Regional Program on Enterprise Development (RPED)
Tanzania Manufacturing Sector Survey
Waves I – III (1993-1995)

Dataset User Guide

Centre for the Study of African Economies
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This data was originally collected by a team from the Helsinki School of Economics, in conjunction with the Tanzanian Confederation of Industries and the University of Dar es Salaam. The surveys were undertaken as part of the Regional Program on Enterprise Development (RPED) organised by the Africa Technical Department of the World Bank. We are grateful to Xavier Blanc from Helsinki for making the data available to CSAE researchers in preparation for Wave 4 of the Tanzanian Manufacturing Enterprise Survey, undertaken in late 1999 (see separate dataset and documentation also on CSAE website). This dataset forms part of an ongoing CSAE research project into manufacturing sector performance in Tanzania and Ghana funded by the Department for International Development (DFID).

Address for correspondence: Centre for the Study of African Economies, Department of Economics, University of Oxford, Manor Road, Oxford, OX1 3UL. Please contact: Alan Harding (alan.harding@economics.ox.ac.uk) or Dr. Francis Teal (francis.teal@economics.ox.ac.uk) for further information.

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We are particularly grateful to Xavier Blanc from Helsinki for making the data available for CSAE researchers in January 1999, in preparation for Wave 4 of the Tanzanian Manufacturing Enterprise Survey undertaken in late 1999 (see separate dataset and documentation also on the CSAE website). This data has been cleaned and analysed as part of an ongoing CSAE research project into manufacturing sector performance in Tanzania and Ghana funded by the Department for International Development (DFID).

1. Introduction

The objective of this user guide is to provide potential users with some basic information and explanations about the dataset which will hopefully facilitate their ability to use it for their own research or other purposes.

The relevant material is a comprehensive panel data set on a sample of firms within the Tanzanian manufacturing sector. This data was collected over the period 1993 to 1995 in a series of three annual surveys, referred to here as Waves I – III, as part of the Regional Program on Enterprise Development (RPED) organised by the World Bank and funded by bilateral donor governments. The data was collected by a team from the Helsinki School of Economics, in collaboration with the Tanzanian Confederation of Industries and the University of Dar es Salaam.

The timing and results of the three surveys were as follows:

Wave of Survey	Timing	Firm Data For	No. Firms	No. Workers
Wave 1	Autumn 1993 (Aug-Oct)	1992	217 firms	1086
Wave 2	Autumn 1994 (Oct-Dec)	1993	213 firms (40 replacements)	653
Wave 3	Early 1996 (Feb- Mar 1996	1994/ 1995*	152 firms (no replacements)	342

** Large firms with written accounts generally report 1994 accounting data; smaller firms without written accounts report 1995 figures.*

The three RPED surveys collected one year of data, plus historical data for some of the key variables. Wave 1 was undertaken in August 1993 (data relates to 1992); Wave 2 was undertaken in October 1994 (data relates to 1993); Wave 3 was undertaken in January 1996 (data is from 1995 for some firms, 1994 for others). The time inconsistency of the data needs to be taken into account when constructing constant price series, by identifying the year to which the data given by each firm refers and deflating by the respective year's price index.

Total sample size was 217 firms in Wave 1, 213 firms for Wave 2 and 152 firms for Wave 3. Unfortunately, no replacement firms were selected in Wave 3, which accounts for the fall in sample size. Missing data from the relevant production section of the questionnaire and subsequent investigation of the data consistency has led us to also exclude a number of these firms from our analytical work. The original sampling frame was the 1989 Industrial Census (for formal sector firms) produced by the Tanzanian National Bureau of Statistics which nominally included all manufacturing establishments with 10 employees or more. A sample of informal sector firms were

also chosen randomly by the interview teams in the locations in which the survey was conducted[1].

The firms constitute a panel which is intended to be broadly representative of the size distribution of firms across the major sectors of Tanzanian manufacturing industry. These sectors include food processing, textiles and garments, wood products and furniture, metal products and machinery. It has been possible to obtain data over the three waves for the majority of the original sample of firms. However, in Wave 2, 40 of the firms that dropped out of the survey (for a variety of reasons) were replaced in the sample by similar firms.

A fourth wave of the Tanzania Manufacturing Enterprise Survey (TMES) was conducted in late 1999, involving CSAE and the Economic and Social Research Foundation (ESRF) in Dar es Salaam. This succeeded in revisiting 89 of the remaining RPED firms and interviewing an additional 106 replacement firms. Similar data was obtained for 1996, 1997 and 1998, thus giving a maximum number of six observation per firm. This data is also available on the CSAE website (see below).

A fifth wave of the TMES is currently being conducted by a team from CSAE and ESRF (January/ February 2002) and will seek to revisit all surviving firms from the Wave 4 sample and gather comparable data for 1999, 2000 and 2001, thus giving a rich panel dataset covering an entire decade.

The first four waves of this dataset are being made available to potential users in two ways: firstly, they will be added to the collection of datasets held by The Data Archive at the University of Essex (tel: 01206 872001); secondly, they can be downloaded from the CSAE's website at the following address www.csae.ox.ac.uk/data.

[1] Details of the sampling process for the RPED surveys can be found in Blanc (1997), Report on the Third Wave of the RPED survey in Tanzania.

2. List of Files & their Contents

The following files and folders are included in this release with a brief description of their contents. Please refer to subsequent sections of this user guide for a more detailed description of the files, how they link together and how they can be used.

Raw Data

Wave 1 (folder)	tz1.por tz1new.por	all firm level data from Wave 1; original (tz1) and cleaned (tz1new) versions of files – note some changes were made to these files after Wave 4 of survey hence they date from 03/00
	wk1.por wk1new.por	all worker level data from Wave 1; original (wk1) and cleaned (wk1new) versions of files
Wave 2 (folder)	tz2.por tz2new.por	all firm level data from Wave 2; as above
	wk2.por wk2new.por	all worker level data from Wave 2; as above
Wave 3 (folder)	tz3.por tz3new.por	all firm level data from Wave 3; as above
	wk3.por wk3new.por	all worker level data from Wave 3; as above
tz123.por	this combined data file (created by Helsinki School of Economics) contains some additional variables which are not available in the individual wave files e.g. industrial sector (INDU), formal or informal firm (SECT)	
isic.por	file containing 4 digit ISIC (International Standard Industrial Classifications) code for each firm	

Questionnaires

w1quest	File containing a scanned version of the Wave 1 questionnaires (firm and worker) showing the coding structure utilised in the data entry programme.
w2quest	File containing a scanned version of the Wave 2 questionnaires showing the coding structure utilised in the data entry programme.
w3quest	File containing a scanned version of the Wave 3 questionnaire showing the coding structure utilised in the data entry programme.

SAS Programs & Datasets

SAS program (convspss.sas) which undertakes conversion of SPSS portable files (raw data) into SAS data file format (*.sd2), so that they can be used with the SAS programs listed here
A set of 12 additional SAS program files (*.sas) which use the raw data files above and create a series of both firm-level and worker-level variables (see table below).
Each program file generates one or more permanent SAS datasets (*.sd2) containing the main variables created. A selection of these are included here (see table below)

SAS Program	Description	Datasets Created	Notes
genfirm1.sas	organises general firm variables from Wave 1 of survey (firm outputs and inputs, capital stock, employment etc.) and sets up size and sector dummies	w1chars.sd2 genfirm1.sd2	some firms excluded due to unreliable production data; revisions made to components of Value Added (VAD) and capital stock (CAP) in light of better information in Wave 4 survey
genfirm2.sas	organises general firm variables from Wave 2 of survey; size and sector dummies	w2chars.sd2 genfirm2.sd2	some firms excluded due to unreliable production data; revisions made to components of Value Added (VAD) and capital stock (CAP) in light of better information in Wave 4 survey
genfirm3.sas	organises general firm variables from Wave 3 of survey; size and sector dummies	w3chars.sd2 genfirm3.sd2	some firms excluded due to unreliable production data; revisions made to components of Value Added (VAD) and capital stock (CAP) in light of better information in Wave 4 survey
merge123.sas	pools 3 waves of general firm data; calculation of constant price, US$ and US$ppp series; produces basic descriptive statistics and pooled production functions.	pool1.sd2	contains a total of 519 observations (out of theoretical maximum of 582 observations, given no exclusions over 3 waves)
ownership.sas	defines dummy variables for firm ownership (domestic/ foreign; state/ private), legal status, age and unionisation	owners.sd2	
firmchars.sas	combines firm characteristics for all 3 waves, including size, sector, location, ownership, legal status, unionisation, export status and firm age	fchars1.sd2	incorporates the variables created in ownership.sas and makes further refinements to some of these variables
humancap.sas	creates average human capital variables by firm; including worker age, tenure, education and previous work experience	humcap.sd2 firm3.sd2	also creates owner/ manager education and experience variables in cd.firm3
invest.sas	investment in land, buildings and equipment over 3 waves, investment/ capital ratios and sources of investment financing	invest.sd2	also contains additional variables for rate of capacity utilisation, purpose and type of investment
finance.sas	firm's involvement in financial markets (borrowing and lending); total net indebtedness; sources of firm financing	finance.sd2	
worker1.sas **workmerge.sas** **workpool.sas**	series of SAS programs which create key worker level variables across the 3 waves, including occupational categories (skilled, unskilled) and earnings.	work1.sd2 merge12.sd2 merge23.sd2 work123.sd2	see additional explanatory notes on the worker data in the text; workpool.sas also contains pooled earnings functions and descriptive statistics; total of 1990 observations in the pooled dataset cd.work123

3. Raw Data Files

The data files are in SPSS portable (*.por) format. Data analysis has been undertaken using SAS, hence it will be necessary to convert the SPSS files into SAS data files (*.sd2) to be able to use any of the SAS programs described in the Data Analysis section below. A SAS conversion program (convspss.sas) is included. Conversion of data files from SPSS into SAS, or other statistical program formats, could also be undertaken using the Stat Transfer software package.

There are one set of the data files (one firm-level and one worker-level for each of the 3 waves) which are the original files as received from the Helsinki School of Economics in January 1999. A significant amount of work was subsequently undertaken to clean some of the main variables contained in these files and also to incorporate new information for firms which were re-interviewed in Wave 4 of the survey in late 1999. Another set of the files (those with the *new suffix) contains the cleaned data which has been used in analytical work at CSAE. Note that there are still sections of the data which may require further cleaning and consistency checks before use. Hard copies of the individual firm questionnaires are stored at CSAE and may be consulted on the basis of a written request and permission being granted.

The coding of variables contained in these files follows the structure of the individual wave questionnaires. These are described in more detail in the next section. Variable names follow the page numbers (though not exactly) and question numbers in the questionnaire. Hence, variable V0301 refers to page 3, question 1 and variable V2610a refers to page 26, question 10a. Note that not all of the variables have been manually coded in the questionnaires (since fully coded versions were not available to us). However, it is relatively simple to track down variables by finding the question you are interested in and using the variable name structure outlined above to search for the relevant variable in the data file. A significant proportion of the thousands of variables have been labeled in the data files, which further assists in this process.

Firms are identified by a firm ID number (firm), which remains constant across the waves of the survey. Firm numbers run in series based upon firm location:

Dar es Salaam	1 – 199;
Arusha/ Moshi	201-299;
Iringa/ Njombe	301-399;
Morogoro	401-499;
Mwanza	501-599;
Tanga	601-699.

In the worker files, individual workers are identified by an ID number (called either “wnb” in the SPSS data files or renamed “WID” in the SAS program files) ranging between 1 – 10, which together with the firm ID number can be used to identify them and manipulate this data. Note that the wnb/WID is missing in some of the “uncleaned” worker files.

In each firm-level data file, there are variables which identify each firm's sector and location. There is an additional file called isic.por which gives 4 digit ISIC codes for all of the firms interviewed in the first 4 waves of the Tanzania survey. However, in the interests of maintaining confidentiality, the information that would identify the specific firm interviewed has been excluded (name of firm, address of firm, name of person interviewed). Please contact CSAE if you require further information in this regard.

A great deal of work has already been undertaken to manipulate the raw data into a more usable format and derive a number of the more important continuous and categorical variables in which economic researchers may be interested. This work is described in more detail in Section 5. A selection of these constructed variables are contained in the SAS program and data files included with this dataset, in conjunction with a descriptive listing of some of the main variables in Section 6 below.

4. Questionnaire Structure and Coding

The dataset presented here has been extracted from a detailed questionnaire conducted with the owners/ senior managers and, for relevant sections, workers of the sampled manufacturing firms. The questionnaire was designed by a team from the World Bank. Over the three waves of the survey, the structure of the questionnaire and the range of questions included has evolved in the light of field experience and in response to emerging research issues. Scanned copies of each of the questionnaires are included with the material made available here.

The overall questionnaire has been divided into a number of sections, grouping questions related to different aspects of firm-level structure and performance and also a section of supplementary labour market information gathered from interviews with a sample of up to 10 workers within each firm. Interviewers were instructed to select workers from the range of occupational categories within each firm, in order to attempt to capture the range of earnings and human capital characteristics of the workforce.

These sections are organised as follows in the Wave III Tanzania questionnaire:

Questionnaire Sections (Wave III)

Firm Identification & Contact Details; Visit Details[2]

1. Entrepreneurship
2. General Firm
3. Competition
4. Technology
5. Labour Markets
6. Training
7. Financial Markets & Contractual Relations
8. Infrastructure
9. Regulation
10. Adjustment
11. Investor Confidence
12. Business Support Services

Appendix to Labour Markets Section:
Survey for a Sub-Sample of Workers & Apprentices

Variables within the data files (e.g. output, employment, exports, earnings) can be identified and extracted by referring to the unique variable code used in the data entry process. See notes on variable coding structure in Section 3 above.

[2] Please note that information on the actual names of firms & persons interviewed and their contact details have been excluded from the data files made available here.

5. Basic Data Analysis

As already mentioned, over the three waves of the survey, the structure and contents of the questionnaire have been modified. Hence, while the data collected over the three years is broadly comparable, there are some differences, which have subsequently entailed substantial work to improve the data's organisation and derive consistent variables across the three waves. It is also important to take into account various differences in reporting conventions between firms in the sample – for example firms which report their production and sales data for different time periods (i.e. weeks, months, years).

This work of organising and "cleaning" the raw data in order to ensure that it can be used successfully in variable identification and analysis has been undertaken using the SAS programming language. Further revisions to some of the variables for some firms have been undertaken in the light of information obtained in Wave 4 of the survey[3]. We also discovered that some of the firms originally interviewed were not manufacturing firms, but trading or service firms and hence these have been excluded from subsequent analysis.

As a result of this work, standardised variables across the three waves have been created in several SAS program files (with file extension *.sas) and have been broadly separated according to the types of variables that these files generate. In order to be able to run these programs on the data, it will of course be necessary to modify the library names given at the top of each program which reference the paths of the directory in which the respective raw data files are stored. At the moment the reference is to a directory path 'd:\tanzrped\'.

Each of the program files contains a series of data steps which, in most cases, organise the various waves of the data, pool the three waves and create a whole range of variables of interest to the researcher (some of the main ones are listed below). At the end of each program a permanent data file is created which retains the main variables generated for further analysis. These constructed SAS datasets with file extension *.sd2 are included in the SAS Data folder. A list of some of the main variables in these data files and the methods used in their construction is included in Section 6 of this guide.

Additional Note on Worker Data

Use of the worker data for Waves 1-3 is complicated by a flaw in the questionnaire design. In Wave 1, each worker interviewed was assigned a worker ID number (WID) but their names were not recorded. Questions were asked about time-invariant

[3] Where subsequent information indicated clearly that erroneous data had been entered for specific firms, changes were made in the original data files (*new). Some additional revisions to components of value added and the capital stock, mainly designed to ensure consistency between waves, have been undertaken for a number of firms in the SAS programming. Where there were significant doubts about the veracity or consistency of data for specific firms, these firms were excluded from the analysis in the relevant SAS program.

characteristics of each worker e.g. sex, age, educational standard attained and previous work experience.

In Wave 2, the worker's name was recorded and then each worker was asked whether they had been interviewed previously? If they said they had, then the time-invariant questions were skipped. However, without the worker's name in Wave 1 it is often difficult to match these Wave 2 workers with their crucial human capital characteristics recorded in Wave 1 (where up to 10 workers are recorded per firm). Matching can only be done using job categories and wages received, but these are often inconsistent and common to several of the workers. The worker ID's across waves are not consistent, hence these cannot be used either i.e. the worker in firm x with WID=2 in wave 2 is not necessarily the same worker with WID=2 in wave 1 .

In Wave 3, workers were asked their names and whether they had been interviewed in the previous round. Observations on Wave 2/3 only workers are relatively easy to match, since their names are recorded in both years. But observations on Wave 1/2/3 workers suffer from the same matching problem as above.

In order to try to sort out these problems and minimise the number of usable observations lost, due to lack of information on worker human capital variables, we have undertaken a matching procedure (using all available information). The steps in this rather convoluted process are contained in the SAS program files (worker1.sas; workmerge.sas; workpool.sas).

Also, please note that questions on worker allowances were not included in the Wave 1 questionnaire. In order to allow comparability of earnings (wages plus allowances) over waves, we have used information on aggregate allowances paid in Section 5 of the firm questionnaire and estimated average monthly allowances per employee. This method unfortunately does not allow us to identify differences in allowances between workers in different occupational categories within the firm.

6. Variable Definitions

(a) Continuous Variables used in Production Functions

Output (OUTPUT)

Value of firm's total production during previous year. Values are annualised from monthly or weekly figures reported by some firms. Note that where there is a missing observation, output is set as the value of firm's total sales in the previous year (= *SALES*). In Wave 1, we have chosen to use sales figures instead of output, as there were many missing observations on output and the sales figure is more consistent.

Raw Material Costs (RAWMAT)

Cost of raw materials used in producing firm output per period. Note that this differs from raw materials purchased (by an amount equivalent to the change in stocks of raw materials).

Indirect Costs (MISC)

Indirect costs of production, including rent, utilities, transport, security, maintenance and other overheads (but excluding labour or capital costs).

Value Added (VAD)

Calculated by taking firm output less raw material inputs and indirect costs.

Labour costs (LABCOST)

Cost of labour including wages (*WAGES)* and allowances *(ALLOW).*

Calculated Profits (PRCALC)

Calculated by subtracting labour costs from value added. This is a measure of gross profits before tax and other charges, including interest payments and depreciation.

Reported profits (PROFIT)

Gross profit, before tax and capital charges, as reported in the firm's accounts, where available.

Profit Rate (PRATE)

Measured as the ratio between calculated firm profits and the replacement value of the firm's capital stock (PRCALC/CAP)

Capital Stock (CAP)

This is the replacement value of the firm's total stock of plant and equipment (excluding land and buildings), which is the preferred measure used in all derived variables using capital. Another variable CAPSALE measures the capital stock's estimated resale value.

Total Employment (EMP)

Total number of firm employees, including the owner/ manager, including both full and part-time workers, but excluding seasonal workers.

Capacity Utilisation (CUTIL)

Measured as actual output/ potential output * 100. Potential output was determined by asking firms how much additional output they could produce with no additional investment in plant and equipment. Note: the original data was not collected on a consistent basis across all three waves.

Export Dummy (EXPDUM)

Dummy for whether firm exports. Additional information is available for some waves as to the proportion of output exported to African countries (*EXPAF)* and the proportion outside of Africa (*EXPNAF*). Care needs to be taken in using these variables as the questions asked differ between waves.

Derived Variables:

Capital/ Labour Ratio (CAPEMP)
Labour Productivity measure (VADEMP)
Return on Capital Employed (VADCAP)

Constant price series:

Output (*OUTCP*), Value added (*VADCP*), Capital stock (*CAPCP*)

(b) Categorical Variables/ Firm Level Characteristics

***Location dummies*:**

DSM	Dummy = 1 for firms based in Dar es Salaam
MOROG	Dummy = 1 for firms based in Morogoro
TANGA	Dummy = 1 for firms based in Tanga
ARUSH	Dummy = 1 for firms based in Arusha/ Moshi
MWANZ	Dummy = 1 for firms based in Mwanza
IRINGA	Dummy = 1 for firms based in Iringa/ Njombe
CAPCITY	Dummy=1 for firms based in capital (i.e. Dar es Salaam)

***Sector dummies (4 main sectors and disaggregated)*:**

The survey covers four main manufacturing sectors: food and beverages (FOOD), textiles and garments (TEXT), wood processing and furniture (WOOD) and fabricated metal and machinery (METAL). For analytical purposes, where possible these main sectors are further disaggregated into a total of ten subsectors:

Sector	ISIC Code	Variable Name
Food products	ISIC 3110 - 3129 (exc. 3117)	FOODX
Bakeries	ISIC 3117	BAKE
Beverages	ISIC 3130 – 3135	BEVS
Textiles	ISIC 3210 – 3219	TEXTX
Garments	ISIC 3220	GARMENT
Footwear	ISIC 3240	SHOES
Wood Products	ISIC 3310 – 3319	WOODX
Furniture	ISIC 3320	FURN
Fabricated Metal	ISIC 3810 – 3819	METALX
Machinery	ISIC 3820 – 3850	MACHINE

***Size dummies*:**

These are based upon average number of employees (including both full and part-time workers, but excluding seasonal workers) over the three waves of the survey.

MICRO	Dummy = 1 for micro firms (1 - 5 employees inclusive)
SMALL	Dummy = 1 for small firms (6 – 29 employees inclusive)
MEDIUM	Dummy = 1 for medium firms (30 – 99 employees inclusive)
LARGE	Dummy = 1 for large firms (100 or more employees)

Ownership dummies:

STATE	Dummy = 1 for 100% state-owned enterprises
SSTATE	Dummy = 1 for firms with some degree of state ownership (less than 100%)
SFOR	Dummy = 1 for firms with some degree of foreign ownership (less than 100%)
TZOWN	Dummy = 1 for private firms with 100% domestic ownership
ANYFOR	Dummy = 1 for firms with any degree of foreign ownership (including 100%)
ANYST	Dummy = 1 for firms with any degree of state ownership (including 100%)

Alternative Ownership Dummies:

PRIVDOM	Dummy=1 for Private domestic owners only
PRIVFOR	Dummy=1 for Private foreign owners only
PRIVDF	Dummy=1 for Private foreign and domestic owners
SPRIVDOM	Dummy=1 for Private domestic owners & some state ownership
SPRIVFOR	Dummy=1 for Private foreign owners & some state ownership
SPRIVDF	Dummy=1 for Private foreign and domestic owners & some state ownership
PCFOR	Percentage of foreign ownership (%)

Legal Status of Firm

SOLO	Dummy=1 for sole trader
PARTNER	Dummy=1 for partnership
LLE	Dummy=1 for limited liability enterprise
PRIVCORP	Dummy=1 for private corporation
STATCORP	Dummy=1 for state corporation
COOP	Dummy=1 for cooperative
SUBDOM	Dummy=1 for subsidiary of Tanzanian firm
SUBFOR	Dummy=1 for subsidiary of foreign firm

Owners Ethnicity

AFRICAN	Dummy=1 for African owners
ASIAN	Dummy=1 for Asian (Indian) owners
MIDEAST	Dummy=1 for owners of Middle East/ Arabian origin
OTHER	Dummy=1 for other ethnicity including European and Chinese

Firm Age

Dummies created using the continuous variable (FIRMAGE), which is based on the year in which the firm first commenced operations (STYEAR).

OLD	Dummy=1 for firms > 20 years
MATURE	Dummy=1 for firms 11 – 20 years inclusive
YOUNG	Dummy=1 for firms 6 – 10 years inclusive
NEW	Dummy=1 for firms < 6 years

(c) Worker Level Variables & Characteristics

AGESCH	Age left school
YRENDSC	Year left school
EDUC	Number of years of education (0-16 years) calculated from highest level of formal education completed
IMPEDUC	Imputed education (number of years taken to complete highest level of education, calculated from worker age and year left school, assuming entry at age 6)
TENURE	Number of years employed by current firm
WAGE	Wage received (per time period)
ALLOW	Allowances received (per time period)
EARN	Total earnings (wages & allowances) (per time period)
PCALLOW	Ratio of allowances to total earnings

Occupational Categories

The worker questionnaires contain a total of 19 occupational categories into which workers were classified (*OCCUPAT*). These have been organised into a total of 8 combined categories for analytical purposes [with composite groups in brackets]:

MGMT	Dummy=1 for management [employed manager; owner manager]
ADMIN	Dummy=1 for senior administrative staff [engineer; scientist; accountant; technician] *Note: all should have university degree or professional qualification*
CLERIC	Dummy=1 for clerical staff [skilled office; unskilled office]
SALES	Dummy=1 for sales staff [specialised sales; sales assistant]
SUPER	Dummy=1 for production supervisors
TECH	Dummy=1 for technical staff [electricians, plumbers, welders; maintenance]
PROD	Dummy=1 for production workers [machine operator; labourer/helper; skilled production worker; service worker]
APPREN	Dummy=1 for trainees/ apprentices

7. Price Deflators Used

In order to construct the constant price series for gross output (OUTPUT) and value added (VAD), we have experimented with the use several alternative price deflators.

Consumer Price Index:

We initially used the consumer price index (CPI) for mainland Tanzania as our price deflator. The trend path of this index is shown in Table 1. Price inflation was an important factor throughout the survey period, peaking at 33.1% in 1994, hence our results are potentially sensitive to price changes. It is believed that changes in prices faced by domestic producers for their inputs and outputs may differ considerably from levels of consumer price inflation, due to increased competition in most product markets and a number of additional price distortions facing domestic producers (including indirect taxation and tariffs on their imported inputs).

Table 1: National Consumer Price Index, Mainland Tanzania

	CPI (1992=100)	% change	Food (1992=100)	% change	Non-Food (1992=100)	% change
1988	36.0					
1989	47.0	30.3%				
1990	63.8	35.8%				
1991	82.1	28.7%				
1992	100.0	21.8%	100.0		100.0	
1993	125.3	25.3%	120.1	20.1	133.8	33.8
1994	166.7	33.1%	167.1	39.1	165.8	23.9
1995	216.4	29.8%	216.7	29.7	208.9	26.0
1996	259.0	19.7%	260.9	20.4	254.8	22.0
1997	300.6	16.1%	306.5	17.5	288.0	13.0
1998	339.1	12.8%	351.6	14.7	311.3	8.1
1999	365.8	7.9%	382.5	8.8	328.7	5.6

Source: IMF International Financial Statistics; Bank of Tanzania Economic Bulletin 2000 Q1

To take account of possible inter-sectoral inflation differentials, we also undertook analysis using the food and non-food components of the CPI index (for firms in the relevant sectors). It can be observed that food prices have risen faster in Tanzania since 1992 than prices of a basket of non-food products.

Available producer price data shows that the rate of increase of producer prices has been below the CPI changes for this period. Hence, the use of the CPI as a price deflator will have introduced an artificial downward bias into our calculations of real output and value added for the later years.

Producer Price Deflators:

More recently, we have used 45 producer price series at the 4 digit ISIC level as a set of deflators for firms' real output and value added. This price data was obtained from the National Bureau of Statistics (NBS) in Dar es Salaam and is based upon price indices taken from returns to their Quarterly Survey of Industrial Production (QSIP).

This producer price index was last published in 1996 but has now been updated to June 1999. These indices are presented in Table 2 below.

There are firms in our survey which fall within 4 digit ISIC product groups for which there is no price series available in the NBS indices, presumably because there are no firms in their sample producing these products. One example of this is the lack of a price index for furniture (ISIC 3320) in the NBS data, since their survey excludes furniture producers which are mainly small-scale enterprises. In these cases we have used the price index for the ISIC category which is closest to the missing category e.g. we have used the wood products (ISIC 3319) price index to deflate the outputs of furniture firms in our sample. This is obviously not an ideal solution and we hope in the future to develop firm-specific price deflators using internal price data from our survey.

Some data on prices of firm outputs and material inputs were collected in all four rounds of the survey. In the three RPED surveys, product prices can only be derived from data on quantities of products produced and the total value of output or sales. In the Wave 4 survey, firms were explicitly asked for unit sale prices and input prices. It is intended that this data will be used in future analysis of firm growth and productivity to construct a set of alternative producer price series for comparison with the NBS price indices. Other studies have also emphasised the importance of allowing for differential changes in firms' output and input prices when constructing real VAD series.

Capital stock deflator:

We do not have a reliable measure of changes in the domestic prices of firm's plant and machinery and other capital goods. A considerable proportion of these capital goods are imported and hence their shilling value depends partly on changes in nominal exchange rate. The capital stock deflator we have used is a weighted average of the national CPI (weight = 0.5) and the nominal US dollar exchange rate (weight = 0.5). We have some evidence from the producer price series for domestically-produced machinery that capital goods prices have risen in line with changes in the CPI. A comparison of alternative deflators is presented in Table 3.

Exchange Rates:

Table 4 shows trends in the nominal exchange rate of the Tanzanian Shilling against the US dollar (the benchmark currency for cross-country comparative work to date). There has been a substantial devaluation since 1992, although the major nominal devaluation took place from 1988-92 with the move from a fixed to floating rate mechanism. We also calculate a simple real exchange rate measure which suggests an appreciation over the survey period, due to the high levels of domestic price inflation. This will have served to make production for the domestic market more attractive, in comparison to export markets.

Table 2: Producer Price Series by 4 Digit ISIC Categories

ISIC	Activity	1992	1993	1994	1995	1996	1997	1998	1999
3111	Meat products	100	114	152	201	214	230	239	254
3112	Dairy products	100	113	145	174	251	321	331	304
3113	Fruit & Veg Canning	100	90	119	142	134	155	146	160
3114	Fish & sea products	100	114	152	201	243	310	337	354
3115	Vegetable oils & fats	100	119	127	161	195	225	260	286
3116	Grain Mill products	100	110	129	168	175	165	166	178
3117	Bakery products	100	124	168	231	253	226	213	242
3118	Sugar refineries	100	108	166	215	237	249	238	243
3119	Confectionary	100	117	134	147	153	163	190	207
3121	Food products & animal feed	100	139	138	223	221	220	250	283
3122	Food products & animal feed	100	139	138	223	221	220	250	283
3131	Distilled spirits, wine & beer	100	110	140	156	179	188	207	212
3132	Distilled spirits, wine & beer	100	110	140	156	179	188	207	212
3133	Distilled spirits, wine & beer	100	110	140	156	179	188	207	212
3134	Soft drinks	100	129	179	210	327	401	399	391
3140	Tobacco & cigarettes	100	117	179	210	260	261	263	264
3211	Spinning & weaving	100	101	114	186	209	217	220	221
3212	Made up textiles	100	132	187	266	292	346	360	357
3213	Knitting mills	100	104	119	191	227	202	180	197
3214	Carpets & rugs	100	104	119	191	227	236	241	246
3215	Cordage, rope & twine	100	126	180	240	299	328	351	371
3219	Other textiles	100	104	119	191	227	236	241	246
3220	Garments	100	104	119	191	227	236	241	246
3233	Leather products	100	104	119	191	227	236	241	246
3240	Footwear (exc rubber & plastic)	100	104	119	191	221	268	269	280
3311	Sawmills	100	147	156	194	233	241	256	249
3312	Wood products	100	147	156	194	233	241	256	249
3319	Other wood products	100	147	156	194	233	241	256	249
3320	Furniture & fittings	100	147	156	194	259	311	295	295
3511	Industrial Chemicals	100	101	155	184	198	217	247	339
3513	Plastics & Foam	100	101	155	184	198	217	247	339
3811	Cutlery, tools & hardware	100	116	165	241	272	276	278	269
3812	Metal Furniture	100	116	165	241	272	276	278	269
3813	Metal structures	100	119	154	222	282	292	316	319
3819	Fabricated metal products	100	119	154	222	282	292	316	319
3821	Engines & Turbines	100	110	132	159	169	160	160	159
3822	Agric. Machinery	100	105	120	143	241	235	251	251
3823	Metal & wood machinery	100	105	120	143	241	235	251	251
3824	Industrial Machinery	100	105	120	143	241	235	251	251
3829	Other machinery	100	105	120	143	241	235	251	251
3831	Electrical machinery	100	110	132	159	169	160	160	159
3833	Electric appliances	100	110	132	159	169	160	160	159
3839	Other Electrical mach.	100	110	132	159	169	160	160	159
3843	Motor vehicles	100	115	140	156	151	152	152	162
3844	Bicycles & motorcycles	100	115	140	156	151	152	152	162
3849	Transport equipment	100	115	140	156	151	152	152	162

Source: NBS Producer Price Indices, unpublished data (1996-99)

Table 3: Alternative Capital Stock Deflators

	ER	CPI	Cap Defl 1		Cap Defl 2		Cap Defl 3	
			0.5 ER/0.5 CPI		0.8 ER/0.2 CPI		0.2 ER/0.8 CPI	
1988	99.29	56.52	77.91	*1.00*	90.74	*1.00*	65.07	*1.00*
1989	143.38	73.62	108.50	*1.39*	129.43	*1.43*	87.57	*1.35*
1990	195.06	100.00	147.53	*1.89*	176.05	*1.94*	119.01	*1.83*
1991	219.16	128.70	173.93	*2.23*	201.07	*2.22*	146.79	*2.26*
1992	297.71	156.80	227.26	*2.92*	269.53	*2.97*	184.98	*2.84*
1993	405.27	196.40	300.84	*3.86*	363.50	*4.01*	238.17	*3.66*
1994	509.63	261.40	385.52	*4.95*	459.98	*5.07*	311.05	*4.78*
1995	574.76	339.30	457.03	*5.87*	527.67	*5.82*	386.39	*5.94*
1996	579.27	406.10	492.69	*6.32*	544.64	*6.00*	440.73	*6.77*
1997	612.12	471.40	541.76	*6.95*	583.98	*6.44*	499.54	*7.68*
1998	664.67	531.70	598.19	*7.68*	638.08	*7.03*	558.29	*8.58*
1999	739.25	573.60	656.43	*8.43*	706.12	*7.78*	606.73	*9.32*

Source: Author Calculations

Table 4: Tanzania Nominal and Real Exchange Rates

	Nominal Exchange Rate Tsh/US$	Index 1992=100	Real Exchange Rate (a) Tsh/US$	Index 1992=100
1986	32.7	11.0		
1987	64.26	21.6		
1988	99.29	33.4	193.06	88.4
1989	143.38	48.2	219.69	100.6
1990	195.06	65.5	222.17	101.8
1991	219.16	73.6	195.66	89.6
1992	**297.71**	**100.0**	**218.35**	**100.0**
1993	405.27	136.1	238.13	109.1
1994	509.63	171.2	229.86	105.3
1995	574.76	193.1	209.71	96.0
1996	579.27	194.6	177.59	81.3
1997	612.12	205.6	159.20	72.9
1998	664.67	223.3	149.51	68.5
1999	739.25	248.3	154.14	70.6

*Notes: (a) RER = Nominal exchange rate * (US Export Price Index/ Domestic CPI)*

Selected Bibliography

Blanc, Xavier (1997), "Industrial Change under Structural Adjustment: Tanzania 1993-1996", Wave 3 Report, Helsinki School of Economics, February 1997.

Harding, Alan and Francis Teal (1999), "Tanzanian Manufacturing Sector Performance in a Comparative Perspective 1992-95", CSAE Report, University of Oxford, October 1999.

Harding, Alan and Francis Teal (2000), "Firm Survival, Growth and Productivity: Tanzanian Manufacturing in the 1990's", mimeo, CSAE, University of Oxford, October 2000.

Helsinki School of Economics (1995), "Dynamics of Enterprise Development in Tanzania: Final Report on the Round 2 Survey Data", Helsinki, July 1995.

Ndulu, Benno and Joseph Semboja (1992), "Trade and Industrialisation in Tanzania: A Review of Experience and Issues," in *Trade Policy, Industrialization and Development: New Perspectives*, G. K. Helleiner ed., Oxford: Clarendon Press, pp. 515-53.

Wangwe, Samuel, F. Musonda and J. Kweka (1997), "Policies for Manufacturing Competitiveness: The Case of Tanzania", Working Paper, Economic and Social Research Foundation (ESRF), Dar es Salaam.