Policy Brief 1
Smallholders' Productivity and Profitability in Pakistan: Evidence from Horticulture Survey

Motivation

Improvement in agricultural productivity and profitability has taken the centre-stage in discussions on food security and poverty alleviation in the developing countries like Pakistan (World Bank, 2008). Increased productivity ensures food security through greater utilization of resources in agriculture, as well as releasing productive inputs for use in other sectors of the economy (Shultz, 1953). From a policy point of view, the decision makers would like to know the factors impeding productivity growth and the degree of influence on profitability to better target interventions to achieve productivity growth and profit maximization objectives.

In informing possible interventions, it is important to explore whether productivity shortfall is the outcome of factors within the farm or outside the farm. For instance, if small farms are technically inefficient, that is the factor input combinations they use can be rearranged to achieve higher output levels with known technologies, then education and training programs (e.g., extension services) may be a desirable policy, compared to programs that encourage innovation and technological advancement. Access to explicit measures of farm productivity can help inform both public policy decisions on appropriate ways to facilitate productivity growth, as well as private individuals such as smallholder producers making better decisions on farm.

Moreover, the identification of characteristics of the production environment that affect the combination of agriculture inputs and outputs (such as market environment and knowledge about the use of technology) are important when identifying the sources of productivity and assessing whether agriculture sector payoffs can be increased through innovation or better access to input resources (e.g., fertilizers and credit facilities) or both.

Background

Agriculture is a key sector that has been identified as a priority area in the development plan of Pakistan to target pro-poor growth and achieve food security. The Pakistan Vision 2025 program and the Punjab Development Strategy Programme 2018 call for exploring various drivers of agricultural productivity to guide policy makers to formulate effective policies to deal with food insecurity and poverty issues.

This brief draws from a detailed analysis of horticulture sector productivity and its various sources that focussed on vegetables, mango and citrus sectors. The study used farm level survey data to estimate comprehensive measures of productivity, by decomposing the sources of productivity growth into those that affect resource allocation and profits. Hence the methodology was used to produce crop level estimates of profit and input costs and compare farm level returns for the selected crop enterprises.

Main Findings

- Farmers have experienced increased costs of inputs. These costs vary significantly across different activities as well as different agro-climatic zones. The increased cost

of inputs appears to have affected farm level profitability. A district level comparison shows that farmers in Kasur District experienced the highest cost per acre of harvesting, fertilizers and irrigation compared to other districts. Since farmers in the Kasur District mostly grow vegetables, viz., chillies, onion and potatoes, this may be one of the reasons behind the increased costs. In addition, farmers also use aggressive farming such as tunnel cultivation, which may have resulted in higher costs for some inputs.

- Based on our focus-group interviews, farmers are concerned over increased irrigation and fertilizer cost in recent years, which have eroded their profitability considerably. Our survey data also reveals that most of the farmers are either illiterate or have little education and thus lack the technical skills of input application (e.g., fertilizers). This, suggests the need for extension services to promote better use of the input resources.

- Vegetables and fruits are more profitable. Our crop-wise estimates of per acre profit show that vegetables are more profitable compared to fruits and cereals. Another important finding from a follow-up interview with one vegetable grower in Kasur reveals that about 6 percent of total revenue is paid as commission to dealers for the loan taken from them. This tends to significantly reduce the profitability.

- We also note that per acre yield of tomatoes, onions and peas differs significantly between Muzaffargarh and Kasur districts. Whether this is due to varying farming practices (e.g., aggressive farming) or other factors (such as output prices volatility) still needs to be explored. However, the insights from our qualitative survey data reveals that a large number of farmers express their concern about decreased prices of vegetables (e.g., potatoes).

- Farmers could produce same level of output by using 38 percent less input resources. Our productivity decomposition provides a detailed explanation of various drivers of farm level productivity. The estimates of technical efficiency based on the stochastic frontier analysis show that, on average, farmers could increase their production by 20 percent using the same input resources. Further, these differences are significant across agro-climatic zones. Farmers in Muzaffargarh district appear to be most technically efficient with an average score of 0.66, followed by Lahore district (0.63), Sargodha district (0.62) and Kasur district (0.61). The results also indicate that the growers of tomato, potato and onion in Kasur district out-perform growers from other agro-climatic zones.

  These technical inefficiency differentials across crops and agro-climatic zones are indicative of the varying farming practices. Our second stage analysis of production characteristics also shows that vegetable and fruit growers are more productive as compared to cereals and other crops. Moreover, these results show that education, access to extension services and access to credit facilities also improve farm-level productivity. Therefore, it may be stressed that farmers need training and education to enable them to optimally use inputs and technology to improve their productivity.

- Adjustment in scale and scope operations needs significant improvement to increase agriculture productivity. The decomposition of productivity into its various exhaustive measures such mix efficiency and scale efficiency was meant to provide further policy insights to identify areas that can help enhance smallholder productivity.

  Mix efficiency is relatively a new concept which is associated with scope economies, which occur through changes in input (e.g., capital to labour ratio) and output mixes (potato to cauliflower) in response to changes in input and output prices; these importantly motivate productivity because small growers cultivate a variety of crops by using varying input mixes. Scale mix efficiency analysis will enable us to comment how farmers are able to adjust their scale and scope operations in response to changes in the market environment. Our estimates of mix efficiency indicate that farmers could improve productivity by 30 percent with the appropriate use of input mixes. However, a further look at district level reveals that farmers in Our crop-level analysis of mix efficiency illustrates that tomato and onion growers in Muzaffargarh were efficient to make use of input resources as compared to famers in Kasur.

Policy Implications

- A considerable variation in input costs across farmers and districts indicates that farmers need more education and training to use appropriate amounts of inputs for various production activities. Moreover, market regulations regarding input and output prices could have helped realize more profits with decreased input costs and through increased farm level revenues.

- The examination of components of total factor productivity and the relationship between technical efficiency and various socioeconomic, institutional and market environment characteristics show that education, access to credit and extension services have significant influences on farm efficiency. The empirical results suggest that educating rural farmers about input use through the delivery of extension services and provision of streamlined credit facilities could have realized significant gains in productivity.

- The scale and mix efficiency appear to be the main drivers affecting the farm-level productivity. While the results of mix efficiency encourage farmers to account for the productivity losses due to incorrect use of input and output mixes, scale economies inform whether farmers are able to achieve the optimal scale of production with inputs change. The policies related to input and output prices could have larger impact on productivity gains. This would also be helpful to farmers in their decision making for crop diversification and realization of better net returns.

References:

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