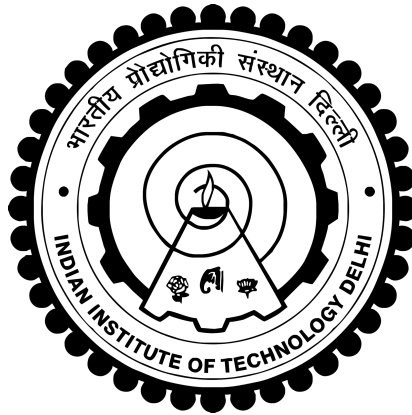


ESSAYS ON FINANCE AND PRODUCTIVITY

PANKAJ SINGH RAWAT



Department Of Management Studies

INDIAN INSTITUTE OF TECHNOLOGY DELHI

MARCH 2023

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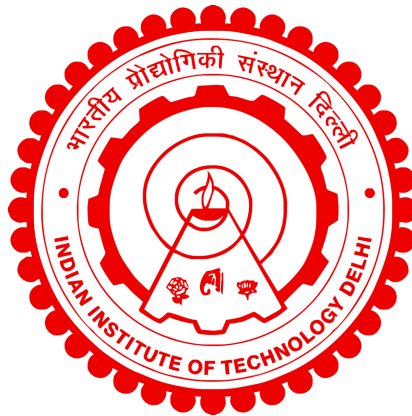
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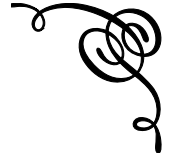
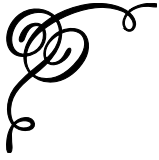
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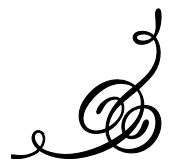
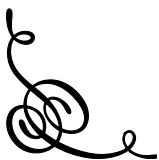


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March 2023



*I dedicate this thesis to my parents, whose
constant support and encouragement
made this all possible.*



Certificate

The thesis titled, "**Essays on Finance and Productivity**", being submitted by **Pankaj Singh Rawat** to the **Indian Institute of Technology Delhi**, for the award of degree of **Doctor of Philosophy** is a record of bonafide research work carried out by him. He has worked under my guidance and supervision, and has fulfilled all the requirements for the submission of this thesis, which has attained the standard required for a Ph.D degree of this institute. The results presented in this thesis have not been submitted elsewhere for the award of any degree or diploma.

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Abstract

Productivity growth is considered to be a key component of economic growth and competitiveness. It is an important indicator because it measures how efficiently production inputs are used in a firm, industry, or economy to produce a given output. This thesis contains three studies covering three different aspects of productivity growth. In the first study, we study labour productivity growth and its components at the sectoral level for a panel of developing and advanced economies. In the second study, we moved from macro to micro and studied total factor productivity using the control function approach at the establishment level in the Indian manufacturing sector. Finally, in the third study, a firm-level study of Indian manufacturing, we study productivity as a combination of technical, scale, and efficiency change. These three studies will make three separate chapters in the thesis, briefly explained in the following paragraphs.

In the first study, the thesis explored how the effects of financial development on the components of labour productivity growth differ in advanced and developing economies. Labour productivity growth in an economy can be attributed to the "within" component and the "structural change" component. The "within" component represents the labour productivity growth within a sector due to technological change or efficiency gains. Another source of labour productivity growth is when labour resources move from a less efficient sector to a more efficient sector. It also contributes to overall labour productivity gains in the economy. The structure change component captures productivity gains due to such inter-sectorial movements of labour resources. Using a long-term dataset of 81 economies from 1960 to 2018, we show that financial development in an economy is associated with the "within" components of labour productivity. This effect is stronger for developing economies than for advanced economies. However, we have not found any statistically significant association between financial development and the "structural change" component. The study also shows that structural change, though important for economic transition, is a complex process, and financial development is not a sufficient factor to explain this phenomenon.

The second study explores the mechanism through which financial friction affects a firm's productivity growth. Based on an investment model of a firm, we endogenous the relationship between financial friction and productivity growth through investment in innovative projects. We empirically test this relationship with Indian manufacturing establishment-level data, containing 632100 firm-year observations for 188562 firms from 2001 to 2018. The study uses the control function approach to estimate total factor productivity. The study suggests that a firm's productivity grows with innovative investment, and financial friction hinders firms' ability to invest in innovative projects. As a result, firms facing higher financial friction observe lower future productivity growth.

Finally, the third study examines the dynamics of Technical efficiencies and TFP growth in Indian manufacturing. Technical efficiency can be both persistent (long-term) and transient(short-term); however, their dynamics in the manufacturing sector have been barely studied. This study investigates the dynamics of persistent and transient technical efficiencies and TFP growth in the Indian manufacturing sector. Using firm-level panel data from 17 manufacturing industries from 1999-2018, we have employed a four-component stochastic frontier model to separate the persistent technical efficiency from the firm heterogeneity and the transient technical efficiency from the random noise. Results support conditional and unconditional beta convergence in transient technical efficiency, indicating a catching-up by transiently inefficient firms. Convergence speed remains unaffected by firm characteristics; however, it slowed after the 2008 financial crisis. Results also show that with time persistently inefficient firms exit the market. Finally, the study investigates the drivers of TFP growth. We show that technical change and efficiency improvements drive TFP growth in Indian manufacturing.

सारांश

वैश्विक स्तर पर उत्पादकता वृद्धि को आर्थिक विकास और प्रतिस्पर्धात्मकता का एक प्रमुख घटक माना जाता है। इसे एक महत्वपूर्ण संकेतक माना जाता है क्योंकि यह किसी निर्धारित कारक इनपुट से कोई संयंत्र या उद्योग या अर्थव्यवस्था कितना उत्पादन कर सकती है, जो उसकी उत्पादकता को दर्शाता है। इस शोध लेख में उत्पादकता वृद्धि के तीन अलग-अलग पहलुओं का अध्ययन किया गया है। पहले अध्ययन में, हमने विकासशील और उन्नत अर्थव्यवस्थाओं के एक समूह के लिए क्षेत्रीय स्तर पर श्रम उत्पादकता वृद्धि और इसके घटकों का अध्ययन किया है। दूसरे अध्ययन में, हमने समष्टि से व्यष्टि का रुख किया है और भारतीय विनिर्माण क्षेत्र में संयंत्र स्तर पर कुल घटक उत्पादकता का अध्ययन किया। तीसरे अध्ययन में हमने भारतीय विनिर्माण में फर्म-स्तरीय दीर्घकालिक और अल्पकालिक तकनीकी दक्षता का अध्ययन किया है। ये तीन अध्ययन थीसिस में तीन अलग-अलग अध्याय बनाते हैं जिन्हें निम्नलिखित अनुच्छेद में समझाया गया है।

पहले अध्ययन में हमने विश्लेषण किया है कि कैसे वित्तीय विकास उन्नत और विकासशील अर्थव्यवस्थाओं में श्रम उत्पादकता वृद्धि के घटकों पर कैसे भिन्न प्रभाव डालता है। किसी अर्थव्यवस्था में श्रम उत्पादकता वृद्धि को दो घटकों में विभाजित किया जा सकता है - क्षेत्र के भीतर श्रम उत्पादकता वृद्धि और संरचनात्मक परिवर्तन। किसी क्षेत्र के भीतर श्रम उत्पादकता वृद्धि उस क्षेत्र में तकनीकी प्रगति या दक्षता में सुधार का प्रतिनिधित्व करता है। अर्थव्यवस्था में श्रम उत्पादकता वृद्धि का एक अन्य स्रोत है संरचनात्मक परिवर्तन। किसी अर्थव्यवस्था का संरचनात्मक परिवर्तन तब होता है जब उसके श्रम संसाधन का किसी कम उत्पादक क्षेत्र से अधिक उत्पादक क्षेत्र में स्थानांतरण होते हैं। यह स्थानांतरण अर्थव्यवस्था के समग्र श्रम उत्पादकता वृद्धि में योगदान देता है। इस अध्ययन में हमने वर्ष १९६० से २०१८ तक ८१ अर्थव्यवस्थाओं के दीर्घकालिक आकड़ों का उपयोग कर हमने दिखाया कि अर्थव्यवस्था में वित्तीय विकास क्षेत्र के भीतर श्रम उत्पादकता वृद्धि को प्रभावित करता है। यह प्रभाव उन्नत अर्थव्यवस्थाओं की तुलना में विकासशील अर्थव्यवस्थाओं के लिए अधिक प्रबल होता है। हालांकि, हमें वित्तीय विकास और संरचनात्मक परिवर्तन के बीच सांख्यिकीय रूप से कोई महत्वपूर्ण संबंध स्थापित नहीं मिला। इस अध्ययन से यह भी पता चलता है कि संरचनात्मक परिवर्तन, यद्यपि आर्थिक परिवर्तन के लिए महत्वपूर्ण है, पर यह एक जटिल प्रक्रिया है, और इसको समझाने के लिए वित्तीय विकास अपर्याप्त कारक है।

हमने इस थीसिस के दूसरे अध्ययन उस तंत्र की पड़ताल की है जिसके माध्यम से वित्तीय घर्षण एक फर्म/संयंत्र की उत्पादकता वृद्धि को प्रभावित करता है। हमने एक फर्म के निवेश मॉडल के आधार पर संयंत्र की कुल कारक उत्पादकता वृद्धि को अभिनव परियोजनाओं में निवेश से जोड़ कर ये दिखाया है कि वित्तीय घर्षण इस तंत्र को किस तरह से प्रभावित करता है। हमने भारतीय विनिर्माण के संयंत्र स्तर का डेटा उपयोग करते हुए अनुभवजन्य रूप से हमारे मॉडल का परीक्षण किया है। हमने इसके लिए वर्ष २००१ से २०१८ तक का १८८५६२ संयंत्रों के आंकड़ों का उपयोग किया है। इस अध्ययन से पता चलता है कि किसी संयंत्र की भविष्य की उत्पादकता अभिनव परियोजनाओं में निवेश के साथ बढ़ती है। और वित्तीय घर्षण संयंत्रों के अभिनव परियोजनाओं में निवेश करने की क्षमता को बाधित करता है। परिणामस्वरूप, उच्च वित्तीय संघर्ष का सामना करने वाले संयंत्र भविष्य में काम उत्पादकता वृद्धि प्राप्त कर पाते हैं।

हमने तीसरे और आखिरी अध्याय में भारतीय विनिर्माण क्षेत्र में दीर्घकालिक और अल्पकालिक तकनीकी दक्षता की गतिशीलता के साथ कुल कारक उत्पादकता वृद्धि के स्रोतों का अध्ययन किया है। तकनीकी दक्षता स्थायी (दीर्घकालिक) और क्षणिक (अल्पकालिक) दोनों हो सकती है; हालाँकि, भारतीय विनिर्माण क्षेत्र में उनकी गतिशीलता का बमुश्किल ही कोई अध्ययन किया गया है। हमने भारतीय अध्ययन क्षेत्र के १७ उद्योगों के २० साल (१९९९-२०१८) के फर्म-स्तरीय पैनल डेटा पर चार-घटक वाले स्टोकेस्टिक फ्रंटियर मॉडल का उपयोग कर स्थायी और क्षणिक तकनीकी दक्षता को अनुमानित किया है। हमारा इस शोध के परिणाम क्षणिक तकनीकी दक्षता में सशर्त और बिना शर्त बीटा-अभिसरण को प्रदर्शित करते हैं। ये क्षणिक रूप से तकनीकी दक्षता में अक्षम फर्मों में सुधार का संकेत देता है। अभिसरण की गति फर्म की विशेषताओं से अप्रभावित रहती है; हालाँकि, २००८ के वित्तीय संकट के बाद इसकी गति कुछ धीमा हुई थी। इस शोध के परिणाम यह भी दिखाते हैं कि समय के साथ लगातार अकुशल फर्मों बाजार से बाहर निकल जाती है। अंत में हमने कुल कारक उत्पादकता वृद्धि के चालकों की जांच करते हुए दिखाया है कि तकनीकी परिवर्तन और दक्षता सुधार भारतीय विनिर्माण में उत्पादकता वृद्धि की गति के प्रमुख स्रोत हैं।

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Abbreviations

ASI	Annual Survey of Industries
CPI	Consumer Price Index
CSO	Central Statistics Office
DAR	Debt to Asset Ratio
EFDR	External Finance Dependence Ratio
FY	Financial Year
GDP	Gross Domestic Product
GVA	Gross Value Added
IER	Interest Expense Ratio
IIP	Index of Industrial Production
n.e.c.	Not elsewhere classified
NIC	National Industrial Classification
OECD	Organisation for Economic Co-operation and Development
SC	Scale Change
SFA	Stochastic Frontier Approach
TC	Technical change
TEC	Technical Efficiency Change
TFP	Total Factor Productivity
WPI	Wholesale Price Index