Rural to urban migration and crop productivity: evidence from Pakistani Punjab

Köyden kente göç ve ürün verimliliği: Pakistan Pencap örneği

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ABSTRACT

Push and pull factors are involved in decision making process of rural-urban migration. In addition to increasing burden on urban resources, rural migrants also cause decrease in agricultural productivity. The present study was designed to determine the effect of rural-urban migration on crop productivity. Cross-sectional data were collected from the Southern Punjab. Cobb Douglas production function was used to determine the impact of migration on crop productivity. Cotton productivity was adversely affected by rural-urban migration while the wheat productivity was positively related with rural-urban migration.

ÖZET

Köyden kente göçün karar verme sürecinde itme ve çekme faktörleri etkilidir. Kentsel kaynaklarda genel giderlerin artmasına ek olarak, kırsal göçmenler tarımsal verimliliğin azalmasına neden olmaktadır. Bu çalışma köyden kente göçün ürün verimliliğindeki etkilerini saptamak amacıyla hazırlanmıştır. Kuzey Pencap'tan kesit veriler toplanmıştır. Göçün ürün verimliliği üzerine etkilerini belirlemek için Cobb-Douglas üretim fonksiyonu kullanılmıştır. Buğday verimliliği köyden kente göçten olumlu olarak etkilenirken pamuk verimliliği köyden kente göçten olumsuz etkilenmiştir

1. Introduction

Like other developing countries, Pakistan is facing rising population growth rate with increasing rural-urban migration. Population growth rate of Pakistan is 1.6% and cities are growing at 3.1% indicating that rural to urban migration is 1.5% (The World Fact Book 2011). With the passage of time, share of rural-urban migration has increased as compared to urban-urban migration in the internal migration (Hamid 2010).

The decision of migration of any individual involves many 'push factors' which force migrant out of rural areas and 'pull factors' which attract migrants to urban centers. The earlier studies by Todaro (1969). Harris and Todaro (1970) explaining rural-urban migration show that expected wage differential is the main cause of rural-urban migration. It implies that people will continue migrating from rural to urban centers until the wages in the rural areas become equal to those in urban areas. Many studies have examined factors affecting rural to urban migration and revealed that the economic consideration was the primary motivation factor (Baril et al. 1986; Muhamud et al. 2010; Ikramullah et al. 2011). Other studies indicated that economic push factors (lack of credit, small landholding and rural poverty) were important while others showed high wage rate at urban centers, being the more crucial factor. Other factors include lack better of social services, better education and health facilities and entertainment at urban centers, marriage and joining family at the urban centers (Ullah 2004; Hamid 2010; Gimba and Kumshe 2011).

As economies continue to develop, the percentage of the people engaged in the agriculture sector declines. In general, a

1% increase in GDP leads to decrease of a .052 in the percentage of people employed in agriculture (McCatty 2004). Agriculture sector is also fragile from the view point of weather dependent and price stability. Farmer's welfare will be consequently affected if there is decline in the price of their crops. More farming industry just offers seasonal employment, so it does not provide suitable income to sustain the family household for an entire year.

Despite migration, farming is still the mainstay in rural areas. Among rural households, family members with higher opportunity cost tend to migrate and the old, uneducated households live behind to manage farm operations resulting in labor shortage in the rural areas (Paris et al. 2009; Ohajianya 2005). The productivity of the old labor also affects agriculture productivity. However, income received from migrants can have positive impact on crop production and the net impact on crop productivity is negative (Rozelle et al. 1999).Migration has positive impact on non-agricultural income and negative impact on agriculture income. The non-migrant households earn higher agricultural income compared to migrant households (Zahonogo 2011), as migration positively affects non-agriculture income and negatively affects agriculture income. Moreover, remittances can facilitate farmers in on-farm investment, credit problems which have impeded famers in buying fertilizer and other key inputs. Although there have been a significant work on migration and impacts of migration on development, little attention is paid to the rural-urban migration and its impacts on agriculture productivity. The present study provides an insight by estimating the impacts of rural-urban migration on agriculture productivity. Cotton as an export commodity and wheat as a staple food are important contributors in Pakistan's agrarian economy, so the impact of migration on these crops will be considered.

2. Data and Sources of Data

The study was conducted in the Punjab province of Pakistan, being the largest province in terms of population among all four provinces. Major part of population of the Southern Punjab lives in rural areas and their livelihood depends on agriculture and agriculture related activities. From this part of the province, district Muzaffargarh, being the important on the basis of wheat and cotton production was selected. Muzaffargarh district is also among the districts where migration of people occurs many times due to natural disasters, mainly flood and sometimes for search of job. A total of 120 respondents were interviewed from two tehsils (Administrative area) of district. From each tehsil (Administrative area) 5 villages were selected randomly, 10-13 farmers were selected from each village randomly. A well-defined and pre-tested questionnaire was used. Individual with more than three month away from the native village was considered as a migrant (Paris et al. 2009). The study also included a comparison group of non-migrant households.

3. Empirical Methods

Cobb Douglas Production function was used to estimate the impacts of migration on yield of both cotton and wheat crop. This functional form was used because of the ease of estimation and interpretation of the results. Other main factor is that due to less number of observations, Cobb Douglas type production function is the most appropriate production function compared to other functional forms (translog, quadratic, etc.) to save

degree of freedom. Log linear form of Cobb Douglas production function for cotton crop is as follows;

$$LnY = ß_0 + ß_1Lnx_1 + ß_2Lnx_2 + ß_3Lnx_3 + ß_4Lnx_4 + ß_5Lnx_5 + ß_6Lnx_6 + ß_7Lnx_7 + ß_8Lnx_8 + ß_9x_9 + \varepsilon \qquad \text{(equation 3.1)}$$

Similarly, log linear form of production function for wheat crop used in the present study is as follows

$$LnY = ß_0 + ß_1Lnx_1 + ß_2Lnx_2 + ß_3Lnx_3 + ß_4Lnx_4 + ß_5x_5 + ß_6x_6 + \varepsilon \qquad \text{(equation 3.2)}$$

Dependent variable in both crops is yield per acre. Detail description of variables including dependent and independent variables is given in Table 1.

Table 1. Variablesused in Cobb-Douglas Production Function with standard Errors and means.

Name of Variables	Cotton		Wheat	
	Mean	S.E	Mean	S.E
log of seed (Kg/acre)	4.208	3.592	60.008	16.176
log of fertilizer NPK(kg/acre)	53.841	50.111	93.383	36.703
log of number of irrigation	1.600	3.452	4.725	1.365
log of number of sprays	1.310	2.998	N/A	N/A
log of labor hours used in crop production	22.364	48.831	80.073	22.508
dummy for migration (0=No, 1=Yes)	0.241	0.429	0.241	0.429
dummy variable for area owned (Acres)	N/A	N/A	4.866	5.815

4. Results and Discussion

Table 2 represents the econometric results. We run multiple regression for cotton and wheat separately. Seed is an important factor that influences the yield of cotton crop, so this variable has significant positive impact on cotton yield when taken alone, but its interaction term with migration is negative and significant. Negative sign for interaction term may be that due to availability of credit in the form of remittances causing overuse of seed than recommended level. With more number of plants in one acre the plants can't grow easily and due to less sunlight, process of photosynthesis is low, decreasing yield. For wheat crop, seed has a positive impact on wheat yield but this impact is not significant. Farmers may be using recommended amount of wheat seed. Fertilizer is also an important input which enhances the productivity. Fertilizer nutrients have a positive impact on crop yield (cotton and wheat). Goldsmith et al. (2004) also reported the similar results for fertilizer nutrients.

Table 2. Estimates of Production Function of Wheat& Cotton yield.

Variables	Cotton		Wheat	
	Coefficients/Standard Error	t-values	Coefficients/Standard Error	t-values
Constant	1.08/0.77	1.39	2.68/0.92	0.005
Ln NPK	0.37***/0.22	1.68	0.18/0.13	1.41
Ln Irrigation	0.16/0.11	-1.37	0.08/0.08	1.06
Ln Pesticides	-0.17/0.12	1.38	-0.19**/0.09	-2.01
Ln Labor	-0.18**/0.08	-2.28	n/a	n/a
Migration (yes/no)	0.30***/0.17	1.80	0.01/0.12	0.08
Ln Seed_migration	-0.46***/0.27	-1.67	1.09***/0.61	1.79
Ln NPK_migration	-0.0000849***/0.000049	-1.73	n/a	n/a
Ln Pesticides_migration	-0.000092/0.001	-0.06	n/a	n/a
Area owned	0.04***/0.02	1.71	n/a	n/a
R²	n/a	n/a	0.09**/0.05	2.03
	0.25		0.12	
F-value	2.82		3.53	

*** Significant at 10%, ** significant at 5%, * significant at 1%

Number of irrigation variable has negative coefficient for both crops. It is non-significant for cotton but having significantly and negative impact on productivity of wheat. The negative effect may be the result of waterlogged soils in the study area. Pesticides interaction term with migration has significant positive impact on yield of cotton.

Cotton production involves labor intensive practices whereas wheat is less labor intensive crop. Coefficient of labor variable has significant and positive impact on cotton yield. It indicates that one percent increase in the use of labor increases the cotton yield by 0.30 percent. Although statistically non-significant, coefficient of labor is found having positive impact on wheat productivity. Results are consistent with previous study which shows that additional workers do no significantly impact on aggregate output (Goldsmith et al. 2004). Migration variable has a significant negative impact on yield of cotton. Results support the findings of Rozelle et al. (1999). While in case of wheat as being less labor intensive, migration do not have any negative impact rather it has positive impact, as remittances ease farmers in purchasing inputs timely. Acreage of land owned plays a very important role in the yield of a crop. Area owned has a positive impact on yield of wheat, and this impact is statistically significant. Rozelle et al. (1999) and Mullan et al. (2011) also found the similar results.

5. Conclusions

Individuals from rural settings move to urban areas in order to diversify the sources of earning, in addition to other factors, so many push and pull factors are involved in making decision relating to migration. Keeping these aspects in view, the present study was designed to determine the consequences of rural to urban migration on crop productivity. Production function was used separately for each crop. Results showed a negative relation between migration and cotton productivity. As cotton crop requires intensive use of work force from sowing to harvesting operations, availability of small number of work force due to migration adversely affects cotton productivity. Providing credit to the households, reforming the formal rural credit system along with encouraging informal credit institutions could increase households' production efficiency and this would reduce the pace of rural to urban migration. In addition to the adverse effect of migration on cotton productivity, it is also found that migration contributes in improving crop productivity through investing in seed, pesticide and other farm inputs. The reason lies in the fact that migrant households may be in the position to spend more on farm inputs as a result of income sent by the migrants. So the need is to channelize the income sent by the migrants in productive uses. This can be possible by strengthening the institutions in the rural areas.

References

Baril R, Goel G, Rulx-Leonal R (1986) Exodus as a strategy of survival: the case of rural Haiti. Environment Caraibe. No. 2:69-104.

Gimba Z, Kumshe MG (2011) Causes and effects of rural-urban migration in Borno State: A Case Study of Maiduguri Metropolis. As. J. of Business and Management Sci., 1: 168-172

Goldsmith P, Gunjal DK, Ndariskianye B (2004) Rural-urban migration and agricultural productivity: The Case of Senegal. Agri. Econ., 31:33-45.

Hamid S (2010) Rural to urban migration in Pakistan: The gender perspective. PIDE Working Paper No. 201056.

Harris J, Todaro M (1970) Migration, Unemployment, and Development: A Two-Sector Analysis. American Economic Review. 60:126-142.

Ikramullah, Shair G, Rehman N (2011) Economics and social dimension of rural-urban migration in Pakistan: Results from a recent survey in the North West Pakistan. Int. J. of Business and Social Sci., 2:119-126.

McCatty M (2004) The Process of Rural-Urban Migration in Developing Countries. Bachelor Thesis, Carleton University, Ottawa.

Muhamud M, Musadiq T, Said F (2010) Determinants of internal migration in Pakistan –lesson from existing pattern. Research report Centre for Research in Economics and Business, Lahore School of Economics, Pakistan.

Mullan K, Grosjean P, Kontoleon A (2011) Land tenure arrangements and rural–urban migration in China. World Dev. Rev., 39: 123–133.

Ohajianya DO (2005) Rural-urban migration and effects on agricultural labor supply in Imo state, Nigeria. Int. J. Agri. Rural Dev., 6: 111-118.

Paris TR, Luis J, Villanueva D, Rola-Rubzen MF, Chi TTN, Wongsanum C (2009) Labour out migration on rice farming households and gender roles: synthesis of findings in Thailand, the Philippines and Vietnam. Paper presented at the FAO-IFAD-ILO Workshop on Gaps, trends and current research in gender dimensions of agricultural and rural employment: differentiated pathways out of poverty Rome, Italy.

Rozelle S, Taylor JE, Debrauw A (1999) Migration, remittances, and agricultural productivity in China. The Am. Econ. Rev., 2: 287-291.

The World Fact Book (2011) CIA. https://www.cia.gov/library/publications/the-world-factbook/geos/pk.html

Todaro MP (1969) A Model of Labor Migration and Urban Unemployment in Less Developed Countries. American Economic Review. 69: 486-499.

Ullah AA (2004) Bright city lights and slums of Dhaka city: determinants of rural-urban migration in Bangladesh. J. Mig. Letters, 1: 26-41.

Zahonogo P (2011) Migration and agricultural production in Burkina Faso. African J. of Agri. Res., 7: 1844-1852.