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Research Article

INVESTIGATION OF RURAL MIGRATION PATTERNS AS AN EFFECTIVE STEP TO IMPROVE RURAL DEVELOPMENT: THE CASE STUDY OF DARAB

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ABSTRACT
Urban centers act as focal points that transfer development to rural areas. The rate of this transfer has dramatically increased in recent years. One way to increase villagers' incomes is to increase off-farm jobs that – if achieved appropriately- can prevent excessive migration. This paper investigates various factors that affect off-farm income. First, various factors affecting income from farming and its divisions are discussed and then migration functions are estimated. Taking into account the rate of parameters related to rural planning, strategies are presented to prevent villagers' migration. In the final analysis, after collection and extraction of statistical parameters and the required data through questionnaires, OLS method was used to estimates linear and logarithmic forms and the results were processed in related statistical software. The results showed that increasing cooperation between villagers and government can act as an effective step to stop or slow down their migration.
Key Words: migration patterns, migration, rural development, Darab

INTRODUCTION
Today, urban centers act as focal points that transfer development to rural areas. This has tremendously increased the level of interactions between urban and rural areas in recent years. Development of communications and especially satisfaction of the needs (social, cultural, economic, etc.) of villagers have drastically changed the characteristics of rural areas. In this process, temporary and permanent migrations have had a major impact on making rural and urban areas close together in terms of their characteristics. Nowadays, innovations in small towns easily penetrate neighboring rural areas as a result of ease of migration for various reasons. These effects are more dramatic in villages that are closer to the developed centers.
Interactions and mutual relations between urban and rural settlements are manifested mostly in form of migration and exchange of goods, capital, opinions, information and innovation. This is a spatial-geographic phenomenon and recognizing, determining and discovering general rules governing it in the framework of mutual relations between human and the environment is of particular practical importance (Rezvani, 2002). Migration and population displacement are important due to different outcomes they leave in the areas of origin and destination. Therefore, lack of proper predictions about population in each region have led to failure of social, economic and cultural planning (Taherkhani, 2001).
One major problem of Iranian society is that of mass migration of villagers to large cities. In other words, employment restrictions in rural areas on the one hand, and development of services and facilities in urban areas on the other have increased migration (Pour Ahmad, 2002). On the one hand, this phenomenon has deprived the villages of efficient competition, reduced agricultural production and increased the country's dependence on food imports. On the other hand, it has increased unemployment and the number of people who live in cities in marginal conditions leading to economic and social problems (Lhsaei Zadeh, 1996). One of the most fundamental problems in Iranian agriculture is that of low average farm income which is about a quarter of off-farm income leading to migration from rural areas to urban areas. This is a kind of economic and social injustice that villagers who produce food for urban people are starving themselves (Tavalaee, 1996). Rural sociologists say that poverty in these areas is the cause of poor agricultural production not its result. Therefore, other agricultural purposes have a

relatively small share of the national income. The result of this difference between conditions of rural and urban areas, is deprivation of villages of manpower (Klavel, 1997).

Geographical characteristics of the study area

Darab is a city in and the capital of Darab County, Fars Province, Iran located at 28° 40′ N, 54° 30′ E in the South-Eastern part of Zagros in thesouthern water basin of these mountain ranges. It borders Fasa to the East, Hormozgan to the West Neiriz to the north and Dasht Zarrin to the south (Shakoor, 2000). This city has an area of 6540 square kilometers, 3 districts, 3 urban points, 12 villages and 254 villages with rural population. Darab is the center of the Darab county and is located at a distance of 230 kilometers South East of Shiraz. According to the 2011 census, the city had a population of 249,556. The climate is hot and dry to semi-dry. An average rainfall of 250 mm has been reported for Darab (Shakoor, 2001).

MATERIALS AND METHODS

In this study, the functions of farm income resulting from off-farm jobs and migration functions of multivariate regression type have been estimated using ordinary least squares method and cross-section data. The required data about the area under study were collected through administration of a questionnaire to villagers visited in their settlements. The sample was chosen from 10 villages in three districts of the county. The study unit is rural household. Using stratified random sampling, sample size was determined using Cochran formula. A total of 255 rural households in the sample villages and 140 migrated rural families were investigated to estimate income functions and to estimate the migration functions respectively. The questionnaires were administered to collect data. To test the significance of the coefficients, t-test was used and to check correlations, Durbin-Watson test was used. In the stratified sampling, villages were classified into five categories: 1) villages with high migration rate in the last 10 years which are getting evacuated; 2) villages with lower migration rate compared to the first class in the last 10 years; 3) villages where 60 percent of farmers’ income is from farm jobs; 4) villages where 50 percent of farmers’ income is from farm jobs and 5) villages where the income is from animal breeding and farm jobs.

In the present study, the adjusted lin-log model is used to estimate income functions of off-farm jobs, agriculture, animal husbandry and consolidated income from agriculture and animal husbandry a the migration functions in the forms of net migration and migration rate. The model used for off-farm job was utilized by Sumner (1966) in the US, Hans (1971), Larson and Yebres (1994) in Cyprus (see Larson and Yebres, 1994). Also research in this area has been carried out in Japan, Indonesia, Thailand, and Nigeria with changes in independent factors which have achieved similar results.

1 - Models used to estimate off-farm income (after elimination of insignificant variables) using adjusted linear model.

1-1 – The model used when the independent variable of daily off-farm income (X1) is included:

1-Y1=B0+B1X+B2X2+B3X4+B4X14+B5X15+B6X16+B7X17+B8X18+Ei

Y2 to Y13 are omitted variables.

1-2 - The model used when the independent variable of daily off-farm income (X1) is omitted.

2-Y=B0+B1X5+B2X12+B3X13+B4X14+B5X15+B6X16+B7X17+B8X18+B9+Y2+B10Y4+Ei

Variables X1, Y3 and X6, X4 and X11 have been eliminated.

2 - Models used to estimate functions of agriculture and animal husbandry income (after elimination of insignificant variables) using the adjusted linear model.

2-1- The model used when the independent variable off-farm income (X2) is included in the model.

3 - The models used to estimate the functions (after elimination of insignificant variables) by the adjusted logarithmic model.

3-1- The model used to estimate off-farm income functions when the independent variable of farm income (X1) is included in the model.

1-LNY1=LNB0+B1LNX1+B2LNX2+B3LNX4+B4LNX5+B6X14+B7X15+B8X18+Ei

3-2- The model used to estimate functions of off-farm income when the independent variables of YX, Y3, X4, X3 have been omitted from the model.

2-LNY1=LNB0+BLNX1+B2LNX5+B3X11+B4LNX12+B5X14+B6X15+B7X16+B8X17+Ei
Definition of variables in the income models are as follows.
- Y1: Total annual off-farm income (Rls.)
- Y2: Total annual farm income (Rls.)
- Y3: Total annual animal husbandry income (Rls.)
- Y4: Total annual income from agriculture and animal husbandry (Rls.)
- X1: The daily off-farm wages of each member of the household (Rls.)
- Variables are obtained by dividing total off-farm income by the number of days working.
- X2: Farm daily wage of each member of the household (Rls.)
- X3: Animal husbandry daily wage of each member of the household (Rls.)
- X4: Animal husbandry and farming daily wage of each member of the household (Rls.)
- X5: The size of the household's farming land (in hectares)
- X6: The subjects' age
- X7: Family literacy. Family literacy is obtained by dividing the number of literate household members (reading and writing) by the number of active household members.
- X8: Family literacy rate

This variable is obtained by dividing the number of literate household members by the total number of household members.
- X9: Women's off-farm income (Rls.)
- X10: Women's farm income (Rls.)
- X11: Driving jobs

This variable is represented as virtual variables by zero and one.
- X12: The amount of the bank deposit (Rls.).
- X13: Migration status of the household.

These two variables are represented as dummy variables by zero and one.
- X14: Worker (dummy variable)
- X15: Employee (dummy variable)
- X16: Business (dummy variable)
- X17: Gardening
- X18: Other jobs (dummy variable)
- B0: Unknown constants
- B1, B2,…, Bn: Unknown coefficients of independent variables
- Ei: Residual.

It is noted that X13, ., X18, X11 are considered a dummy variable in the model.
To estimate the migration functions, the dependent variable of migration is included as two forms of migration rate and net migration rate in the model. Thus, 29 independent variables are considered and estimated in the model including 13 dummy variables.
The models used in the migration model in the present study include Adal (1981). Migration model and linear statistical models presented by Adal in Colombia, Jatan in Mexico, Sahota in Brazil and Shukla (1988) in Ghana. In their studies, their found similar results.
1 - Models used to estimate migration functions when the dependent variable is the rate of migration in the model.
1-1 - Models used to estimate household migration functions (after elimination of insignificant variables) using adjusted linear model.
1-M1=B0+B1Z4+B2Z16+B3Z22+B4Z23+B5Z25+B6Z26+B7Z28+Ei
1-2- Models used to estimate household migration functions (after elimination of insignificant variables) by adjusted logarithmic model.
2-LNm1=LNB+B1LNZ2+B2LNZ21+B3LNZ22+B4LNZ23+B5LNZ25+B6LNZ26+
B7LNZ27+B8LNZ28+B9Z15+Ei
Definitions of variables in migration models are as follows:

- M1: Emigration rate

This variable is obtained by dividing the number of active migrant members (15 to 60-year old) by the total number of active members in the household.

- Z1: The migrant's daily farm income in the village (Rls.)
- Z2: The migrant's daily off-farm income in the village (Rls.)
- Z3: The migrant's daily income in city (Rls.)
- Z4: Agricultural jobs in the village (this variable has been presented as dummy variable by zero and one)
- Z5: Gardening jobs in the village (this variable has been presented as dummy variable by zero and one).
- Z6: Worker jobs in the village (dummy variable)
- Z7: Driving jobs in the village (dummy variable)
- Z8: Employee jobs in the village (dummy variable)
- Z9: Business Jobs in the village (dummy variable)
- Z10: Other Jobs and unemployment (dummy variable)
- Z11: Driving jobs in the city (dummy variable)
- Z12: Worker jobs in the city (dummy variable)
- Z14: Business and shopkeeper jobs in the city (dummy variable)
- Z15: Other Jobs in the city (dummy variable)
- Z16: The size of the migrant's land in the village (in hectares under cultivation)
- Z17: family Age
- Z18: The migrant's literacy rate

This variable is obtained by dividing the number of literate migrants by the number of family members (15 to 60 years old).

- Z19: Education rate. This variable is obtained by dividing the number of literate active members of the household by the number of family members (15 to 60 years old).
- Z20: Marital status. This variable has been presented as dummy variable by zero (single) and one (married).
- Z21: Average amenities in the village
- Z22: Active household population
- Z23: Distance between the village and the nearest town or city (km)
- Z24: Percent employed in agriculture
- Z25: Percent employed in animal husbandry
- Z28: Proportion of households employed in agriculture and in off-farm jobs
- Z29: Unemployment in the village (dummy variable)
- Z30: Net migration
- Z31: Cultivated land

This variable is obtained by dividing cultivated land by the number of active household members (15 to 60 years old).

B0: Unknown constant

B1, B2, … , Bn: Unknown constants for independent variables.

Ei: Residual

It is noted that Z29, Z20, Z4, ., Z15 are included in the model as dummy variables.

Table 1: Details of sample villages

	Village	District	Village-city distance (km)	Number of households in the village	Village population	Number of migrant households	Cultivated land	Z24: Percent employed in agriculture	Z25: Percent employed in animal husbandry	Z26:Percent employed in off-farm jobs	Z27: Percent employed in agriculture and animal husbandry	Z27: Percent employed in agriculture and off-farm jobs
1	Banooj	Central	14	407	2300	30	380	12	7	40	8	33
2	Jamsi	Central	5	350	2125	47	400	30	4	50	10	6
3	Soltan Abad	Central	30	508	3220	-	500	19	6	35	20	19
4	Marian	Central	12	200	1550	22	320	17	8	22	15	38
5	Khoroosloo	Central	7	170	935	30	200	30	16	29	8	7
6	Hasan Abad	Central	35	370	2259	17	780	35	10	25	5	15
7	Akbar Abad	Central	5	200	1632	50	250	27	17	20	18	18
8	Rastagh	Rastagh	65	758	6935	70	800	23	6	26	20	25
9	Nasir Abad	Forg	83	150	837	123	600	45	12	25	12	4
10	Navayegan	Rastagh	60	173	1035	78	75	33	27	13	12	15
11	Doborji	Forg	80	256	2023	122	130	39	6	19	15	20
12	Ghalebayan	Rastagh	50	321	1987	22	170	29	13	30	10	17
13	Marz	Forg	90	470	3125	70	850	29	5	25	15	16
14	Shahabi	Rastagh	67	203	1509	25	125	35	10	17	3	35
15	Abshoor	Forg	95	553	2990	115	753	37	15	20	10	17

Source: Management and Planning Organization of Fars (2011)

Table 2: Multivariate regression analysis results for off-farm income using model 1-1- Adjusted linear model

Y1=B0+B1X1+B2X2+B3X4+B4X14+B5X15+B6X16+B7X17+B8X18+EI

	B0	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**B8**
	2292066.52	300.27	-25.31	0.12	-2687297.5	2446324.12-	2041979.67	2781687.16	-2660890.62
SEB	554373.05	14.87	11.41	0.039	579495.24	708882	625955.1	657090.56	586880.5
T	4.135	20.186	-2.218	3.079	-4.637	-3.451	3.262	4.233	-4.534
Sig t	000	000	0.02	0.0028	000	0.0007	0.0013	000	000
		R2 = 0.92		R-2 = 0.85		F=126.42	SIGNIF	F=0.0000	

Source: Authors

In this model, after stepwise removal of insignificant variables, the final form of functions with 8 variables of X1, X2, X4, X14, X15, X16, X17, X18 are obtained. Investigation of the above functions shows that these 8 variables explain about 92% of the variation in off-farm income. All variables are statistically accepted at significant level less than 5 percent. Also the significance of all variables are as expected. This can be observed for the off-farm income as Darab is the second largest citrus producer in Fars Province. The model used when the independent variable of daily off-farm income (X1) is omitted.
The off-farm income had a positive impact on farm income as expected. It can be said that the higher the farm income, the lower the farmers' interest in off-farm jobs, because they spend more energy on the farm (Table 3).

Table 3: Multivariate regression analysis results for farm income using model 1-2- Adjusted linear model

Y2=B0+B1X2+B2X3+B3X5+B4Y1+B5Y3+B6Y4+EI

	B0	B1	B2	B3	B4	B5	B6
	44373.82	49.96	-123.94	-3236.35	0.033	-0.134	0.98
SEB	76543.93	7.35	14.89	4497.53	0.028	0.026	0.030
T	0.656	7.393	-8.203	-3.633	1.681	-6.218	54.856
Sig t	0.7724	000	000	0.0093	0.0944	000	000
	R2=0.98		R -2=0.98	F=1457.88		0.0000=FSIGNIF	

Source: Authors

Table 4. Multivariate regression analysis results for animal husbandry income using model 2-2- Adjusted linear model

$Y3=B0+B_1X_2+B_2X_9+B_3Y_2+B_4Y_4+E_I$

	B0	B1	B2	B3	B4
	21985.53	93.27	-3.21	-1.324	0.395
SEB	191224.20	17.3	2.23	-0.214	0.227
T	0.118	7.23	-2.023	-7.213	6.9
Sig t	0.8086	000	0.043	000	000
	R2=0.6 F=0.0000	R-2=0.39	F =25.47	SIGNIF	

Source: Authors

Comparing the results of the two models 2 and 3 and 3-1 shows that by eliminating variables Y3, Y4, X3 and X4, the impact of other variables on off-farm income has increased so that the coefficients of the job variables are all positive and expected. Driving jobs had the highest and worker jobs had the lowest impact on off-farm income. In the linear models (1-1 and 1-2), the above variables have a negative impact on the dependent variable Y1. Variable X5 has a negative coefficient as expected and X12 has a negative coefficient. This suggests that for every one percent increase in the area under cultivation and amount of saving, off-farm income decreases 0.14 and 0.96 percent respectively. Table 6 shows multivariate regression analysis results for off-farm income using model 3-2- Adjusted linear model:

Table 5: Multivariate regression analysis results for farm and animal husbandry income using model 3-1- Adjusted linear model

LNY1=LNB0+B1NX1+B2LNX2+B3LNX4+B4LNX5+B5LNX7+B6X14+B7X15+B8X18+EI

	B0	B1	B2	B3	B4	B5	B6	B7	B8
	2.94	2.358	2.358	0.122	0.144	-0.128	0.308	-0.846	-1.907
SEB	0.451	0.034	0.034	0.063	0.060	35%	0.080	0.508	0.310
T	6.067	34.408	34.408	1.934	-2.623	-1.252	-2.340	-3.07	-5.120
Sig t	000	0.0127	0.0127	0.546	0.0032	0.0128	0.0113	0.0499	000
		R2=0.094	R-2=0.97		F =413.43	SIGNIF	0.0000=F	BW =1.985	

Source: Authors

Table 6: Multivariate regression analysis results for off-farm income using model 3-2- Adjusted linear model

$LNY_1=LNB_0+B_1NX_1+B_2NX_2+B_3X_{11}+B_4LNX_{12}+B_5X_{14}+B_6X_{15}+B_7X_{16}+B_8X_{17}+E_I$

	B0	B1	B2	B3	B4	B5	B6	B7	B8
	0.828	1.112	0.141	5.854	0.96	2.845	3.539	4.738	2.988
SEB	0.375	0.085	0.055	2.076	0.055	0.763	0.937	0.883	0.937
T	2.617	14.163	-2.324	6.052	-1.749	3.835	3.775	4.234	3.715
Sig t	0.0114	000	0.0129	000	0.851	0.0003	0.0003	0.0001	0.0003
		R 2=0.97	R- 2=0.93		F =113.19	SIGNIF	F= 0.0000	BW =1.982	

Source: Authors

RESULTS AND DISCUSSION

A requirement for development of less developed countries is that changes should occur in the rural economy, especially in agriculture, so that a series of economic, social and cultural relations change and encourage people to stand on their own feet. Therefore, agriculture underpins overall economic growth and has a pioneering role. However, this does not mean that economic growth is confined to increase in agricultural production and the related expertise. It means that gradual increase in agricultural production can change a traditional economy with old foundations to a new economy with complex fundamentals. The development of agriculture is not a goal, but through economic growth can stimulate the emergence of activities that guide rural development in the region. In line with this policy, increasing income by expanding job opportunities can be effectively used to prevent mass migrations from rural areas to urban areas. There can be jobs in the villagers' place of residence and not necessarily in the farms. Therefore creating necessary motivation to work in non-farm jobs, increases income and helps to stop migration.

In this study, estimates of income functions were obtained by linear logarithmic equations. In this regard, the equation for animal husbandry income was considered as worst-case, it was not estimated in the logarithmic form (Model No. 2-2).

According to the estimates obtained, in all off-farm income equations, daily off-farm wage (X1) is the most influential variable. This is not unexpected given the close relationship between daily wage and income. The related coefficient was 300.27 in the linear method and 1.114 and 1.358 with positive signs in the logarithmic method.

According to the results, the sensitivity of off-farm income to changes in jobs was high. This sensitivity was higher for driving jobs (truck and trailer), gardening, business and shopkeeper and employee jobs. The sensitivity was about 6.509 and 9.739 for driving; 3.481 and 10.989 for gardening, and 3.738 and 10.095 for business and shopkeeper. Therefore, off-farm jobs in villages of Darab generate more income than other jobs. This is expected especially about gardening and driving in this area. That is because the county has the second rank in citrus production and produces crops such as wheat, corn, cotton and vegetable, the positive impact of such jobs on off-farm income is expected.

We expected the positive effects of women's off-farm income on total income. However, as seen, this variable was omitted in all equations as an insignificant variable. This can be attributed to the fact that they were mostly housewives. The savings, which is considered as one of the off-farm income categories showed unexpected negative effects and had coefficients between 0.96 and 1.75 with negative signs. The family immigration status suggests that with an increase in migration, the off-farm income is reduced. This was also against our expectations.

In all equations estimated for off-farm jobs, cultivated land had a negative impact on off-farm income so that the sensitivity of income to changes in cultivated area was about 0.14 and 0.208. In fact, this result is against expectations, because with an increase in cultivated land, farmers have to spend more time on the farms and have no time for off-farm jobs. This results in a decrease in income. The findings of this study show that with an increase in age, the off-farm income increases. In addition, the sensitivity to changes in family literacy rate (proportion of literate household members to active members) was 0.208. Given its negative sign, it can be concluded that the increase of literacy decreases off-farm income. It can be concluded that with an increase in literacy, migration and as a result off-farm income in the rural areas increases.

According to the findings, off-farm income had a positive impact on farm income with a sensitivity of 0.978. That is, for every one percent increase in off-farm income, the farm income experiences an increase of 0.978 %. The good coefficient of this variable can be an effective lever for government agencies in the area of decreasing migrations. On the other hand, though savings had a negative impact on off-farm income which was against expectations, it has a positive impact in the farm income model with a coefficient of 0.137. It can be explained by the fact that farmers use their savings in order to increase farm income. The results of investigations about the estimated models of off-farm income show that coefficient of determination R2 in the selected models was about 76 to 92 percent in the linear and 88 to 97 percent in the logarithmic form. Also, coefficient of determination R2 in the selected models of farm income and farm and animal husbandry income was about 98 to 99 percent in the linear and 92 to 99 percent in the logarithmic form. The coefficients of all the variables were at levels less than 10 percent. The coefficients of all variables at levels less than 10% and F statistic at the 1% level are significant.

Signs of coefficients of most variables in the migration rate linear model are contrary to expectations. Thus, the coefficients for the size of the migrant's land in the village (Z16), the village-city distance (Z23) and the percent of working households in the village (Z25) were positive 3.370, positive 2.197 and positive 0.25 respectively. These are all contrary to expectations because land shortage is usually considered as one of the factors contributing to increased migration. Moreover, in the same model, farm jobs are seen as a positive factor in migration which is contrary to expectation. This study shows that in the migration model in logarithmic form, the sensitivity of migration rate to changes in off-farm income is -9.429. The negative impact of this variable on migration is as expected and has the highest coefficient relative to other variables. In contrast to the linear form, the coefficient of village-city distance is 0.258 which is as expected. The study showed that for every one percent increase in the percentage of household members employed in off-farm jobs the migration rate decreased by 0.258 percent. Thus off-farm jobs reduced migration rate. The estimated net migration model in logarithmic form and its sensitivity to changes in land size is approximately 0.024 with a negative sign as expected. In other words, increasing the area of cultivated land in the village reduced the incentive to migrate. Net migration sensitivity to changes in household age was 1.067 to 1.107 with negative signs. The village-city distance had a coefficient ranging from 0.056 to 0.095 with a negative sign as expected.

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