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Impact of farm mechanization on crop productivity and economic efficiency in central and southern Oromia, Ethiopia

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Getachew Legese Feye³

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Introduction: Farm mechanization has multi-dimensional impacts on agricultural production systems like economic efficiency and productivity, thereby improving the quality of life in the farming community by reducing work drudgeries. However, these impacts were not studied empirically in Ethiopia. Hence, this research was initiated to estimate the level of economic efficiency, and productivity of wheat and barley, and the impact of farm mechanization on economic efficiency and productivity of wheat and barley.

Methods: The analysis was done for 232 and 257 wheat and barley producer farmers respectively who are selected from the Arsi and West Arsi zones. The stochastic frontier model was used to estimate economic efficiency while augmented inverse probability weighted (AIPW) was used to estimate the impact.

Results and discussion: Based on the result, it is apparent that farm mechanization has a significant positive impact on wheat productivity while the percentage change in average treatment effect for the barley was not statistically significant. Farm mechanization also affects wheat and barley economic efficiency positively. Hence, we recommended the wider use of farm mechanization to improve economic efficiency and productivity. Therefore, policy design should focus on ways to avail farm machinery easily like establishing farm mechanization service centers and facilitating credit services for mechanization service renders.

KEYWORDS

augmented inverse probability weight, economic efficiency, farm mechanization, impact, stochastic frontier analysis

1 Introduction

The impacts of agricultural mechanization have been estimated for different outcome vary in different regions of the world. *Aminass* (2001) and *Houmany et al.* (2013) pointed out that farm mechanization has multi-dimensional impacts in agricultural production system like economic efficiency, and life quality of the farming community by reducing work drudgeries. Its introduction can also increase the productivity of the farming system significantly, especially where agriculture is more dominated by traditional technologies. Mechanization reduces production costs, thereby increasing profit and reducing food costs (*Cossar, 2019; Bello, 2012*). Farm mechanization has great impacts on factor productivity improvement like labor productivity, land productivity, and capital productivity (*Goyal et al., 2014*). Moreover, the literature indicated that farm mechanization has an impact on the adoption of technologies like an improved seed, chemical fertilizer, agrochemicals, etc., and crop yields (*Takeshima*

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Economic Efficiency and Farm Mechanisation P. Narasimha Rao, 2003 Modernisation Of Agriculture Is A Worldwide Trend Modernisation And Technological Inputs Are Highly Interrelated Among Technological Innovations The Mechanization Is Perhaps The Most Critical One Unfortunately The History Of Agricultural Policy In Many Developing Countries Including India Is Replete With Controversies When It Come To Mechanization Mechanization Was Dubbed As Anti Labour Anti Employment Anti Poor And Hence Needs To Be Discouraged At Any Cost Over The Years The Scare Among Policy Makers About Mechanization Has Receded In Its Intensity But The Phobia Has Not Disappeared Many Economists Have Also Contributed To The Predicament Of Policy Makers In This Regard Part Of It Was Ideological And Visibly Anti Big Farmer Oriented In This Perspective Mechanization Was Identified With Large Farms And Big Farmers The Present Study About The Impact Of Mechanization Is Able To Pinpoint With A Great Deal Of Accuracy The Desirable Consequences And Welcome Features Of Mechanization It Is Able To Explore The Effects Of Mechanization On Farm Income Employment Productivity And Economic Efficiency In Crop Production The Arguments That Have Been Made In The Present Study Regarding The Social Costs And Benefits Of The Existing Pattern Of Mechanization Leads To The Conclusion That Net Social Benefits Are Positive Analysis Of Data From The Present Study Indicates That The Existing Pattern Of Mechanization Does Not Add To Unemployment In The Region Where The Thrust Is To Expand Agricultural Output Because Machines Are Used In Response To Worthwhile Techno Economic Considerations And High Cost Of Draught Power As Machines Help To Save Resources Hitherto Allotted To Maintain Draught Animals They Enable An Increase In Output By Raising Crop Intensity And Yield Per Acre Their Use May Be Socially More Beneficial In The Context Of Shortages And High Prices Of Agricultural Commodities The Increase In The Scale Of Operation The Rise In The Crop Intensity And Yield Per Acre Made Possible By Mechanization Can Lead To A Net Increase In Farm Employment Being In An Age Of Technology We Simply Cannot Ignore This Beneficial Fallout From Mechanization Although The Empirical Work Is Confined To Andhra Pradesh In Its Analytical Framework Methodology And Discussion Of Relevant Issues It Has Much Wider Application It Is A Major Contribution To The Research And Would Be Useful To Economists Agricultural Scientists And Policy Makers

Farm mechanization in India:

Economic issues, perspective and opportunities Ranjith Kumar P.S, Prasanna Kumar P.S ,Prem Jose Vazhacharickal, Mechanization is a process of replacing biological sources of energy involving animal and human labour to mechanized sources of energy Farm mechanization indicates the use of machines for conducting agricultural operations replacing the traditional methods which involve human and animal labour In the period 2004 05 to 2011 12 robust growth in the secondary and tertiary sectors led to significant job creation in agriculture sector Tractors and power tillers have been driving the farm mechanization in India Tractor sales have grown at a CAGR of 9.0 % in Financial Year FY 05 15 to around 5.5 lakh tractors in FY15 around 2.3 lakh in FY2005 whereas sales of power tillers have grown at a CAGR of 10.6% in FY2005 to 2015 to 48 000

power tillers in FY2015 17 841 in FY2005 Farm mechanisation is a fuel to agriculture production now days As several studies indicate the mechanisation not only reduced the drudgery of manual labour and it enables the efficient and judicious use of resources The increased agricultural production and productivity over the decades is coupled with the farm power availability High labour intensive crops have turned to low labour intensive crops by replacing the mechanical power which also reduced the cost of production and improved quality of produce led to increased farmers income share The Economics of Farm Mechanization in the United States, 1950-1960 ,1960 Economic indicators of the farm sector. Production and efficiency statistics ,1981 **Farm Machinery and Processes Management in Sustainable Agriculture** Edmund Lorencowicz,Bruno Huyghebaert,Jacek Uziak,2024-09-18 This book gathers the latest advances innovations and applications in the field of sustainable and smart agriculture as presented by leading researchers at the XII Farm Machinery and Processes Management in Sustainable Agriculture FMPMSA held in Lublin Poland on June 12 14 2024 The book covers highly diverse topics including management of field and livestock production machinery management of biomass and agroenergy production plant protection soil management and agrochemicals application smart farming and sustainability ergonomic labor organization and sustainable agriculture in the European Union and other countries The papers which are published after a rigorous international peer review process highlight numerous exciting ideas that will spur novel research directions and foster multidisciplinary collaboration among different specialists Consequences of Small-farm Mechanization International Rice Research Institute,1983 Proceedings of the 2022 International Conference on Bigdata Blockchain and Economy Management (ICBBEM 2022) Daowen Qiu,Yusheng Jiao,William Yeoh,2022-12-28 This is an open access book As a leading role in the global megatrend of scientific innovation China has been creating a more and more open environment for scientific innovation increasing the depth and breadth of academic cooperation and building a community of innovation that benefits all These endeavors have made new contribution to globalization and creating a community of shared future With the rapid development of modern economic society in the process of economic management informatization has become the mainstream of economic development in the future At the same time with the emergence of advanced management technologies such as blockchain technology and big data technology real market information can be quickly obtained in the process of economic management which greatly reduces the operating costs of the market economy and effectively enhances the management level of operators thus contributing to the sustained rapid and healthy development of the market economy Under the new situation the innovative application of economic management research is of great practical significance 2022 International Conference on Bigdata Blockchain and Economic Management ICBBEM 2022 will be held on March 25 27 2022 in Wuhan China ICBBEM 2022 will focus on the latest fields of Bigdata Blockchain and Economic Management to provide an international platform for experts professors scholars and engineers from universities scientific institutes enterprises and government affiliated institutions at home and abroad to share experiences to expand

professional fields to exchange new ideas face to face to present research results and to discuss the key challenging issues and research directions facing the development of this field with a view to promoting the development and application of theories and technologies in universities and enterprises

Efficient Decision Support Systems Chiang Jao, 2011-09-09
This series is directed to diverse managerial professionals who are leading the transformation of individual domains by using expert information and domain knowledge to drive decision support systems DSSs The series offers a broad range of subjects addressed in specific areas such as health care business management banking agriculture environmental improvement natural resource and spatial management aviation administration and hybrid applications of information technology aimed to interdisciplinary issues This book series is composed of three volumes Volume 1 consists of general concepts and methodology of DSSs Volume 2 consists of applications of DSSs in the biomedical domain Volume 3 consists of hybrid applications of DSSs in multidisciplinary domains The book is shaped upon decision support strategies in the new infrastructure that assists the readers in full use of the creative technology to manipulate input data and to transform information into useful decisions for decision makers

Chinese Aid and African Development D. Bräutigam, 1998-06-21
Since 1957 more than 45 African countries have received aid from China yet until recently little has been known about the effectiveness or impact of this assistance Bräutigam provides the first authoritative account of China's experience as an aid donor in rural Africa In a detailed and highly readable analysis the author draws on anthropology economics organization theory and political science to explain how China's domestic agenda shaped the design of its aid and how domestic politics in African countries influenced its outcome

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Agricultural Policies in Developing Countries Frank Ellis, 1992-01-30 This book is designed for undergraduate and graduate students taking courses related to agricultural policy agricultural economics or rural development in developing countries

Economic Indicators of the Farm Sector, 1981 Farm output in 1979 rose 6 percent from 1978's record level Crop and livestock increased 10 million acres to the biggest acreage since 1954 Crop production per acre a record rose 7 percent spurred by favorable weather higher prices received and increased fertilizer use Tractor and farm machinery numbers declined though tractor horsepower increased Hours of farm labor dipped 2 percent to 4.3 billion hours but each farmworker produced farm products for 68 persons 5 more than in 1978

Human-Centered Agriculture P. K. Nag, L. P. Gite, 2020-08-31 This book explores the interplay of farm mechanization human factors and climatic and other environmental uncertainty in agriculture using an ergonomics based approach to discuss solutions to the traditionally acknowledged vulnerability of the sector It converges contemporary research documentation case studies and international standards on

agricultural ergonomics engineering anthropometry human factors basic occupational health services safety management human performance and system sustainability to provide a handy reference to students and professionals working to optimize agricultural output while balancing the rational utilization of labour in agricultural practices and human well being

Mergers, Sell-Offs, and Economic Efficiency David J. Ravenscraft, F. M. Scherer, 2011-10-01 This book covers the consolidation and merger of corporations and corporate divestiture in the United States Small Farm Equipment for Developing Countries, 1986 The role of small farm equipment Land preparation Irrigation Seeding and planting Plant protection and soil fertility Harvesting Threshing Grain drying Improving research and development manufacturing marketing extension and use of small farm equipment

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