and timely

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[1] This means activities relating to production of crops and all related ancillary activities. However, growing of trees/plants/crops (such as rubber, cashew, coconut, pepper, coffee, tea, etc.) as plantation or orchards is not considered under *'cultivation'*. It comes under *'other agricultural activity'*.

[2] Minimum level of Non-Performing Assets (NPAs) or sub-standard loans.

[3] 60 per cent of the agricultural land depends on rainfall for irrigation. Farmers are constantly facing problems of marketing, inadequate supply of fertilizers, seeds, and finance. (Farmer Assessment Survey, 2003 indicates that the share of moneylenders increased from 36 per cent in 1990-91 to 38 per cent in 2001-02 etc.)

[4] Scheduled Commercial Banks—which carry on the business of banking in India and which **(a)** have paid-up capital and reserves of an aggregate real or exchange value of not less than ₹ 5 lakh, **(b)** satisfy the Reserve Bank that their affairs are not being conducted in a manner detrimental to the interest of their depositors, are eligible for inclusion in the Second Schedule to the Reserve Bank of India Act, 1934 and when so included, are known as *'Scheduled Banks'* /Scheduled Commercial Banks.

[5] Priority sector includes agriculture; small scale industries, other small business operators and weaker sections of the society that need finance in the shape of loans. The description of the priority sector was formalized in 1972 on the recommendations of the informal study group on statistics relating to advances to the priority sector constituted by the RBI. Although initially, there was no specific target fixed in report of priority sector lending, it reached a level of not less than 1/3rd of the outstanding credit by March 1979. In 1980, the target of priority sector lending was fixed - 18 per cent for agriculture, 10 per cent for weaker sections of the society, and no target was fixed for small scale industry under the priority sector lending .

[6] It is estimated that if the country has to maintain a GDP growth rate of over 8 per cent, the agricultural sector has to grow at the rate of at least 4 per cent (Eleventh Five Year Plan).

supply of institutional/formal credit [7] to agriculture has assumed critical importance. Hence, continuous study for tracking flow of agricultural credit by scheduled commercial banks is important for the sustainable agricultural development and poverty alleviation perspective. The study makes an attempt to track the flow of agricultural credit as well as analyses the comparative performance of Scheduled Commercial Banks i.e., State Bank of India and its associate Public Sector Banks and Private Sector Banks with respect to agricultural credit in Haryana from 2000/2001 to 2008/2009 by using the Freidman test.

OBJECTIVES OF THE STUDY

- To examine the trends and composition of agricultural credit in Haryana by Commercial Banks; and
- To study the performance of different groups of Commercial Banks in providing agricultural credit in Haryana.

SOURCES OF DATA, RESEARCH METHODOLOGY AND LIMITATION OF THE STUDY

The present study is based on secondary data. The secondary data were collected from reports on trends and progress of banking in India, website of the Indian Banking Association; Statistical Abstract of Agriculture, published by Ministry of Agricultural Development ; related banking magazines, Haryana Development Report, 2010, Agriculture Statistics At A Glance, 2008 and research papers. The present study covers a period of eight years - from 2000/2001 to 2008/ 2009. For this purpose, the researchers have used ACGR and Friedman's Test.

The Limitation of the study is that it has only considered Scheduled Commercial Banks, and the Regional Rural Banks (RRBs) were not considered for the present study.

THE FRIEDMAN'S TEST- A DISTRIBUTION FREE APPROACH TEST

The Friedman's Test is used to test the null hypothesis that several independent samples come from the same population. This test is a non-parametric test. This test requires fewer restrictive assumptions concerning the level of data measurement. The test does not require the assumption of normality and equal variance. It can be used whenever the number of sample is greater than or equal/parallel to way analysis of variance. The calculation of total ranks (row total and column total) is shown in the Table 4. In order to calculate the 'F' values for this study, ranks were assigned for the agricultural credit outstanding as per cent to the credit limit of different types of commercial banks for each year from 2001 to 2009 in Haryana. The lowest ratio in each year (among the three classifications of commercial banks) received a rank of 1, whereas, the highest ratio received the rank of 3. Intermediary ratio received the rank 2. Hence, the total ranks in each row are constant and equal to:

$$K(K+1)/2 = 3(3+1)/2 = 6$$

Where,

K =Number of samples, 3 (number of classifications of commercial banks - Public sector banks, Private sector banks and foreign banks.)

Null Hypothesis Under Friedman's Test

H_0 = There is no significant difference in the ratio of agricultural credit limit and agricultural credit outstanding of all the three types of bank groups in Haryana.

Under null hypothesis (H_0), the Freidman Test Statistics:

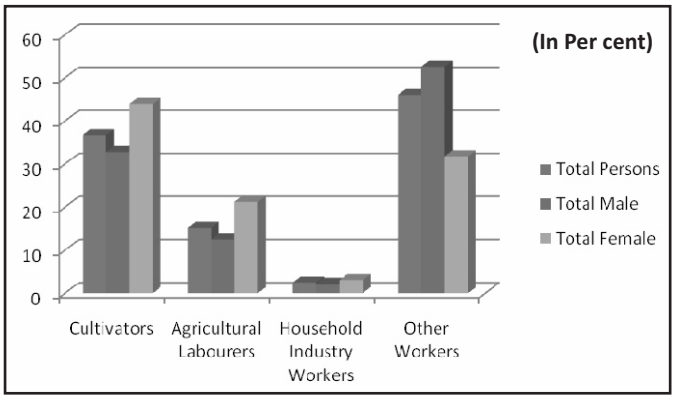
$$H = 12/N(N+1) * (R_1^2 + R_2^2 + ... + R_k^2) - 3(N+1)$$

In "F" test, the sampling distribution 'F' can be approximated by a χ^2 (chi –square) distribution, with k-1 degree of freedom. The chi-square (χ) value at 5% level of significance of $\chi^2 = 5.99$ and at 1% level of significance is $\chi^2 = 9.21$. The calculated value of 'F' is compared with the table value of chi-square (χ^2) at 5% level of significance. If the calculated value of 'H' is less than or equal to the table value of chi –square (χ^2 at 5% level of significance), there is no

[7] The formal sector of rural credit is the sector in which loan transactions are regulated by legislation and other public policy requirements. The institutions in this sector include commercial banks, cooperative banks and credit societies, and other registered financial institutions.

significant difference in the ratio of agricultural credit limit and agricultural credit outstanding in all three types of

Figure 1 : Composition of The Work Force In Haryana



Source: Agriculture Statistics at a Glance: 2008

Table 1 : Classification of Workers In Haryana In 2001

Particulars	Workers	(Main + Marginal)	Cultivators	Agricultural Labourers	Household Industry Workers	Other Workers
Total	Persons	8382890 (100)	3046091 (36.66)	1276143 (15.22)	207135 (2.47)	3853521 (45.96)
	Male	5718804 (100)	1873479 (32.76)	712404 (12.45)	125524 (2.19)	3007397 (52.58)
	Female	2664086 (100)	1172612 (44.01)	563739 (21.16)	81611 (3.06)	846124 (31.76)
Rural	Persons	6455946 (100)	2975643 (46.09)	1222270 (18.93)	134639 (2.08)	2123380 (32.89)
	Male	4079735 (100)	1820096 (44.61)	679191 (16.64)	74640 (1.82)	1505808 (36.90)
	Females	2376211 (100)	1155552 (48.63)	543088 (22.85)	59999 (2.52)	617572 (25.98)
Urban	Person	1926944 (100)	70443 (3.65)	53864 (2.79)	72496 (3.77)	1730141 (89.78)
	Male	1639069 (100)	53383 (3.25)	33213 (2.02)	50884 (3.10)	1501589 (91.61)
	Female	287875 (100)	17060 (5.92)	20651 (7.17)	21512 (7.47)	228552 (79.39)

Source: Agriculture Statistics at a Glance: 2008

Table 2 : Contribution of Agriculture, Agriculture Allied Activities in NSDP of Haryana

(₹ in Crore and Current Prices)

Year	Net State Domestic Product of Haryana	Agriculture and Animal Husbandry Domestic Products of Haryana	Priority Sector[8]
1999/2000	47345.05 (100)	15857.07 (33.49)	16459.69 (34.76)
2001/02	53503.70 (100)	17135.15 (32.02)	17746.19 (33.16)
2002/03	60104.20 (100)	17353.20 (28.87)	1810.11 (30.13)
2003/04	66413.58 (100)	17871.46 (26.90)	18502.34 (27.85)
2004/05	75948.53 (100)	19985.89 (26.31)	20746.03 (27.31)
2005/06	85831.93 (100)	20816.01 (24.25)	21641.36 (25.21)
2006/07	97180.48 (100)	21260.50 (21.87)	22380.60 (23.02)
2007/08	118994.99 (100)	27071.47 (22.75)	28528.49 (23.97)
2008/09	140457.10 (100)	31498.95 (22.42)	33224.73 (23.65)
ACGR	**12.84**	**7.92**	**8.12**

Source : Statistical Abstract of Haryana, 2008

[8] Priority sector includes agriculture; small scale industries, other small business operators and weaker sections of the society.

banks groups in Haryana. In case the calculated value exceeds the table value, the difference will be termed as significant at the 5 percent level. It is further checked at the 1 percent level of significance. In order to test the above hypothesis, 'F' values were calculated for the ratio of agricultural credit limit and agricultural credit outstanding of all three types of bank groups in Haryana. The Table 1 reveals the classification of workers - category wise, area wise as well as sex wise in Haryana. It is evident from the Table 1 that out of the total workers in Haryana, 45.21 per cent were male, and 65.17 per cent were female , and they were dependent on agriculture in 2001. Whereas, in case of rural areas, the workers' agricultural dependence ratio was higher and was 65.02 per cent of the total workers (61.25 per cent of the male workers and 61.48 per cent of the female workers). Therefore, agriculture development is a prerequisite for the rural as well as the overall development of Haryana.

Table 3 : Trends of Agricultural Credit By Commercial Banks in Haryana

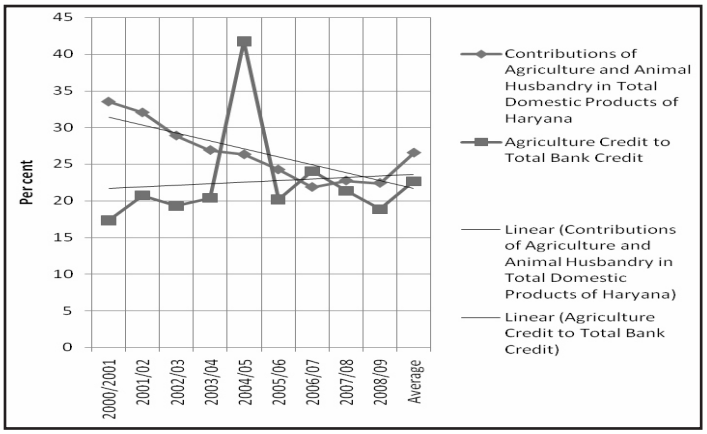
(Amount in ₹ Lakh)

Year	Agriculture Credit	Per cent to Total	Total Credit
2000/2001	158240	17.30558	914387
2001/2002	238081	20.72562	1148728
2002/2003	271553	19.26755	1409380
2003/2004	342604	20.38048	1681040
2004/2005	421396	41.75566	1009195
2005/2006	634832	20.16999	3147409
2006/2007	883245	24.04317	3673579
2007/2008	961327	21.34678	4503382
2008/2009	1068468	18.83881	5671632
Average	**553305.1**	**22.64818**	**2573192**

Source: Basic Statistical Returns of Scheduled Commercial Banks in India, Various Issues

The Table 2 explores the trend of NSDP of Haryana along with agriculture & animal husbandry and priority sector domestic product of Haryana from 1999/2000 to 2008/09. It is clear from the Table 2 that the NSDP of Haryana increased from ₹ 47345.05 crore in 1999/2000 to ₹ 140457.10 crore in 2008/09. Both agriculture & animal husbandry and priority sector domestic product of Haryana also increased from ₹ 15857 crore and ₹ 16459.69 crore to ₹ 31498.5 crore and ₹ 33224.73 crore during the same period. The Table 2 further reveals that the contribution of agriculture & animal husbandry and priority sector in NSDP decreased from 33.49 per cent and 34.76 per cent in 1999/2000 to 21.87

Figure 2 : Movement of Agricultural Credit and Contributions of Agriculture And Animal Husbandry In NSDP of The State



Box 1 : Impact of Agricultural Credit On Agriculture and Allied Activities

AGDP	= 2.61364 + 0.3000 AGCREDIT
std. err	= (0.30015) (0.05297)
t	= (8.70770) (5.66340)
p	= (0.00000) (0.00076)
R square	= .82085 df= 7
Adj. R square	= .79520
$F_{1,7}$	= 32.074 (p-value = .00076)

Source: Researchers' Calculations

Table 4 : Composition of Agricultural Credit By Commercial Banks In Haryana

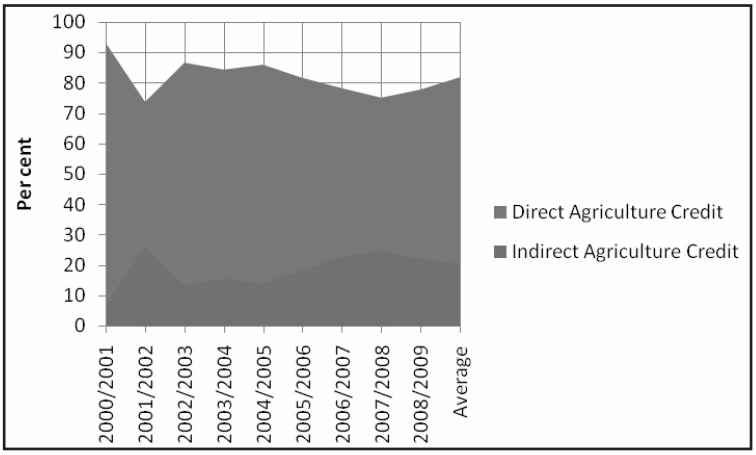
(Amount in ₹ Lakh)

Year	Direct Agricultural Credit	Per cent to Total Agricultural Credit	Indirect Agricultural Credit	Per Cent to Total Agricultural Credit	Total Agricultural Credit
2000/2001	147607	93.28046	10627	6.715748	158240
2001/2002	175795	73.83832	62286	26.16168	238081
2002/2003	235605	86.76207	35949	13.2383	271553
2003/2004	289459	84.48792	53145	15.51208	342604
2004/2005	362740	86.08055	58656	13.91945	421396
2005/2006	518830	81.72713	116002	18.27287	634832
2006/2007	692028	78.35063	200216	22.66823	883245
2007/2008	723093	75.21821	238235	24.78189	961327
2008/2009	832442	77.90987	236026	22.09013	1068468
Average	**441955.4**	**112349.1**	**79.87554**	**20.30509**	**553305.1**

Source: Basic Statistical Returns of Scheduled Commercial Banks in India, Various Issues

per cent and 23 per cent in 2006/07 and further, these figures increased and stood at 22.42 and 23.65 per cent respectively. The ACGR of NSDP, agriculture & animal husbandry and priority sector was 12.84 percent, 7.92 per cent and 8.12 per cent respectively during the period under consideration. The Table 3 depicts the total credit as well as the agricultural credit disbursement by commercial banks in Haryana from 2000/ 2001 to 2008/2009. The total credit and agricultural credit disbursed by Commercial Banks in Haryana increased from ₹ 914387 and ₹ 158240 lakh in 2001 to ₹ 5671632 and ₹ 1068468 lakh in 2009. The Table 3 also reveals the share of agricultural credit to total credit by commercial banks in the same period. It can be observed from the Table 3 that the maximum share of agricultural credit to total credit was 41.75 per cent in 2004/2005, while the minimum was 17.30 per cent in 2000 / 2001. During the period under consideration, the average share of agricultural credit in total credit disbursed by commercial banks was 22.64 per cent. Figure 1 clearly depicts that the contribution of agriculture and animal husbandry in total Net State Domestic Products (NSDP) of the state decreased, while the linear trend of disbursement of agricultural credit by

Figure 3 : Composition of Agricultural Credit By Commercial Banks in Haryana



commercial banks shows an incremental trend over the period. Box 1 expresses the possible impact of agricultural credit on the value of agriculture and allied activities domestic products of the State. It is clear from the regression equation[9] that agricultural credit, agricultural and allied activities domestic products are positively related. If

Table 5 : Comparative Performance of Different Groups of Banks In Agricultural Financing in Haryana

Years	State Bank of India and Its Associates		Public Sector Banks		Private Sector Banks	
	Credit Limit	Credit Outstanding	Credit Limit	Credit Outstanding	Credit Limit	Credit Outstanding
2001	69066 (100)	54862 (79.43)	120275 (100)	103136 (85.75)	321 (100)	242 (75.38)
2002	114993 (100)	94681 (82.33)	167103 (100)	142578 (85.32)	2266 (100)	822 (36.27)
2003	103634 (100)	88328 (85.23)	192491 (100)	181160 (94.11)	2674 (100)	2065 (77.27)
2004	125307 (100)	107525 (85.80)	267541 (100)	228924 (85.56)	7914 (100)	6155 (77.77)
2005	149453 (100)	125671 (84.08)	337249 (100)	291093 (86.31)	5998 (100)	4632 (77.22)
2006	197616 (100)	166225 (84.11)	533661 (100)	450465 (84.41)	18964 (100)	18142 (95.66)
2007	278614 (100)	229721 (82.45)	750315 (100)	583385 (77.77)	87792 (100)	70139 (79.89)
2008	237873 (100)	204446 (85.94)	738838 (100)	677625 (91.71)	92843 (100)	79256 (85.36)
2009	339723 (100)	279345 (82.22)	815040 (100)	696851 (85.49)	97141 (100)	92272 (94.98)

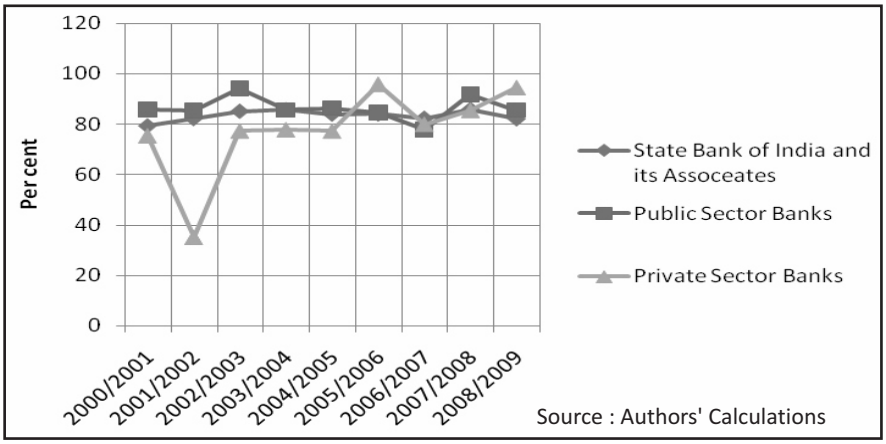
Source: Basic Statistical Return of Scheduled Commercial Banks in India (RBI)-Various Issues

Table 6 : Descriptive Statistics of Comparative Performance of Different Groups of Banks In Agricultural Credit in Haryana

Years	State Bank of India and Its Associates	Public Sector Banks	Private Sector Banks
Average	83.51	86.27	77.75
Minimum	79.43	77.77	36.27
Maximum	85.94	94.11	95.66
C.V.	2.52	5.32	22.30

Source: Authors' Calculations

Figure 4 : Bank Group Wise Achievement In Disbursement of Agricultural Credit Limit



Source : Authors' Calculations

[9] Both variables are used in the natural logarithm form for econometric estimation. Because on theoretical and empirical grounds, the log linear form is superior to the linear form. A log-linear form is more likely to find evidence of a restraint than the linear form. So, the transformed natural log form of the model is i.e., $\mathbf{Log\,AGDP = a + a_1 log\,(AGCREDIT) + e}$

Table 7 : Performance Score of Agricultural Financing By Different Types of Bank Groups In Haryana							
Years	State Bank of India and its Associates		Public Sector Banks		Private Sector Banks		Total Rank
	Ratio [11]	Rank [12]	Ratio	Rank	Ratio	Rank	(Row Total)
2001	79.43	2	85.75	3	75.38	1	6
2002	82.33	2	85.32	3	35.27	1	6
2003	85.23	2	94.11	3	77.27	1	6
2004	85.80	3	85.56	2	77.77	1	6
2005	84.08	2	86.31	3	77.22	1	6
2006	84.11	1	84.41	2	95.66	3	6
2007	82.45	3	77.71	1	79.89	2	6
2008	85.94	2	91.71	3	85.36	1	6
2009	82.22	1	85.49	2	94.38	3	6
Total Rank (Column Total)		**18**		**22**		**14**	**54**
Source: Authors' Calculations							

agricultural credit by commercial banks went up by a rupee on an average, agricultural and allied activities domestic products increased by about 33 paise. The R-square value of about .820 means that 82 per cent of the variation in agriculture and allied activities domestic products is explained by agricultural credit by commercial banks. Therefore, the Government of Haryana should boost the disbursement of agricultural credit for enhancing the contribution of agriculture and allied activities in the total State Domestic Product (SDP), as well strengthen the agricultural development in general and animal husbandry in particular in the State. Figure 3 depicts the composition of agricultural credit [10] in Haryana by Commercial Banks from 2000/2001 to 2008/ 09. The direct agricultural credit disbursement increased from ₹ 147607 lakh in 2000/2001 to ₹ 832442 lakh in 2008/2009, while the proportion of direct agricultural credit as a percent to total agricultural credit decreased from 93.28 per cent in 2000/ 2001 to 77.90 per cent in 2008/09. The indirect credit by commercial banks also increased from ₹ 10633 lakh to ₹ 236026 lakh and its proportion in total agricultural credit increased from 6.72 per cent to 22.10 per cent during the period under consideration.

Table 5 and 6 shows the agricultural credit limit and agricultural credit outstanding bank group wise from 2000 - 2001 to 2008 - 2009. It is observed from the Tables that during the period under study, all types of bank groups failed to achieve 100 per cent distribution of agricultural limit. The State Bank of India and its associate public sector banks and private sector bank groups distributed agricultural credit limit on an average 83.51 per cent, 86.27 per cent and 77.75 per cent respectively, while consistency (coefficient of covariance) of allocation of agricultural credit limit was 2.52 per cent, 5.32 per cent and 22.30 per cent respectively during the period under study. The Tables also highlight the maximum agricultural credit limit distributed by the private sector bank group (95.66 per cent) in 2006, and minimum agricultural credit limit distributed by the private sector bank group (36.27 per cent) in 2002.

In order to test the hypothesis, 'F' value is calculated on the basis of performance score as shown in the Table 4.

$$F = 12/nk(k+1) = \sum Rj^2 - 3n(k+1)$$

$$F = 12/9*3(3+1)*[18^2 + 22^2 + 14^2] - 3*9(3+1)$$

$$= (12/108)*(324+484+196) - (108)$$

$$= \mathbf{2.44}$$

[10] Here, the researchers have used direct and indirect agricultural credit as a proxy of composition of agricultural credit. Indirect finance for agriculture by SCBs comprises of loans advanced for storage and market yards and for setting up of other agricultural allied activities. Unlike in the case of direct finance, which is issued directly to the borrower, in case of indirect finance, it is normally routed through some other agency/conduit/tier.

[11] Agriculture Credit Outstanding as per cent of agricultural credit limit by different types of banks groups.

[12] Rank is 3 for the Highest Ratio and Rank 1 is for the Lowest Ratio.

The calculated value of 'F' is less than the tabulated value of 'F', both at 5% and 1% levels of significance. Hence, the null hypothesis framed for this purpose of this study is accepted. To conclude, we can say that there is no significant difference in the allocation of agricultural credit limit by all types of Commercial Banks in Haryana from 2000 / 2001 to 2008 / 2009.

CONCLUSION AND POLICY RECOMMENDATIONS

In this paper, the researchers have analyzed the contribution of agriculture and allied activities in NSDP of Haryana with the help of appropriate statistical techniques and it was found that agriculture and allied activities are the lifeline of the economy of Haryana because they contributed 22.42 per cent in NSDP in 2008- 2009 and further, 52 percent workers as percent to total workers were engaged in agriculture and allied activities in Haryana (Census of Haryana: 2001). So, sustainable development of agriculture is a prerequisite for the overall development of Haryana in general and rural Haryana, in particular. Credit plays a crucial role in agricultural development. Therefore, adequate, affordable and timely flow of institutional agricultural credit is a must for improving the socio- economic conditions of the farmers. The study indicates that the agricultural credit as per cent of NSDP and as per cent of agriculture & animal husbandry increased from 3.34 per cent and 7.60 per cent in 2000/2001 to 9.00 per cent and 44.00 per cent respectively in 2006/07 and in later years, both ratios showed a decreasing trend and stood at 7.60 per cent and 33.92 per cent in 2008/09. During the period under study, the ACGR of agricultural credit, NSDP as well agriculture & animal husbandry domestic product of Haryana had been 23.64 per cent, 12.84 per cent and 7.92 per cent respectively. The proportion of direct agricultural credit as per cent to total agricultural credit decreased, while the ratio of indirect credit as per cent to total agricultural credit increased from 6.72 per cent to 22.10 per cent during the period under consideration and lastly, Friedman's test indicates that there is no significant difference among all three types of bank groups in distribution of 100 per cent agricultural credit limit as an agriculture loan and further, the study also shows that all types of bank groups failed in the distribution of 100 per cent agricultural credit limit in the State from 2000/2001 to 2008/2009.

High cost and NPAs are the main barriers between setting of credit allocation target and achievements. So, banks should implement low-cost financial products through the generalized use of electronic payment methods, which would enable financial institutions to improve their efficiency ratios, facilitate the use of low-cost distribution channels, and enable application of credit risk monitoring system that decreases the default rate (Chhikara and Kodan: 2011). To conclude, we can say that proper agricultural credit is not only necessary for agricultural development; it is also important for rural development as well as women empowerment [13] as 71.48 per cent women are engaged in agriculture and agricultural allied activities in rural Haryana (Census of India: 2001).

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[13] Women empowerment is the ability to make choices (Kabeer, 1999), the ability as one chooses to live and power to achieve chosen results (Sen, 1985), women must be able to decide first for her what she wants to do with her body, her mind and her heart (Sann et al., 2007), and moreover, women empowerment is a process of awareness and capacity building leading to greater participation, to greater decision-making power and control and to transformative action taken by women in domestic, social and economic activities (Karl,1995). The empowerment of a person in general, and women, in particular, is the ability to participate in social and economic activities/decision making process of his/her own and household well being with regards to choice, preference, livelihoods, and overall welfare that acknowledges human values of freedom of choice in decision-making and human rights (United Nation, 2005).

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