Falk Urban

The Economics of Technological Change and Employment in the Digital Machine Age

Master's Thesis



YOUR KNOWLEDGE HAS VALUE



- We will publish your bachelor's and master's thesis, essays and papers
- Your own eBook and book sold worldwide in all relevant shops
- Earn money with each sale

Upload your text at www.GRIN.com and publish for free



Bibliographic information published by the German National Library:

The German National Library lists this publication in the National Bibliography; detailed bibliographic data are available on the Internet at http://dnb.dnb.de .

This book is copyright material and must not be copied, reproduced, transferred, distributed, leased, licensed or publicly performed or used in any way except as specifically permitted in writing by the publishers, as allowed under the terms and conditions under which it was purchased or as strictly permitted by applicable copyright law. Any unauthorized distribution or use of this text may be a direct infringement of the author s and publisher s rights and those responsible may be liable in law accordingly.

Imprint:

Copyright © 2015 GRIN Verlag ISBN: 9783668114029

This book at GRIN:

https://www.grin.com/document/312623

The Economics of Technological Change and Employment in the Digital Machine Age

GRIN - Your knowledge has value

Since its foundation in 1998, GRIN has specialized in publishing academic texts by students, college teachers and other academics as e-book and printed book. The website www.grin.com is an ideal platform for presenting term papers, final papers, scientific essays, dissertations and specialist books.

Visit us on the internet:

http://www.grin.com/ http://www.facebook.com/grincom http://www.twitter.com/grin_com

The Economics of Technological Change and Employment in the Digital Machine Age

MASTER THESIS

Chair of International Economics & Macroeconomics Department of Economics Faculty of Business Administration and Economics University of Paderborn

Author: Falk Urban

December 22, 2015

Contents

| 1 | Intr | oduction | 5 |
|----|--|---|----|
| 2 | The | Economic History of Technological Change | 9 |
| | 2.1 | From Industrial Revolution to Automation | 9 |
| | 2.2 | From Automation to Digitization | 13 |
| 3 | The | Neoclassical Theory of Technological Change and Employment | 19 |
| | 3.1 | Types and Drivers of Innovation | 19 |
| | 3.2 | Compensation Theory of Labor-Saving Technological Change | 24 |
| | 3.3 | Labor-Saving Technological Change | 28 |
| | 3.4 | A Neoclassical Model of Technological Change and Employment | 32 |
| 4 | Estimating the Impact of Technological Change on Employment Measures | | |
| | 4.1 | Description of the Model | 38 |
| | 4.2 | Building the Model | 44 |
| | 4.3 | Estimation Results | 48 |
| 5 | Con | clusion | 55 |
| Bi | Bibliography | | |
| Ap | Appendix | | |

List of Figures

| 1 | German Manufacturing and Service Industry as a Percentage of GDP $$ | 7 |
|----|---|----|
| 2 | Share of Capital Stock younger than five years in German Manufacturing | 14 |
| 3 | Change of Employment in Three German Sectors | 15 |
| 4 | Labor Productivity in Germany | 16 |
| 5 | Wage Share of GDP vs. Corporate Profit Share of GDP | 17 |
| 6 | Development of Education Level in Germany | 17 |
| 7 | Development of Gross Incomes in Germany | 18 |
| 8 | Product Life Cycle | 20 |
| 9 | Invention Possibility Frontier | 22 |
| 10 | Localized Technical Progress | 28 |
| 11 | Types of Technical Change According to Hicks | 29 |
| 12 | Equilibrium Analysis - Introduction of a Labor-Saving Technology | 30 |
| 13 | Harrod and Hicks-neutral technological change | 30 |
| 14 | The Aggregate Production Function | 33 |
| 15 | The Labor Market | 34 |
| 16 | The Goods Market | 34 |
| 17 | Technical Change in a Neoclassical Framework | 35 |
| 18 | Monopoly as a Consequence of Innovation | 36 |
| 19 | Consequences of a Decrease in Wages | 37 |
| 20 | Employees in German Manufacturing as Percentage of Total Employment | 38 |
| 21 | The Vintage Approach | 39 |
| 22 | Trend of Scrappings and Investments in German Manufacturing $\ . \ . \ .$ | 42 |
| 23 | Trend of Productivity Measures in German Manufacturing | 43 |
| 24 | Trend of Hours Worked in German Manufacturing | 45 |
| 25 | Trend of Payroll in German Manufacturing | 46 |
| 26 | Development of Capital Stock in German Manufacturing | 47 |
| 27 | US Manufacturing and Service Industry as a Percentage of GDP | 65 |