AN EMPIRICAL ANALYSIS OF THE IMPACT OF TRADE ON PRODUCTIVITY IN SOUTH AFRICA’S MANUFACTURING SECTOR

by

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Charles Augustine Abuka
SUMMARY
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DEGREE: PhD (ECONOMICS)

This study contributes to the debate regarding the impact of trade on manufacturing productivity and labour demand over the period 1980 to 2002. The analysis extends existing work in a number of ways. First, total factor productivity is decomposed into efficiency and technical change in order to provide more directions to policy makers. Second, an industry specific time varying measure of total factor productivity is estimated from an underlying production function using panel data of South African industrial sectors. Third, total factor productivity is interacted with trade measures, industry characteristics and macroeconomic factors to determine its key drivers. Finally, the impact of trade on derived labour demand is examined.

Panel data econometric techniques are applied to estimate productivity loss due to technical inefficiency in South African manufacturing industries. Technical
change and efficiency are estimated using stochastic frontier approaches that allow inefficiency to be either time invariant, or to evolve in a time varying decay mode. A generalised time index is employed to introduce more flexibility on the measurement of technical change. The results account for periods of technical progress as well as regress and indicate the presence of significant room for efficiency improvement, while the pattern of technical change was found to have been particularly slow over the period. The fact that a substantial amount of intermediate inputs into South African manufacturing are imported implies that significant improvement in industry efficiency will be related to the openness of trade policy in South Africa. More importantly, efficiency scores are also likely to be related to how labour force adjusts to these imported inputs. Skill improvements for the labour force are, therefore, fundamental, because the mix of goods manufactured and the factor proportions used to produce them depend on the skill competencies of local technicians. Skills are important for the labour force to produce at its full potential, avoiding waste in inputs and time.

The estimation of the determinants of total factor productivity is able to account, in a simultaneous context, for the impact of trade policy, industry level characteristics and the role of macroeconomic factors. The results suggest positive payoffs for industrial productivity of an appropriately managed liberalisation of the external sector. Liberalisation of the external sector is good for competition and learning. Learning is available through increased access to world class intermediate inputs and technology.

The evolution of derived labour demand in manufacturing is investigated using the dynamic Generalised Method of Moments estimator (GMM). The results indicate greater induced efficiency effects from some products entering South Africa that are produced at lower cost abroad than obtain for similar products in South Africa; such commodities have tended to displace South African products
and labour. Increased import penetration serves to reduce inefficiency and encourages the use of new technology. The positive impact of export expansion on derived labour demand supports results from efficiency estimates that indicate the importance of skilled labour. Increased trade requires emphasis on skill development for the labour force, because intra-industry trade benefits can only arise in an environment in which the skill competencies of labour are improved. In a nutshell, trade has the potential to exact factor adjustment. It is therefore, important to identify the product specific effects that are inimical to some manufacturing sectors and which effects serve to reduce the level of employment in manufacturing for the sake of policy intervention.

Increased trade with developed countries is found to provide South Africa with global production networks, where it supplies to the world market. In this arrangement, South Africa benefits from the use of the latest internationally available production and marketing techniques. These networks are important for accelerating the country’s development by transferring technology and innovation, as well as bringing new ideas, to increase its competitive advantage. This comparative advantage should be used to expand the untapped trade potential, particularly with the rest of Africa. However, more needs to be done to improve the technical competencies of industrial labour. Policies are also still required to significantly improve the speed of labour market adjustment.
# TABLE OF CONTENTS

- **ACKNOWLEDGEMENTS** ........................................................................................................ iii
- **LIST OF TABLES** ................................................................................................................ xi
- **LIST OF FIGURES** ............................................................................................................. xii

## CHAPTER 1 ................................................................................................................................ 1

### TRADE AND MANUFACTURING: AN OVERVIEW .............................................................. 1

#### 1.1 INTRODUCTION AND BACKGROUND ................................................................... 1

1.1.2 An overview of the debate ......................................................................................... 1
1.1.3 Linking trade, productivity and labour demand in industry .................................. 5
1.1.4 Problem statement, motivation and point of departure ........................................... 8

1.1.3.1 Panel data application ......................................................................................... 11
1.1.3.2 Components of total factor productivity ............................................................... 11
1.1.3.3 Determinants of total factor productivity ............................................................. 12
1.1.3.4 Understanding derived labour demand in manufacturing .................................. 12

#### 1.2 HYPOTHESES INVESTIGATED ........................................................................... 13

#### 1.3 TRADE POLICY IN SOUTH AFRICA ................................................................... 13

#### 1.4 EMPLOYMENT ISSUES IN MANUFACTURING ..................................................... 21

#### 1.5 STRUCTURE OF THE THESIS ............................................................................ 28

#### 1.6 CONCLUDING REMARKS ................................................................................ 28

## CHAPTER 2 ............................................................................................................................ 31

### EFFICIENCY AND TECHNICAL CHANGE IN MANUFACTURING .......................... 31

#### 2.1 INTRODUCTION ...................................................................................................... 31

#### 2.2 MEASURING EFFICIENCY AND TECHNICAL CHANGE .................................... 32

2.2.1 Importance of decomposing total factor productivity ............................................... 32
2.2.2 The stochastic frontier production function ............................................................... 35

2.2.2.1 Measuring technical efficiency ........................................................................ 37
2.2.2.2 Measuring technical change ............................................................................ 38

2.2.2.3 Panel data production frontier models ............................................................... 39
2.3 ECONOMETRIC SPECIFICATION ................................................................. 40
2.4 THE DATA AND SAMPLE CHARACTERISTICS ........................................ 41
2.5 ECONOMETRIC RESULTS ....................................................................... 43
  2.5.1 Univariate data analysis ....................................................................... 43
  2.5.1.1 Summary statistics ......................................................................... 43
  2.5.1.2 Correlation analysis ........................................................................ 43
  2.5.1.3 Intuition behind panel unit root tests .............................................. 45
  2.5.1.4 Testing for cointegration in the production function ......................... 49
  2.5.2 Multivariate model results: production functions ............................... 51
    2.5.2.1 A time invariant inefficiency model ............................................ 51
    2.5.2.2 A time varying inefficiency decay model .................................... 54
  2.5.3 Technical change in South African manufacturing .............................. 56
  2.5.4 Technical efficiency in South African manufacturing .......................... 58
  2.5.5 The relationship between trade and manufacturing efficiency .......... 61
    2.5.5.1 Causality between trade and manufacturing efficiency ............... 62
  2.5.6 Some determinants of manufacturing efficiency ............................... 63
2.6 CONCLUDING REMARKS ........................................................................ 66

CHAPTER 3 .................................................................................................. 69
TRADE AND TOTAL FACTOR PRODUCTIVITY IN MANUFACTURING... 69
3.1 INTRODUCTION ....................................................................................... 69
3.2 TRADE AND MANUFACTURING PRODUCTIVITY ................................. 70
  3.2.1 Foreign input push ............................................................................. 72
  3.2.2 Competitive push and the elimination of X-inefficiency .................... 73
  3.2.3 Competitive elimination .................................................................... 73
  3.2.4 Higher incentives for technological innovation ................................. 74
  3.2.5 Economies of scale ......................................................................... 75
3.3 APPROACHES TO THE STUDY OF TRADE AND PRODUCTIVITY ...... 76
  3.3.1 The macro- level approach ................................................................ 76
  3.3.2 The industry-level approach ............................................................. 77
  3.3.3 The micro-level approach ................................................................ 78
5.2.1 Trade and industrial productivity policies ..................................................... 133
5.2.2 Trade and labour market policies ................................................................. 135
5.3. AREAS FOR FURTHER RESEARCH .......................................................... 136

REFERENCES .............................................................................................................. 138

APPENDIX .................................................................................................................. 161

Appendix A1: Technical efficiency in panel frontier models .................................. 161
Appendix A2: The Battese and Coelli (1992) specification ...................................... 166
Appendix A3: Variable definitions ............................................................................ 171
LIST OF TABLES

Table 1: Tariff phase down under the WTO .............................................................. 17
Table 2: Changes in manufacturing tariff structure .................................................. 18
Table 3: Variability in employment, production and wages ................................. 21
Table 4: Two digit level variability in selected trade measures, 1980 and 2002 ... 25
Table 5: Import share and variability within three-digit sector, 1980 and 2002 ... 25
Table 6: Export share and variability within three digit sector, 1980 and 2002.... 26
Table 7: Summary statistics for inputs and outputs .................................................. 43
Table 8: Correlation between inputs and output measures ................................... 44
Table 9: Non parametric tests for production function variables ......................... 44
Table 10: Group unit root tests for production function variables ....................... 49
Table 11: Production function cointegration ............................................................ 50
Table 12: Time invariant inefficiency: Cobb-Douglas production function ......... 52
Table 13: Time invariant inefficiency: Translog production function ................... 53
Table 14: Time varying inefficiency: Cobb-Douglas production function .......... 54
Table 15: Time varying inefficiency: Translog production function ................. 55
Table 16: Non parametric tests correlation tests for efficiency and trade .......... 60
Table 17: Determinants of efficiency ................................................................... 64
Table 18: Proportion of industry sales to total manufacturing sales .................. 85
Table 19: Descriptive statistics for productivity variables ................................... 87
Table 20: Estimating TFP determinants by maximum likelihood regression ...... 93
Table 21: Estimating TFP determinants by fixed effects within regression ........ 95
Table 22: Summary statistics for employment variables .................................... 117
Table 23: Correlation between employment and determinants ......................... 118
Table 24: Non parametric tests for employment and its determinants ............... 119
Table 25: Baseline labour demand models for South African manufacturing .... 122
Table 26: Import origin and manufacturing labour demand ............................... 124
Table 27: Product and time specific effects in manufacturing ............................ 126
LIST OF FIGURES

Figure 1: Evolution of employment in the manufacturing sector, 1980-2002 ........ 22
Figure 2: Capital stock and productivity in manufacturing sector, 1980-2001 ...... 23
Figure 3: Labour productivity in the manufacturing sector, 1980-2001............. 24
Figure 4: Import penetration and export shares, 2002....................................... 27
Figure 5: Evolution of employment and output in manufacturing, 1980-2002 .... 42
Figure 6: Technical change in manufacturing: Cobb-Douglas function ........... 57
Figure 7: Technical change in manufacturing: Translog function .................. 58
Figure 8: Technical efficiency scores by sector ............................................... 60
Figure 9: Manufacturing machinery and equipment expenditure, 1980-2001..... 86
**Notation and Used**

This part of the thesis lists the symbols and abbreviations used in the main text. The symbols that are not standard, if not explained here will be explained in areas where they first emerge in the text.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Interpretation</th>
</tr>
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<tbody>
<tr>
<td>$N$</td>
<td>Number of observations or firms</td>
</tr>
<tr>
<td>$T$</td>
<td>Number of time points</td>
</tr>
<tr>
<td>$\hat{\beta}$</td>
<td>Estimate of $\beta$</td>
</tr>
<tr>
<td>$\Delta Y$</td>
<td>Change in $Y$</td>
</tr>
<tr>
<td>$\infty$</td>
<td>Infinity</td>
</tr>
<tr>
<td>$E$</td>
<td>Expectation operator</td>
</tr>
<tr>
<td>Acronym</td>
<td>Meaning</td>
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<td>---------</td>
<td>--------------------------------------------------------------</td>
</tr>
<tr>
<td>DEA</td>
<td>Data Envelopment Analysis</td>
</tr>
<tr>
<td>EU</td>
<td>European Union</td>
</tr>
<tr>
<td>EU-SAFTA</td>
<td>European Union-South Africa Free Trade Agreement</td>
</tr>
<tr>
<td>et al</td>
<td>et alii – and others</td>
</tr>
<tr>
<td>GATT</td>
<td>General Agreement on Trade and Tariffs</td>
</tr>
<tr>
<td>GEIS</td>
<td>Generalised Export Incentive Scheme</td>
</tr>
<tr>
<td>GLS</td>
<td>Generalised Least Squares</td>
</tr>
<tr>
<td>GMM</td>
<td>Generalised Method of Moments</td>
</tr>
<tr>
<td>ISIC</td>
<td>International Standard Industrial Classification</td>
</tr>
<tr>
<td>LP</td>
<td>Linear Programming</td>
</tr>
<tr>
<td>LSDV</td>
<td>Least Squares Dummy Variables</td>
</tr>
<tr>
<td>MC</td>
<td>Marginal Cost</td>
</tr>
<tr>
<td>MLE</td>
<td>Maximum Likelihood Estimation</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
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</tr>
<tr>
<td>OLS</td>
<td>Ordinary Least Squares</td>
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<tr>
<td>SADC</td>
<td>Southern Africa Development Community</td>
</tr>
<tr>
<td>SARB</td>
<td>South African Reserve Bank</td>
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<tr>
<td>STATSSA</td>
<td>Statistics South Africa</td>
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<tr>
<td>TC</td>
<td>Technical Change</td>
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