

## **An Empirical Analysis of TFP Gains in an Agriculture Sub-sector Using Malmquist Index Approach: The Case of North West Frontier Province of Pakistan**

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### **Abstract**

An investigation of the total factor productivity (TFP) performance of the agriculture crop sub- sector in the North West Frontier Province (NWFP) of Pakistan from 1970 to 2004 is undertaken. First: the sources of growth of TFP gain are identified. Second: an assessment of the TFP growth changes in agriculture crop sub-sector is done. Data envelopment analysis (DEA) approach is used to estimate the changes in the production frontier. The Malmquist productivity index has decomposed total factor productivity into technological change (TECHCH) and technical efficiency change (EFFCH). TECHCH implies shifts in the frontier or innovation while EFFCH implies catching up to the frontier. Empirical results show reduction of productivity of the agriculture sector in NWFP and there has been no improvement in the efficiency level.

**Keywords:** Malmquist Index, Total factor productivity, Technological Change, Efficiency Change, Agriculture sector, Pakistan.

**JEL Classification:** O30; D24; D80; Q10; Q16.