CHAPTER 1

TRADE AND MANUFACTURING: AN OVERVIEW

1.1 INTRODUCTION AND BACKGROUND

This chapter provides an overview of the issues that are analysed in the rest of the study. It starts with brief introductory remarks on the debate regarding the links between productivity, labour demand and trade in Section 1.2. Section 1.2 also provides the key hypotheses that are investigated. The problem statement, the underlying motivations for the study and the point of departure from existing work are presented in Section 1.3. Section 1.4 details the concluding remarks that suggest that the jury is still out on the theoretical and empirical underpinnings of the trade, productivity and labour demand nexus, providing justification for further empirical analysis to inform the debate. Section 1.5 provides an outline for the remainder of the thesis.

1.1.2 An overview of the debate.

Trade liberalisation results from policies that remove restrictions on the free movement of goods and services. The policies include the removal of import quotas, the lowering of import tariffs, the diminishing of export restrictions and the lowering of export taxes. The end result of these measures should be a decrease in the price of imports, and an increase in the price of exports if markets are working and strong supply elasticities obtain (Djikstra, 2000:1568). In sum, these measures should lead to an increase in imports and exports as outcomes[1].

[1] Openness refers to trade outcomes while trade liberalisation denotes explicitly the reduction of domestic trade policy barriers.

There are a number of suggestions as to why the impact of increased trade on manufacturing in South Africa should be a matter of concern. One suggestion is that productivity growth and technical change are more robust in manufacturing industries than in other sectors of the economy, which implies that technological spillovers from industry to the rest of the economy may be critical for economic growth. In addition, the growth of manufactured exports is considered to be an indicator of dynamic efficiency, which is important for overall sustained growth of the economy (Dijkstra, 2000:1567). Trade expansion is also important, because it affects the efficiency with which factors of production, such as labour, are used in industries, and it has implications for the level of employment in the manufacturing sector.

More specifically, the debate regarding the effect of trade expansion on manufacturing concerns two interrelated issues. The first relates to the relationship between trade and manufacturing productivity[2] and the second relates to the effect of trade on derived labour demand. These issues remain largely contested (Deraniyagala and Fine, 2001:4). For instance, in the neoclassical growth model, trade does not affect the steady state rate of output growth, because growth is determined exogenously given technological progress (Funke and Ruhwedel 2001:226). However, because of imperfections, a number of possibilities can occur as a result of trade policies. In some models, trade policy affects the steady state level of savings and capital accumulation. The impact on growth can, therefore, be positive or negative depending on how capital accumulation and savings respond. The effects of trade in the neoclassical model are only transitional, changes that occur only while the economy converges towards the steady state (Gunnar and Subramanian, 2000:4). Models

[2] A fundamental debate concerns the seemingly miraculous development in East Asia and hence the relative importance of TFP in explaining the Asian Miracle.

following Solow (1957) explain output growth by the accumulation of factor inputs and the growth of total factor productivity[3].

Trade literature also differentiates between the static[4] and dynamic gains from trade expansion (Dijkstra, 2000:1568). The static effects can arise from an improvement in either allocative or technical efficiency. An improvement in technical efficiency occurs when the same output is produced with fewer resources or more output is produced with the same amount of resources. Allocative efficiency improvement occurs if resources are better allocated over the whole economy. Improvements in technical and allocative efficiency are one off changes resulting from the change in relative prices, which follow trade expansion. Dynamic gains tend to be long term and evolve from the elimination of rent seeking and gains from technical efficiency and entrepreneurial effort. When markets are characterized by entry barriers, the absence of foreign competition allows domestic producers to enjoy monopoly power and excess profits, making dynamic gains unattainable (Tybout et al 1991; 231). Increasing returns to scale are also cited as an important source of dynamic gains from trade. These gains result because firms operating in more open trade regimes operate at lower average costs due to higher levels of output available through participating in world markets. An improvement in dynamic efficiency is expected to lead to a permanently higher growth rate. The higher growth rate results from more investment, research, innovation, learning and productivity (Dijkstra 2000:1568).

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[3] An alternative perspective is that the rapid output growth stems from rapid rates of factor accumulation and not of total factor productivity. East Asian economies are said to have been effective at mobilising and sustaining high rates of investment. Manufacturing productivity, therefore, did not benefit from access to broad export markets or from enhanced inflows of FDI and technology transfer. Young (1995) argues that high rates of capital accumulation accounted for the bulk of the increase in manufacturing productivity over time in the Asian tigers.

[4] The static benefits from trade liberalisation are emphasised in the Ricardian and neoclassical theories.

While traditional trade theory makes the static effects of trade expansion clear cut, the contention regarding the relationship between trade and productivity arises because there are no clear and general presumptions regarding the dynamic benefits of trade (Deraniyagala and Fine, 2001:4). There have been few rigorous theoretical models designed to show how trade and growth could be dynamically linked. Some traditional arguments have emphasised the export channel as a possible dynamic link. In this framework, trade enhances total factor productivity performance by promoting innovation, cost-cutting and acquisition of new technology. Though these arguments are appealing, the analytical underpinnings are regarded as insufficient. The trade and productivity debate also relates to whether policy can influence productivity growth, as is suggested in the endogenous growth literature (Funke and Ruhwedel, 2001:226).

Models of endogenous growth first isolate technical development and then look for possible mechanisms through which improvements in productivity (notably due to innovation, imitation, product variety, human capital and public infrastructure via the sphere of policy) are important for ongoing economic growth. Endogenous[5] growth models allow for the impact of trade on output growth to be either positive or negative. Even in these improved approaches, scepticism persists. Scepticism continues because any possible trade and growth outcomes can be rationalised by changing analytical assumptions[6].

The second issue regards the effect of increases in trade volumes on the level of derived labour demand in manufacturing. Opponents of expanded trade argue

[5] Recently, endogenous growth-trade theorists have provided a range of formal models in which trade contributes to economic growth by, among other things, increasing the variety and quality of intermediate inputs, increasing the diffusion of knowledge, amplifying the learning-by-doing effects, and increasing the size of the markets (Iscan, 1998:1). Trade policy in endogenous growth models can affect growth through technological change. Implications from these models are, however, sensitive to assumptions imposed on the nature of technology spillovers.

[6] An interesting discussion on the role of scope and the extent of technology spillovers is provided in Kim (2000).

that foreign firms may out-compete domestic producers leading to fewer domestic jobs in the manufacturing sector, because lower domestic output is the end result of higher import competition. Trade proponents, on the other hand, posit that free trade expands export markets, resulting in greater demand for manufactured products, greater domestic production and, hence, more jobs. The consensus, however, appears to be that trade volumes do affect, in some way, the efficiency with which firms use labour as well as the distribution of output within sectors between the more and less efficient firms. However, since the issue of labour demand in the manufacturing sector is of critical importance, the direct investigation of the impact of international competition on manufacturing employment remains of vital importance both to academia, policy makers and entrepreneurs.

1.1.3 Linking trade, productivity and labour demand in industry

Theoretically the link between trade liberalisation, productivity and labour demand is less clear than previously asserted (Fajnzylber and Maloney, 2004:2). Indeed, Krishna et al (2001) find that industry labour demand seems to be unresponsive to openness. However, Fagerberg (2000:409) argues that in the first half of the 20th century growth of output, productivity and employment were strongly correlated. Employment in industries based on new technologies expanded rapidly at the expense of more traditional industries, suggesting an important role for structural change in explaining overall productivity growth. More recently, this relationship has been blurred. For example, new technology in electrical machinery has expanded at a very rapid rate but there has not been a similar large increase in the share of that industry in employment.

It is important to investigate the impact of trade on derived labour demand because this issue still attracts considerable debate. For example, Ghose (2000)

reports that in developing countries that emerged as important exporters of manufactures to industrialised countries, growth of trade had a large positive impact on employment and wages[7]. In this vein he argues that the popular apprehensions about the effects of trade liberalisation, though not wholly unfounded, are grossly exaggerated. However, the investigation of the impact of trade on derived labour demand is complicated by a number of factors. First, there are controversies on the appropriate methodology of using available statistical data for assessing the effects of trade on labour markets. Second, most estimates, irrespective of the methodology used, show the effect of trade to be rather small (Greenaway et al: 489).

An important problem also relates to the fact that debates on the subject of trade and derived labour demand have largely been about the effects of trade liberalisation on labour markets in industrialised countries. The effect of trade liberalisation on manufacturing employment in developing countries has so far received inadequate attention in investigative work. Because of inadequate research in this area, there remains serious apprehension in developing countries regarding the employment effects of trade liberalisation. When global competitiveness is emphasised, many feel, trade liberalisation could encourage capital intensity in manufacturing, thereby reducing its capacity to create jobs. In some countries, export oriented manufacturing has also often been associated with low wages and poor working conditions (Ghose, 2000:4).

In spite of this debate, the link between trade, productivity and industry labour demand is informed by various parts of economic theory (Naastepad and

[7] Indeed, Roberts and Thoburn (2001, 2002) argue that employment and wage changes have been one of the major channels through which trade liberalisation generates poverty in the South African economy. In their study they argue that trade liberalisation led textile firms to experience fierce import competition leading to a fall in employment in the sector. This study suggests that liberalisation and restructuring increased productivity largely through cost minimisation and down sizing measures, but failed to support strong growth in production.

Kleinknecht, 2004). In the neo-classical substitution framework, the causality runs from relative prices to relative factor prices. A fall in the price of labour relative to the price of capital induces industries to substitute labour for capital, thus reducing the capital intensity of production. The decline in the capital intensity of production reduces the productivity of labour. In this framework, the impact of trade is dependent on what happens to relative prices. Domestic real wage increases relative to those abroad reduce international competitiveness and hence lower export growth. Domestic real wage increases may result in profit squeeze thereby reducing industry investment and productivity.

In the vintage analysis, the productivity of capital depends on age (or vintage) of capital, more recent vintages are assumed to be more productive than older ones. Through trade, industries can improve productivity because they can acquire more recent vintages of capital. In a related way, if the real wage rises it becomes more efficient for industries to import new more productive vintages of capital to raise labour productivity to the higher real wage. Furthermore, under the induced technological change theory, higher relative wage rate increases the labour saving bias of newly developed technology (Funk, 2002).

More recently, endogenous growth theory has emphasised that a profit maximising capitalist's decision to invest in R&D depends on the share of wages in total costs, the higher the wage share, the more profitable it becomes to devote resources to increasing the productivity of labour (Foley and Michl, 1999). There are several mechanisms through which productivity growth may be affected. For example, trade can facilitate learning by investing. This occurs because the introduction of new capital enables the firm to learn how to produce more. In addition, anticipation of higher profits potential from increased trade suggests that technological advance may stimulate capital formation, because the

opportunity to modernise equipment promises a higher rate of return on investment.

In the demand driven models of technological change (Verdoorn, 1949 and Geroski and Walters, 1995) innovative activity and labour productivity growth are stimulated by buoyant demand prospects. Trade could foster innovation to the extent that it leads to an increase in effective demand for the products of manufacturing industries. If an economy can increase its pace of technological progress by means of capital imports that embody the latest technology, and by cross boarder transfer of knowledge, the higher will be its TFP growth (Wolf, 1996). In view of the debate regarding the theoretical links between trade, productivity and derived labour demand in industry, it is important to investigate these issues within the South African context. To open this investigation, Section 1.1.4 outlines the problem statement and motivation of the study.

1.1.4 Problem statement, motivation and point of departure

This study is motivated by the need to provide a perspective regarding the effects of trade on productivity and labour demand in South Africa's manufacturing sector. These issues are deemed important, because increased trade generates two effects. First, it exposes the sector to more competition. Second, it widens opportunities for exporting to a larger international market. Strong competitive pressures could result from a surge in imports or in attempts to break into an expanded international export market. To benefit from trade, productive efficiency, product quality and labour efficiency must be improved. Success in efficiency improvement will create access to larger markets, providing enhanced opportunities for employment. Productivity and employment change in the manufacturing sector are, therefore, important components of the growth,

employment and trade nexus. Policy makers and industry agents need to obtain knowledge about the manufacturing sector in order to introduce measures aimed at improving productivity and, possibly, labour demand in a sufficiently robust manner.

Empirical implementation proceeds in three steps. First, an underlying production function is estimated to obtain industry specific, but time varying, measures of total factor productivity. Second, total factor productivity (TFP) is decomposed into efficiency and technical change. Because the two components of productivity are analytically very different, it is important to distinguish between them if lessons that inform policy are to be derived. Failure to take account of technical change in measuring TFP produces biased estimates that would suggest all firms are operating with maximum efficiency (Mahadevan, 2001). The production function for the manufacturing sector is obtained by pooling cross sectional data of 28 manufacturing industries over the 1980-2002 period. This sample contains a longitudinal data set of 644 observations (28 industries in 23 years). The explicit specification of the production function allows us to use statistical methods and inference to evaluate the reliability of the results. Indeed, a longstanding problem in the analysis of production functions has been the inability to separate technical change from efficiency in purely cross-sectional or time series data. The availability of panel data may help in addressing some of these concerns (Kumbhakar, 1991:43).

Third, total factor productivity is interacted with trade measures, macroeconomic factors and industrial characteristics to determine its key drivers. Emphasis on delineating productivity determinants is placed on the channels through which trade intensity affects manufacturing productivity. Empirical implementation relies on interacting productivity with determinants that exhibit significant variation across industries over time. Lastly, a logical concluding analysis is the

investigation of the impact of trade on derived labour demand in the manufacturing sector. Derived labour demand is investigated within a context that permits the disagregation of imports by origin for the 28 standard industry codes of the South African manufacturing industry. Investigating derived labour demand in a panel data context is more informative, because benefits from more variability, more degrees of freedom and more efficiency are derived (Baltagi, 2000:5). These benefits are unavailable within time series or strictly cross sectional based studies. It is argued that, with increased competition arising from globalisation, employment and productivity growth in manufacturing have become some of the most important variables of interest in any economy. Therefore, employment and productivity growth are critical indicators monitored by both households and policy-makers regarding the performance of the economy (Tomiura, 2003:118).

This study is an attempt to provide further empirical evaluations of the growth effects of trade, because the empirical evidence on the dynamic effects of trade on productivity and employment remains inconclusive. The works of Gunnar and Subramanian (2000), Fedderke (2001), Fedderke and Vaze (2001), Petersson (2002), and Naude, Oostendorp and Sserumaga-Zake (2002) represent some of the most comprehensive attempts at investigating the dynamic gains from trade in South Africa. However, these studies open a number of areas for further investigation at the empirical level. Given this caveat, this study will attempt to make contributions in four areas. These areas are itemised and discussed in the sub-sections that follow, below.

1.1.3.1 Panel data application

Panel data is employed in estimation to take advantage of time varying trade measures and macroeconomic shocks, as well as available industry specific characteristics on the manufacturing chapters. These industry specific characteristics are important from productivity and employment points of view. Previous attempts relied either purely on aggregated time series or on purely cross-section data or were just descriptive. Allowing for large variability at a disaggregated level helps generate more meaningful results.

1.1.3.2 Components of total factor productivity.

The study helps to identify the components of total factor productivity by taking advantage of the longitudinal structure of the manufacturing data set. An underlying production function is used to decompose manufacturing productivity into efficiency and technical change. This decomposition, not only provides more avenues for policy making, it also helps to indicate how these effects panned-out in the aggregate, in response to expanded trade. The identification of the components of productivity in manufacturing is important because, despite wide reaching trade reforms, little is known about the relationship between trade, domestic competition and manufacturing efficiency in South Africa[8].

[8] There is a strong case for investigating the effects of trade in South Africa because the potential gains from increased trade, if any, should be large. Trade offers the greatest scope for learning opportunities in an economy that was initially protected and has technology catch-up to undertake. If trade induces efficiency, then the potential gains for the country should be large. Pack (1993), however, argues that firm productivity in Africa can only be increased by interventions aimed at improving skills and technical capacity of firms to absorb new technology. Such improvements are necessary before firms can become internationally competitive.

1.1.3.3 Determinants of total factor productivity.

Manufacturing sector total factor productivity and its determinants are consistently modelled. The study generates productivity estimates that are sector specific and time varying as well. It then searches for the channels through which measures of trade orientation interact with industrial characteristics and the macroeconomic environment to determine the level of productivity. Investigating the channels through which trade affects productivity is an interesting angle, and, since the analysis is confined to an identical country panel, it allows for a consideration of variables that determine productivity simultaneously.

1.1.3.4 Understanding derived labour demand in manufacturing.

The analysis contributes to a better understanding of derived labour demand in manufacturing. The analysis models the impact of the increase in trade volumes on derived labour demand within a context that permits disaggregation of imports by origin at the three-digit level for the 28 standard industry codes of the South African manufacturing industry over the period 1988-2002. This sample contains a longitudinal data set of 420 observations (28 industries in 15 years)[9]. This detailed data set is important for an appreciation of the response of South Africa's manufacturing sector to international exposure and competition. More specifically, the study looks at how exposure may have led to efficiency in the use of labour. After outlining the approach that the study explicitly follows, Section 1.2 summarises the main hypotheses that are investigated.

[9] Unlike in the production function case, concorded data for imports by origin of comparable format is only available over the period 1988 to 2002.

1.2 HYPOTHESES INVESTIGATED

This study investigates how trade liberalisation affected productivity and derived labour demand in South Africa's manufacturing sector. More specifically, the following related hypotheses are examined:

(i) Trade has a positive and robust impact on manufacturing sector total factor productivity; and

(ii) Increases in trade volumes, both in terms of exports and imports, cause, on average, reductions in derived labour demand in the manufacturing sector.

The first hypothesis is investigated in Chapter 2 and 3, while the second hypothesis is the subject of Chapter 4. In Section 1.3 below a discussion of the evolution of trade policy in South Africa is provided in order to set ground for the analysis that follows in subsequent chapters.

1.3 TRADE POLICY IN SOUTH AFRICA

One of the key aspects of South African trade policy has been trade liberalisation[10]. There are suggestions of a much longer period of experimentation with trade liberalisation in the country (Fedderke and Vaze, 2001). In the 1970s trade liberalisation focussed on the replacement of quantitative restrictions with tariffs. During this period, there were high tariff walls and extensive import controls, as the attainment of growth was premised on import substitution. In the middle of the decade, attempts were made to mitigate the anti-export bias and emphasis shifted towards export promotion to stem the decline in manufacturing production. A number of export schemes were introduced to assist exporters during the 1970s.

[10] A comprehensive treatment of liberalisation is also available in the government's "Growth, Employment and Redistribution: A macroeconomic Strategy," articulated in 1996.

The 1980s did not witness substantial liberalisation in the trade regime. The result was a marked increase in anti-export bias. By 1985 the country switched from a positive list of permitted imports to a negative list of prohibited imports, which covered 23 per cent of imports and an import surcharge of 10 per cent was introduced (Gunnar and Subramanian, 2000). The declaration of sanctions in the middle of the decade led policy makers to retaliate by imposing exchange controls and a moratorium on payments to foreign creditors. The trade regime became increasingly controlled as the import surcharge on some items was increased to 60 per cent in 1988. By the end of the decade, the trade regime was highly complex. The country had the most tariff lines (more than 13,000), most tariff rates, the widest range of tariffs and one of the highest levels of tariff dispersion in the developing world, implying a highly distorted system of protection (TIPS 2001:27 and Gunnar and Subramanian, 2000:6).

At the onset of the 1990s, protection consisted of a plethora of quantitative restrictions, customs duties and import surcharges. The trade regime was also subject to frequent changes and remained largely complex. The overall binding statutory tariff had a wide dispersion, and consumer goods in manufacturing enjoyed the highest protection. To control imports, three rates of import surcharge were applicable, namely: 10 per cent, 15 per cent and 40 per cent (Gunnar and Subramanian, 2000:8).

During this period, the official policy stance was export-oriented industrialisation. Rapid industrialisation was to be achieved through the Generalised Export Incentive Scheme (GEIS) which was introduced in 1990 to provide a tax-free subsidy to exporters. The scheme was tied to the value of exports, the degree of processing of the export item and the extent of local content in the product. In 1995, the GEIS was scaled down and payments made

under it became taxable. By 1996, it was limited to manufactured commodities only, before being eliminated in the following year (Roberts, 2001).

The 1990s, therefore, coincide with the period in which trade liberalisation gained momentum. For example, as the country signed into the General Agreement on Tariffs and Trade (GATT) in 1994, it offered to the WTO a five-year tariff reduction and rationalisation program. The key aspects of the new tariff program included a reduction to six, from over 100, in the number of tariff categories, while the average weighted import duties were also to be reduced substantially (TIPS, 2001:11).

Emphasis on export orientation from 1994 onwards required an adjustment of the competitiveness of the existing industrial structure, which had been built up through import substitution to enable it to deliver prices that were in line with those obtaining in the world market. To achieve price equalisation, emphasis during this period was on reducing tariffs and following a realistic exchange rate policy. Lowering tariffs would, in particular, serve to strengthen the export orientation of South Africa's manufacturing sector given that the previous regime of tariff protection had created an anti-export bias. The regime of protection did not promote manufacturing competitiveness or productivity growth. Since the broad economic policy strategy was biased towards manufactured exports as a stimulant to economic growth, the reduction in tariffs was also seen as a mechanism to contain input prices, improve cost competitiveness and facilitate an increase in manufactured product exports (Rangasamy and Harmse, 2003:711).

It was in this vein that the offer to GATT displayed a commitment to opening the economy to foreign competition. Industrial protection was to be substantially reduced over a five-year period from an average of 12 per cent in 1994 to about 5

per cent in 2001. The average import weighted tariff rates were to be reduced to well within the WTO bound rates, that is from 34 per cent to 17 per cent for consumer goods, from 8 per cent to 4 per cent for intermediate goods and from 11 per cent to 5 per cent for capital goods. Average import weighted tariffs, since the GATT offer, were reduced from 28 per cent in 1990 to 10 per cent in 1998. For industrial products they were reduced from 11.4 per cent to 8.6 per cent in 2000. The average for the economy as a whole saw applied rates fall from 11.3 per cent in 1990 to 7.3 per cent in 2001 (Gunnar and Subramanian, 2000:7 and TIPS, 2001:15).

South Africa essentially pursued a two-pronged strategy to trade expansion. The strategy involved unilateral and multilateral variants. At the unilateral level, the government regularly announced schedules of tariff reviews. These unilateral reductions in some cases even went beyond the WTO commitments and saw average import weighted tariffs in manufacturing decline from 15.8 per cent in 1994 to 10.3 per cent in 1998 (Roberts, 2001). At the multilateral level, a three-pronged process was followed. The first level concerned the WTO mechanism and was mainly undertaken since the Uruguay Round took effect in 1995. There was an undertaking to reduce the number of tariff lines from over 13,000 at the six-digit level by 15 per cent in 1996 and 30 per cent by 1999. In addition, there was an increase in the number of bindings on industrial products from 55 per cent to 98 per cent. Another important undertaking, was the replacement of all quantitative restrictions with tariffs and a reduction of the number of tariff rates to six, namely 0 per cent, 5 per cent, 10 per cent, 15 per cent, 20 per cent and 30 per cent. Exemption was made to textiles, clothing and motor vehicle industries; these sectors were to liberalise over an eight-year period. Average weighted import duties were also to be reduced from 35 per cent to 17 per cent for consumption goods, 8 per cent to 4 per cent for intermediate goods and 11 per cent to 5 per cent for capital goods (TIPS, 2001:11).

Table 1 indicates the tariff phase down schedule provided under the WTO mechanism. It shows, for example, that tariffs on textiles were expected to fall from 30.1 per cent in 1994 to 17.3 per cent in 2004. Average tariffs on motor vehicles and accessories were set to fall from 55.4 per cent to 22.1 per cent, while the overall average tariff rates would drop from 11.7 per cent to 4.9 per cent over the same period.

Table 1: Tariff phase down under the WTO

Description	1994	1995	2000	2001	2002	2003	2004
Textiles	30.1	33.8	20.3	18.7	17.3	17.3	17.3
Clothing, exc. Footwear	73.7	73.6	42.4	37.7	33.2	33.2	33.2
Leather and leather products	14.9	14.8	14.8	14.8	14.8	14.8	14.8
Footwear	37.5	41.6	29.1	29.1	29.1	29.1	29.1
Wood and wood products	13.9	3.6	3.1	3.1	3.1	3.1	3.1
Paper and paper products	9.6	9.3	7.9	7.3	6.8	6.2	5.6
Printing and publishing	8.1	1.3	1.0	1.0	1.0	1.0	1.0
Industrial chemicals	9.3	7.5	1.6	1.6	1.6	1.6	1.6
Other chemicals	9.0	3.8	2.5	2.5	2.5	2.5	2.5
Rubber products	30.5	14.5	14.6	14.4	14.0	14.0	14.0
Plastic products	19.8	14.7	12.0	12.0	12.0	12.0	12.0
Glass and glass products	11.8	9.5	7.6	7.6	7.6	7.6	7.6
Non metallic mineral products nec	10.6	8.7	7.7	7.7	7.7	7.7	7.7
Basic iron and steel products	7.6	4.4	3.9	3.9	3.9	3.9	3.9
Non-ferrous metal products	2.3	2.3	2.0	2.0	1.9	1.7	1.7
Metal products, excl. machinery	13.1	8.2	7.4	7.4	7.4	7.4	7.4
Non-electrical machinery	6.5	1.4	1.3	1.3	1.3	1.3	1.3
Electrical machinery	11.0	6.1	5.7	5.7	5.7	5.7	5.7
Radio and television & comm.	12.1	5.1	2.3	2.3	2.3	2.3	2.3
Professional equipment	7.2	0.2	0.3	0.3	0.3	0.3	0.3
Motor vehicles, parts & access.	55.4	33.5	24.8	23.2	22.1	22.1	22.1
Other transport equipment	1.4	0.4	0.2	0.2	0.2	0.2	0.2
Furniture	28.1	21.4	18.9	18.9	18.9	18.9	18.9
Other manufacturing	2.9	1.0	4.9	4.9	4.9	4.9	4.9
Mining	2.7	0.6	0.4	0.4	0.4	0.4	0.4
Total	11.7	7.2	5.3	5.1	4.9	4.9	4.9

Source: Trade Policy Strategies (2001).

The second multilateral strategy concerned the EU-SA FTA that took effect in 2000 as an asymmetric agreement. This entailed liberalisation of tariffs on 95 per cent of EU imports from South Africa between 2000-2003. South Africa was required to free 80 per cent of tariffs on imports from the EU spread over a 12-year period. In this agreement, exemption was granted to clothing, textiles, footwear and automotive products. The third level of multilateral trade negotiations has involved the United States Africa Growth and Opportunities

Act that came into effect in 2001. This act provides South Africa as a qualifying country with reduced duties for exports of clothing to the US market. Another multilateral tier concerned the SADC protocol that came into force in 1996 and required 69 per cent of the SADC imports to be zero rated upon the full implementation of the protocol and full liberalisation by 2012. South Africa was to liberalise most of its imports from SADC countries faster than these countries were to free imports from South Africa (TIPS, 2001). Due to these changes, the South African trade regime appears considerably liberalised. Most quantitative restrictions were eliminated; the number of tariff lines was reduced from over 13,000 in 1990 to 7,831 in 2001. The number of tariff bands was reduced from over 200 to 35. The tariff regime by 2002 was relatively simplified, because the number of lines facing a specific tariff was scaled down by half from 500 to 227 (TIPS, 2001:14). Table 2, below, provides the details.

Table 2: Changes in manufacturing tariff structure

Tariffs	**1990**	**1998**	**2000**	**2001**
Maximum tariff	1,389	72	55	55
Average import weighted tariff	28	10	8.6	6.5
Average un weighted tariff	30	14	6.7	6.7
Number of tariff bands	>200	72	39	35
Standard deviation	43	15	9.6	9.4
Number of tariff lines	>13,000	7,814	7,824	7,831
Percentage of lines with non-ad valorem duties	28	26	25	25
Average import weighted surcharge	6	0	0	0
Import surcharge bands	10,15 & 40	Eliminated	Eliminated	Eliminated
Export subsidy	17	Eliminated	Eliminated	Eliminated
Quantitative restrictions on imports	14	Virtually Eliminated	Virtually Eliminated	Virtually Eliminated
Memorandum items	1990	1998	2000	2001
Trade tax revenue as a share of total revenue	7.9	4.0	4.0	3.6
Import taxes as a share of imports	10.8	4.1	4.2	3.9
Export subsidies as a share of GDP	0.3	0.0	0.0	0.0

Notes: Average import weighted surcharge and quantitative restrictions on imports figure for 1990 refers to 1992.

Source: Gunnar and Subramanian (2000), South Africa Reserve Bank (2003) and Trade Policy Strategies (2003).

In summary, the period 1994-2003 can be characterised by steps in rationalising the tax structure and removing quantitative restrictions. Industrial policy made great strides to eliminate loss making enterprises, price controls, entry and exit restrictions on private enterprises, discriminatory tax and subsidy policies, as well as soft budget constraints on state owned enterprises. Privatisation of some public enterprises was promoted to improve efficiency. The policies of market opening, deregulation and privatisation were expected to spur productivity, foster export competitiveness and improve resource allocation.

The underlying belief was that increased manufactured exports[11] could help underpin rapid investment and productivity growth (Rangasamy and Haramse, 2003). Competition would improve the quality of manufactured output, encourage generation of new products and the adoption of new techniques. This latter response could enlist the desired increase in total factor productivity (Fedderke, 2001). In spite of these wide ranging moves in regard to the trade regime, little rigorous empirical work has examined the trade, productivity and employment nexus in the context of South Africa. This study makes a modest contribution towards filling this analytical gap.

To refocus emphasis on the central role that manufacturing is set to play in the South African economy, an Integrated Manufacturing Strategy (IMS) was launched in 2002 as a collective position aimed at improving competitiveness in the industrial sector. This is to be attained, among other ways, through technology improvement and innovation. The strategy stresses integration with the international economy through increased trade, particularly through

[11] One of the objectives of trade liberalisation in Africa is to increase manufactured exports. South Africa government considers growth in manufactured exports as a necessary condition for attainment of high and sustainable economic growth- the reason for offering increasing incentives for exports under its" Growth, Employment and Redistribution Strategy" (GEAR).

increased knowledge intensity in production[12]. The (IMS) is set to build on the efforts of the last decade (1994-2003), where trade policy was driven by the need to weaken the effects of factors that discriminated against productive efficiency and export development in the form of taxation, protectionism and exchange rate misalignment. In spite of the substantial reforms in the trade regime, there still remain fundamental issues to be addressed. In particular, the pace of tariff liberalisation appears to have slowed since 1996; only small reductions in tariff bands and modest declines in the maximum tariff were effected, yet persistent high dispersion in the tariff rates still obtained. As a further example, industrial tariffs remained in 69 categories compared to the 17 targeted by 2004 (TIPS, 2001:12). The challenge for policy is that less progress seems to have been made on creating greater uniformity in the range and number of tariffs. As a result, there still remained more bands than envisaged.

It was also increasingly being recognised that the simplification of the tariff structure remains the key priority on administrative grounds. More importantly, the dispersed tariff structure implies that protection remained uneven and gains from openness were limited, and, as a result, manufactured exports cannot be optimally encouraged. By 2004, tariff peaks still existed in processed foods, motor vehicles and components, tobacco products, rubber products and clothing and textiles. There was still evidence of anti-export bias and the rate of effective protection remained high in some sectors[13] (TIPS, 2001:24). After reviewing the changes that have occurred in South African trade policy, Section 1.4 outlines the key issues in manufacturing industry employment, the restructuring as well as the adjustments that have occurred in response to policy reforms.

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[12] This policy is in contrast to the use of tariffs, quantitative restrictions and export incentives as the main trade incentives to drive the industrialisation process in the 1980's and early 1990's.

[13] It was suspected that the extent of protection on the final product arising from tariffs imposed on intermediate inputs (a high effective rate of protection) was high in textiles, leather, footwear, clothing, motor vehicles and parts, food processing and to some degree, chemicals and rubber products.

1.4 EMPLOYMENT ISSUES IN MANUFACTURING

Table 3 shows that during the last two decades approximately 0.35 million jobs were lost in South Africa's manufacturing sector, representing a 19 per cent contraction in employment. Overall, the whole sector was affected negatively in terms of job losses, but the job losses differed substantially across the 2–digit SIC industry classification. The manufacturing categories under chapter 34 experienced job losses in excess of 50 per cent, while chapters 30, 31, 35, and 38 experienced losses of between 18 and 35 per cent. However, chapters 32, 33, 37 and 39 recorded job gains of between 3 and 35 percent over the same period. Production in real terms was estimated to have increased by about 56 per cent; real wages generally increased over the same period.

Table 3: Variability in employment, production and wages

SIC	Employment			Production (R Million)			Wage rates		
	1980	2002	% change	1980	2002	% change	1980	2002	% change
30	220994.4	178920.0	-19.0	49520.7	69452.3	40.3	56948.6	68392.1	20.1
31	270825.0	207437.0	-23.4	20139.0	20650.6	2.5	33837.0	39397.5	16.4
32	132642.2	179559.5	35.4	22117.3	35335.0	59.8	78044.1	60951.6	-21.9
33	146766.2	181996.5	24.0	34398.6	27442.0	-20.2	86765.7	135896.9	56.6
34	84831.2	40594.5	-52.2	10204.5	10300.5	0.9	36578.5	60078.9	64.3
35	344431.5	228894.8	-33.5	73103.5	93620.8	28.1	58432.7	77632.2	32.9
36	70850.0	79340.3	12.0	8406.3	11173.7	32.9	26957.6	26930.7	-0.1
37	17702.0	18234.3	3.0	4248.5	4514.7	6.3	54122.8	42403.9	-21.7
38	112953.8	86879.0	-23.1	33403.5	62777.6	87.9	78996.0	124678.8	57.8
39	52911.3	68791.3	30.0	9777.2	32882.4	236.3	42199.2	75565.6	79.1
Total	1904523.6	1552433.6	-18.5	328215.9	512400.2	56.1	42120.5	50683.4	16.9

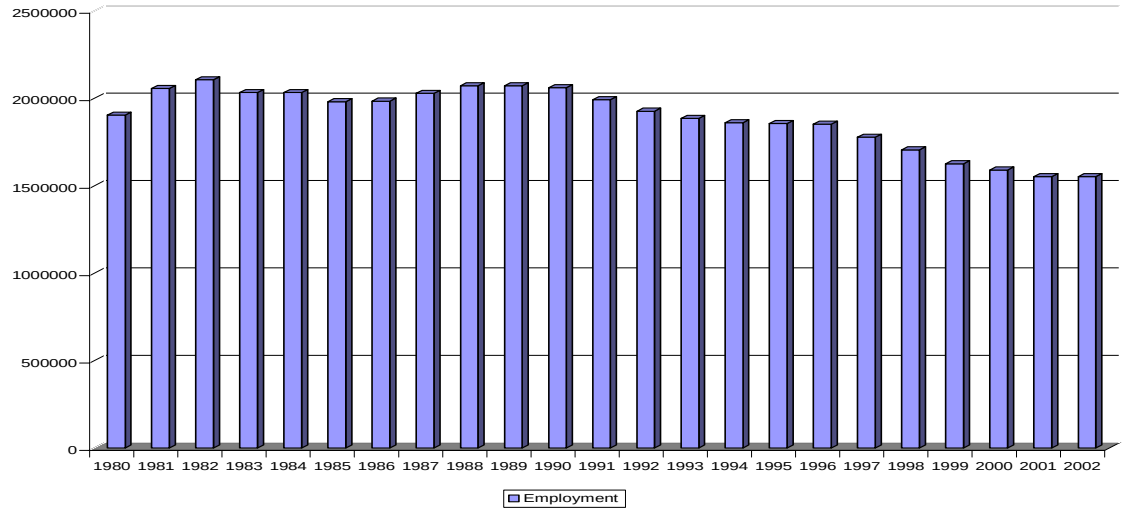
SIC	SIC description
30	Food, beverages and tobacco
31	Textiles, wearing apparel, leather and footwear
32	Wood, Paper, printing, publishing products and recorded media
33	Coke, petroleum, chemicals, rubber and plastic products
34	Glass and non metallic mineral products
35	Iron, steel non ferrous metals, metal products, machinery and equipment
36	Electrical machinery
37	TV, radio, communication, professional and scientific equipment
38	Motor vehicles, parts and other transport equipment
39	Furniture and other manufactured products

Notes: (a). Variability reported here is at the two digit level of classification. (b). Total for sectors 3-5 in SIC classification. (c). Percentage change is computed over the period 1980 to 2002.
Source: Trade Policy Strategies, www.tips.org.za.

The shifts in employment that occurred during this period were in response to significant transition, adaptation and the organisational change that was occurring in South African manufacturing. For the industrial sector, these years represent a period of substantial restructuring and structural change. The main change experienced in the manufacturing sector was an increase in production that was driven by rapid improvements in labour productivity. Some of the key components of this restructuring saw an expansion of capacity in some sectors, modernisation of manufacturing technology and a trend to contain growth in labour input costs.

The decline in employment, in part, reflected the impact of the rationalisation of labour resources in general, but, more specifically, indicated the rise in outsourcing of core activities by manufacturers to increase labour efficiency within a new and more competitive environment (SARB, 2003:85). Figure 1, below, plots the evolution of labour demand by the manufacturing sector during the period under review.

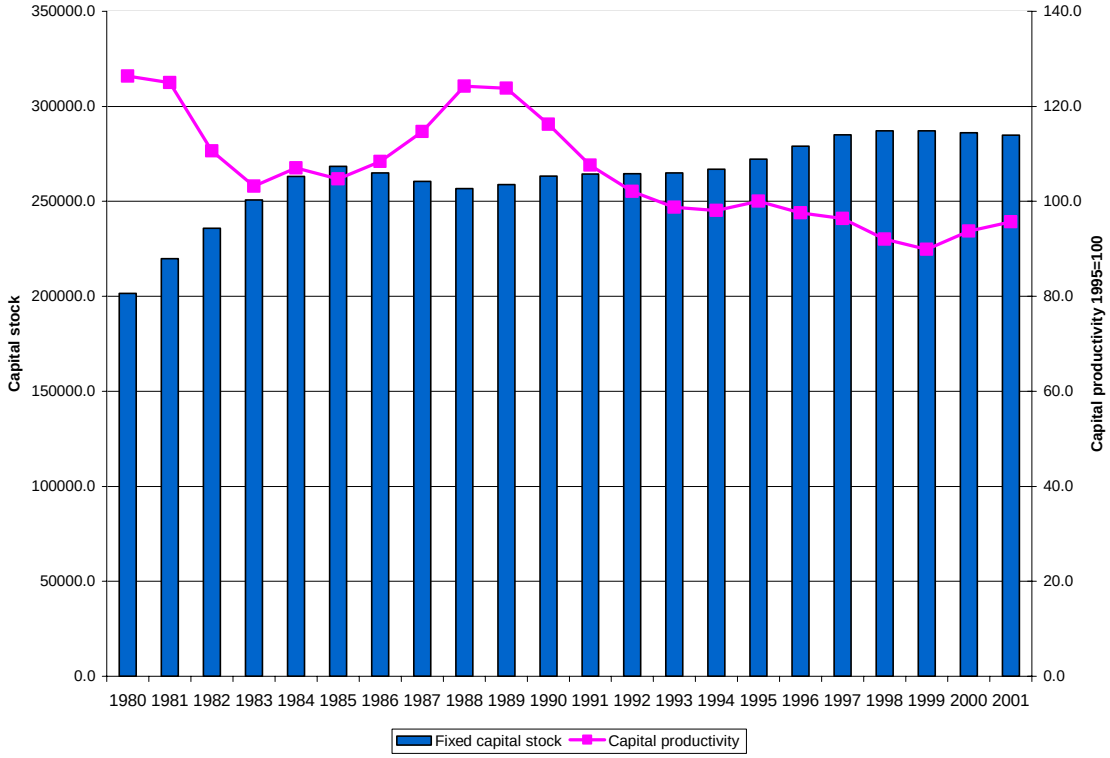
Figure 1: Evolution of employment in the manufacturing sector, 1980-2002



Source: www.tips.org.za

The labour market adjustment alluded to above was a result of the implementation of technologically advanced and more skill-intensive methods of production (SARB, 2003:87), of which, the latter impact reflected the increased capital intensity of South African manufacturing production processes. Increased capital intensity in production in the manufacturing sector is evident, though the productivity of capital has been declining since the peak attained in 1988. Figure 2, below, traces the evolution of the fixed capital stock and its productivity in the manufacturing sector.

Figure 2: Capital stock and productivity in manufacturing sector, 1980-2001

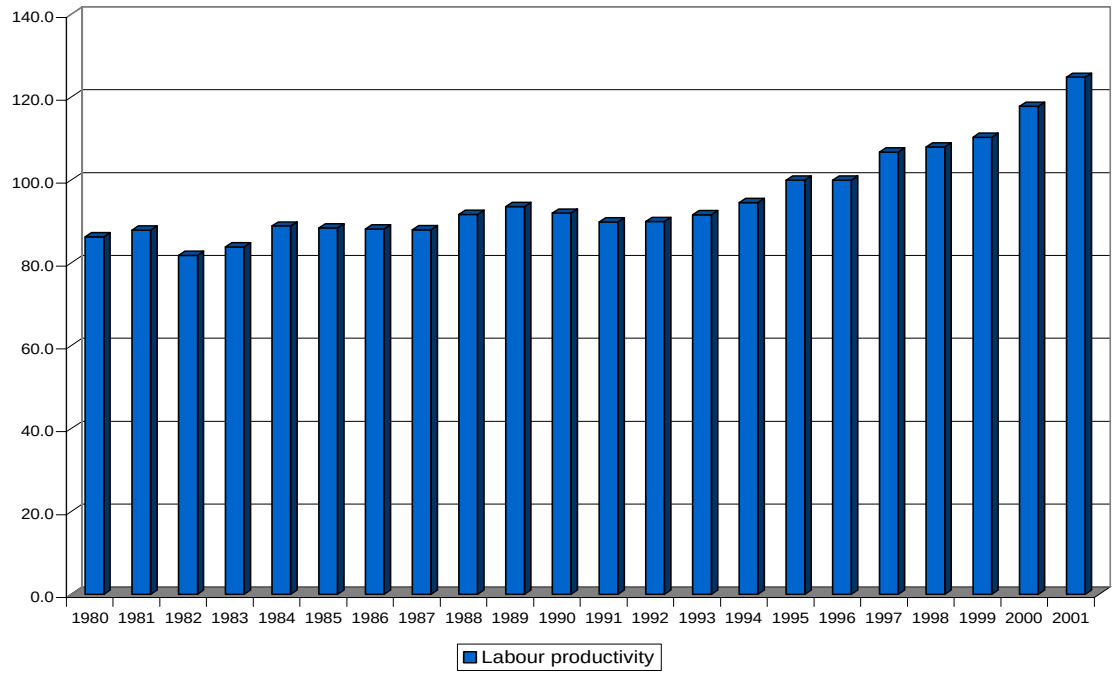


Source: www.tips.org.za

An interesting aspect regarding South African manufacturing during this period was the combination of decreased employment and rising output per person. Given the restructuring that is alluded to above, it is no wonder that growth in manufacturing production was essentially driven by increased labour

productivity. Figure 3 plots the evolution of labour productivity in the manufacturing sector. The improvement in labour productivity is particularly marked over the period 1994 to 2001.

Figure 3: Labour productivity in the manufacturing sector, 1980-2001



Notes : Index computed at constant 1995 prices
Source: www.tips.org.za

Table 4 shows that the South African manufacturing industry became increasingly integrated into the international economy, especially through trade and foreign direct investment between 1980 and 2002. Even at the two digit level of classification, the integration for imports and exports shows that average shares of these aggregates rose for the whole manufacturing sector. With penetration rates of 85 and 92 per cent, respectively, chapters 33 and 37 represent the most open sectors in terms of import penetration. Sector 30 remains the most closed in terms of these trade outcomes. However, a greater diversity of experiences across industries is unearthed, especially when one moves from the two-digit to the three-digit categorisation. In the three-digit classification, only three sectors (namely tobacco, paper & paper products and coke & refined

petroleum products) recorded a decline in import penetration. Table 5 shows the variability of import penetration rates over the period 1980 to 2002.

Table 4: Two digit level variability in selected trade measures, 1980 and 2002

SIC Division	Import penetration			Export share		
	1980	2002	% Change 1980-2002	1980	2002	% Change 1980-2002
30	3.2	5.4	68.2	5.0	7.7	56.2
31	18.3	39.0	114.0	8.6	25.0	190.3
32	19.2	24.6	27.7	8.4	25.2	199.9
33	49.5	84.8	71.4	18.2	71.9	295.0
34	13.2	24.1	83.0	6.1	14.2	134.1
35	18.1	33.9	86.9	16.8	43.5	158.0
36	25.1	38.4	53.0	2.5	14.0	454.1
37	56.1	91.6	63.4	7.7	62.7	711.7
38	32.0	65.0	103.4	2.8	48.2	1651.9
39	15.8	32.9	108.9	15.6	44.8	187.3
Total (3-5)	17.3	29.7	71.7	7.7	23.9	211.6

Source: Trade Policy Strategies, w.w.w.tips.org

Table 5: Import share and variability within three-digit sector, 1980 and 2002

Sector	Import penetration		Within sector			
	1980	2002	Mean	Maximum	Minimum	Standard deviation
Food (301-304)	4.1	9.8	6.9	10.0	4.1	2.0
Beverages (305)	3.9	5.5	4.4	6.2	3.2	0.8
Tobacco (306)	1.7	0.8	2.0	3.2	0.8	0.7
Textiles (311-312)	16.0	30.9	22.3	30.9	16.0	4.7
Wearing apparel (313-315)	8.2	19.0	9.9	19.9	5.0	4.3
Leather & leather products (316)	20.5	21.0	27.3	40.4	17.7	8.2
Footwear (317)	10.1	46.2	19.1	46.2	4.2	12.0
Wood & wood products (321-322)	8.7	15.1	10.0	15.1	6.1	2.4
Paper & paper products (323)	16.4	10.0	13.0	16.4	10.0	2.2
Printing, publishing & recorded media (324-326)	13.4	24.1	17.4	24.1	11.5	3.3
Coke & refined petroleum products (331-333)	30.5	28.8	19.3	30.5	10.7	4.8
Basic chemicals (334)	33.1	50.0	40.6	53.1	28.5	7.7
Other chemicals & man-made fibres (335-336)	16.9	32.2	21.3	32.2	13.6	4.8
Rubber products (337)	12.4	36.1	21.8	36.6	11.9	8.7
Plastic products (338)	6.2	19.4	10.3	19.4	6.2	3.9
Glass & glass products (341)	20.3	26.3	20.2	29.0	14.0	4.3
Non-metallic minerals (342)	6.0	21.8	10.9	21.8	5.8	5.3
Basic iron & steel (351)	6.0	15.5	9.8	16.0	3.6	3.9
Basic non-ferrous metals (352)	14.3	19.4	18.4	31.9	9.0	4.9
Metal products excluding machinery (353-355)	8.1	19.7	11.3	19.7	6.5	3.8
Machinery & equipment (356-359)	44.0	80.9	53.7	80.9	34.2	13.9
Electrical machinery (361-366)	25.1	38.4	28.6	38.4	17.2	5.5
Television & communication equipment (371-373)	35.4	89.1	55.2	91.0	27.9	20.9
Professional & scientific equipment (374-376)	76.7	94.2	76.4	94.2	63.6	10.2
Motor vehicles, parts & accessories (381-383)	34.8	45.1	32.5	45.1	23.9	5.0
Other transport equipment (384-387)	29.2	84.9	48.0	87.0	19.0	22.8
Furniture (391)	3.0	27.3	7.5	27.3	2.4	6.9
Other industries (392)	28.5	38.6	26.3	38.0	17.1	5.4

Source: Trade Policy Strategies, www.tips.org.

For export shares, variability is also apparent at the three-digit level. Most sectors increased their export shares with basic metals, transport equipment, chemical products and electrical equipment being the high export sectors. These divisions also benefited from reciprocal trade agreements and improved price competitiveness brought about by the depreciation of the Rand in 2002. In response, the output volumes in these sectors expanded rapidly compared to other groups, especially during the period 1994 to 2002. The net result was that the combined share in total manufacturing production of the sectors that were prominent in exportation increased from 44 per cent in 1993 to 50 per cent in 2002 (SARB, 2003:81). Table 6 shows the evolution of the export shares in manufacturing over the review period.

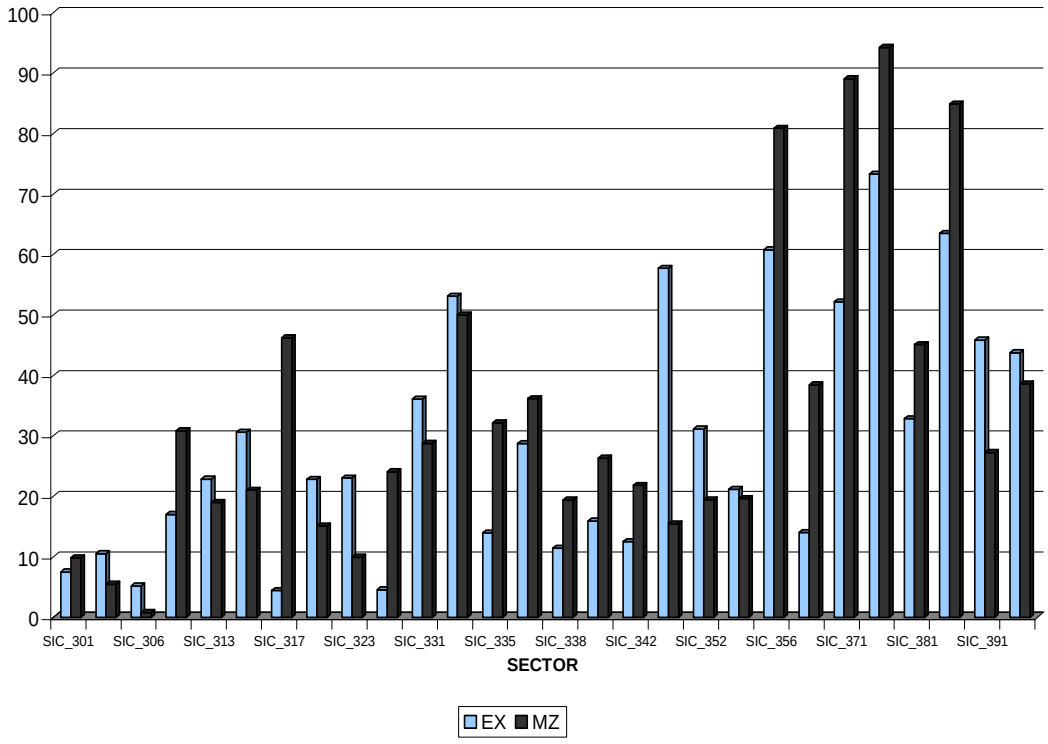
Table 6: Export share and variability within three digit sector, 1980 and 2002

Sector	Export share		Within Sector			
	1980	2002	Mean	Maximum	Minimum	Standard deviation
Food (301-304)	11.6	7.5	7.8	11.6	5.9	1.4
Beverages (305)	1.6	10.5	4.4	10.5	0.8	3.3
Tobacco (306)	1.7	5.2	3.7	7.6	0.6	2.1
Textiles (311-312)	6.2	17.0	13.0	17.0	6.0	3.1
Wearing apparel (313-315)	3.0	22.9	9.7	22.9	3.0	6.0
Leather & leather products (316)	14.2	30.6	26.2	43.2	11.2	11.4
Footwear (317)	2.5	4.5	2.5	5.7	0.5	1.6
Wood & wood products (321-322)	2.7	22.8	12.3	22.8	4.7	5.4
Paper & paper products (323)	9.5	23.0	18.9	29.2	8.4	6.2
Printing, publishing & recorded media (324-326)	0.6	4.5	1.7	4.5	0.3	1.3
Coke & refined petroleum products (331-333)	16.1	36.1	16.4	36.7	8.8	7.7
Basic chemicals (334)	15.1	53.1	32.1	53.1	12.3	14.2
Other chemicals & man-made fibres (335-336)	1.7	14.0	5.3	14.0	1.0	4.2
Rubber products (337)	2.8	28.8	10.5	28.8	1.5	8.9
Plastic products (338)	0.8	11.4	4.3	11.4	0.5	3.5
Glass & glass products (341)	7.3	15.9	10.0	15.9	3.3	3.8
Non-metallic minerals (342)	4.8	12.5	6.7	12.6	2.0	3.6
Basic iron & steel (351)	18.5	57.7	38.8	57.7	14.3	14.3
Basic non-ferrous metals (352)	42.4	31.2	47.0	76.2	34.2	11.4
Metal products excluding machinery (353-355)	1.7	21.1	9.6	22.1	1.4	7.2
Machinery & equipment (356-359)	4.5	60.8	19.3	62.7	2.5	18.4
Electrical machinery (361-366)	2.5	14.0	6.5	14.0	1.2	4.4
Television & communication equipment (371-373)	0.9	52.2	15.1	59.3	0.5	19.3
Professional & scientific equipment (374-376)	14.5	73.3	29.5	76.5	6.1	23.3
Motor vehicles, parts & accessories (381-383)	2.7	32.9	12.0	32.9	2.1	9.0
Other transport equipment (384-387)	2.3	63.5	23.1	70.8	2.1	26.0
Furniture (391)	2.9	45.9	17.2	45.9	1.1	16.3
Other industries (392)	28.3	43.8	27.5	43.8	18.1	6.0

Source: Trade Policy Strategies, www.tips.org.

As a reflection of intra industry trade, movements in import penetration and export shares appeared to be correlated positively at the three-digit level. With the exception of a few outliers, the general trend suggested that sectors, with the highest levels of absolute import penetration also had high export shares. For example, import penetration and export shares in 2002 for professional & scientific equipment were 94 and 73 per cent; other transport equipment 85 and 64 per cent; machinery & equipment 81 and 61 per cent; and television, radio and telecommunications equipment 89 and 52 per cent, respectively. Figure 4 graphs the combined import penetration ratios and export shares.

Figure 4: Import penetration and export shares, 2002



Notes: Graphed are the import penetration (MZ) and export share (EX) measured in percentages in 2002. The numbers on the horizontal axis are the SIC codes for 28 three-digit industries.
Source: Trade Policy Strategies, www.tips.org.

1.5 STRUCTURE OF THE THESIS

The remainder of the thesis is organised as follows, Chapter 2 concentrates on production efficiency analysis with emphasis on understanding total factor productivity and its components. It reviews literature on stochastic frontiers and efficiency measurement and explains the methodology for decomposing the sources of total factor productivity into efficiency and technical change. Efficiency and technical change in South African manufacturing is estimated, enabling the results from the estimation to be used to establish how the evolution of the productivity components related to the liberalisation episodes. The results from the empirical analysis are provided, as well as the key conclusions that emerge.

Chapter 3 focuses on the determinants of total factor productivity and emphasises the channels through which trade affects manufacturing productivity. Again South African manufacturing data is used to investigate the suggested theoretical links. Chapter 4 investigates the effect of trade on derived labour demand. An interesting aspect of this part of the research is the use of a unique South African data set to investigate labour market and trade issues. The concluding chapter nests all the empirical results generated in chapters 2, 3, and 4 to provide implications for policy. This final chapter suggests some directions for future research and investigation.

1.6 CONCLUDING REMARKS

Theoretical and empirical literature continues to deliver disparate predictions regarding the impact of expanded trade on productivity and derived labour demand in manufacturing. While traditional international trade appears to make

some clear predictions about the static effects of trade on welfare, the dynamic effects are much less clear. In view of the fact that theoretical development is yet to resolve the debate about the relationship between increased trade, productivity and employment in manufacturing, empirical analysis is still required to bear on these issues.

A significant amount of trade liberalisation occurred in South Africa over the last decade of the study period[14]. In response, volumes of exports and imports increased and the manufacturing sector experienced significant structural change. From the mid 1990s, especially, output growth in the manufacturing sector rebounded. However, there was a mixed picture regarding employment performance, with a general decline in the trend of labour absorption, reflecting possible efficiency gains in the use of labour due to increased competition. Capital intensity in manufacturing processes increased, implying that the rebound in output growth was supported by continuously strong increases in labour productivity. Increased competition for the sector was reflected in the growth in export orientation as well as import penetration measures.

Against this background, it is important to examine the links between expanded trade, productivity and employment behaviour in the manufacturing sector[15]. Indeed, given the increasing openness of the economy, one is led to ask whether there is a possible link between greater exposure to trade, productivity and labour market adjustment. An empirical exploration of these issues is important, since data that documents the wide variety of experiences of the individual industrial sectors exists at a disaggregated level (Tomiura, 2003:121). Since the impact of competition on productivity as well as labour demand in each industry is likely to vary depending on the industry's access to international markets

[14] Factors such as technical change, trade liberalisation and globolisation contributed substantially to the steady transformation of the South African economy (SARB, 2003:79).
[15] A related subject is investigated by Du Toit and Moolman (1999).

through exports or exposure to imports (Revenga, 1992), it is important not to neglect the considerable inter-industry variation that exists within South African manufacturing. Variations in sectoral productivity performance, employment change and trade intensity measures are illustrations of the existence of substantial inter-industry heterogeneity in many other variables (Greenaway, Hine and Wright, 1999:488). This investigation explicitly takes into consideration the aspect of variability in empirical analysis.

In the following chapter, production efficiency analysis is provided. The chapter explains the methodology of decomposing the sources of total factor productivity into efficiency and technical change, within the framework of an underlying production function.