The Impact of Arms Production on the South African Manufacturing Industry[1]

Alvin Birdi, Paul Dunne and David Saal

Middlesex University Business School
The Burroughs
London
NW4 4BT
United Kingdom

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Abstract: The 1977 UN arms embargo was one of the main factors which led South Africa to establish a largely self sufficient import-substituting arms industry capable of meeting the apartheid state's demand for sophisticated weaponry. While macroeconomic studies suggest that high military spending had a damaging effect on economic growth, no studies have investigated the disaggregated impact of military expenditure on industrial development. This paper applies panel data methods to the Industrial Development Corporation's Sectoral Database in order to analyse the level effects of military spending.

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1. Introduction

With the end of the Cold War there has been a world-wide reduction in military spending and an increase in competition in the international arms markets, as companies often supported by their governments, fight for survival by trying to increase exports. This has led to a restructuring of the industry, involving concentration, retrenchment and globalisation, but with a number of governments still wedded to the maintenance of a domestic military industrial base. In such a climate it is difficult for the larger producers to survive, but it is almost impossible for the smaller producers such as South Africa (Brzoska, 1997).

The research literature has focused on conversion policies that might have been used to achieve a peace dividend, but generally governments have simply made the cuts and have taken a 'hands off' approach to the resulting industrial restructuring (Gelditsch et al 1996). Where they have become more involved, governments have moved to support defence companies to export arms, a policy that has exacerbated the crisis in the market. Moreover, these policies have not only been employed in the advanced economies, but are also evident in countries such as South Africa which is an important intermediate level arms producer.

Given this, a case study of the South African experience is important. It has an arms industry of notable size and sophistication for its stage of development and has undergone considerable change since the abolition of apartheid and the transition to democracy, with dramatic cuts in military spending. The military industry also represents an important part of South African manufacturing industry and manufacturing is vital to the future development of the economy. Moreover, unlike many developing countries, there exist large quantities of relatively reliable data for South Africa which allow a disaggregated analysis of the effects of military spending on the manufacturing economy. Such disaggregated analysis is a powerful tool in explaining the differential impact of military spending at the industry level.

Section 2 provides a brief history of South African military expenditures and domestic arms production. Section 3 discusses the Industrial Development Corporation's sectoral database and considers the intersectoral composition of South Africa's manufacturing production and government manufacturing purchases. Section 4 develops a disaggregated Feder Ram growth model in order to test the effects of South African arms production on industrial performance and section 5 provides

an empirical estimation of this model using panel data methods. Finally section 6 presents some conclusions and discusses the implications of the findings.

2. South African Military Expenditures and Arms Production

From the 1960s until the beginning of the transition to democracy in 1990, South Africa steadily increased its military expenditure. As Figure 1 shows, its military burden (military spending as a share of GDP) increased from just over 1% in the early 1960s, to over 3% in 1964 with the start of the ANC's armed struggle. After 1972 growing external and internal opposition to apartheid, the independence of Angola and Mozambique in 1974, and the involvement of South Africa in their civil wars, led to large increases in military spending. The military burden peaked in 1977 at just under 5% of GDP, as the regime purchased large amounts of imported weapons prior to the imposition of the mandatory UN arms embargo in 1977 and implemented a "Total Strategy" to combat the perceived "Total Onslaught" of communist expansionism in Southern Africa. (Seegers, 1987). While a moderate decline in total military expenditures occurred between 1977 and 1980, the precarious state of the apartheid regime led to steady increases in military expenditures during the 1980s, broken only after the beginning of the transition to democracy in 1989. There followed a 50% cut in defence expenditures by 1996.

Given the demand for weaponry to maintain internal and external security and in anticipation of international sanctions, the Apartheid regime invested heavily in the creation of a domestic defence industry (Landgern, 1988). The share of the military budget devoted to domestic procurement increased greatly from approximately 20 percent in 1974 to almost 50 percent in 1981 as domestic procurement expenditures increased six-fold to 1.8 billion rand (Figure 2). This transformed the manufacturing economy, with its dependence on arms production increasing over five-fold, to 2.6 percent, between 1972 and 1979[2](Figure 3). This led to the creation of a military industrial complex (MIC) centred around the state owned arms producer ARMSCOR with private firms acting as subcontractors.

[2] As Batchelor(1997) argues, these manufacturing dependence data actually underestimate the industry's overall dependence on defence procurement. However, as they are based on the most reliable procurement data available in South Africa we employ them as they probably accurately capture the overall trend in procurement dependence.

After the UN arms embargo in 1977, sophisticated products such as jet fighters, attack helicopters, armoured vehicles, communications systems, guidance systems, mobile artillery pieces, and reconnaissance drones had to be domestically produced or illegally sourced. As part of its Total Strategy, the Apartheid regime thus implemented an industrial policy favouring the arms industry and encouraging import substituting high technology production. Unlike other countries that have gradually developed import substituting production capabilities by employing foreign capital goods and technologies[3], it needed to develop theses capabilities domestically. This led to South Africa developing a level of technical sophistication and independence that was unique to arms production in developing countries, but also increased the resources it needed to allocate to the arms sector. In common with other areas affected by sanctions this meant production was carried out in an inherently inefficient manner (Batchelor, 1997).

Thus, as we will see below, despite a massive investment in arms and arms related production, the industrial policy inherent in the Total Strategy policy actually resulted in disappointing levels of economic growth in the arms related industries relative to other industries.

3. Manufacturing Industry and Government Procurement

South Africa has some of the most reliable and detailed economic statistics of any developing country. The South African Industrial Development Corporation (IDC) provides disaggregate annual manufacturing data for the period 1972-1993. This Sectoral Database is based on the periodic Census of Manufacturers and the South African input output tables, but uses supplemental information on the physical volume of industrial production. The distribution of manufacturing output to intermediate input usage and final demand categories, including government consumption, are extrapolated from the direct input requirements coefficients found in the input output tables that are produced periodically.

While this data provides extremely valuable industrial level data, it does have its problems. The published input output tables only contain coefficients for total government consumption and do

[3] In Brazil for example, the relatively successful aerospace industry tapped foreign aerospace engine manufacturers as well as foreign electronics producers as the technological sophistication of its products increased.. (Conca, 1997) In contrast, South Africa made substantial investments in aerospace engine production despite insufficient scale economies, and developed the electronics capabilities required to upgrade its ageing fleet of French jet aircraft.(Landgern, 1988)

not identify defence. We thus use total government expenditures within an industry as a proxy for defence expenditures, a reasonable approximation given that most manufacturing purchases by governments are defence related.[4] Moreover, government consumption is estimated from the direct requirement coefficients and does not capture the indirect defence dependence of important primary industries such as steel and non-ferrous metal. We can only measure the dependence of industries on government purchases if they sell directly to the government. A further problem is that it is not possible to separate government purchases from domestic industry from those that are imported.

Given these limitations, we employed South Africa's Standard Industrial Classification (SIC) definitions to identify 12 of 45 manufacturing industries as potential providers of weaponry and supplies to the SADF during the apartheid era.[5] 'Other Manufacturing' is included because this sector includes the highly defence dependent 'Scientific Instruments' industry. 'Other Transport Equipment' consists primarily of aerospace and shipbuilding. 'Other Chemical Products' is a critical supplier of the explosive materials used in ammunition and other weaponry, while the 'Medicinal and Pharmaceutical Preperations' industry provides necessary medical supplies as well as chemical and biological weapons that were developed by the apartheid regime. 'Office and Accounting Machinery' consists of the computer industry while the 'Radio, Television, and Communication Equipment' sector contains both the electronics and communications industries that are critical to high tech weaponry. Likewise, 'Furniture and Fixtures of Metal' is included because any metal fixtures for boats, planes, and other vehicles would be included in this category. Similarly, the remaining 4 industries are generally accepted as industries in which a large proportion of production is directly defence oriented in highly militarised societies, with Tires being a possible exception here, but which we have included given the South African military's relatively large use of light armoured vehicles. Finally, the 'Other chemical and petroleum products' industry is included as a twelfth defence related industry because it represents a strategic industry that was critical to the security of the apartheid state.

Table 1 shows total government consumption purchased from an industry as a share domestic production for the manufacturing industries. This gives some idea of the dependence of

[4]For example, using 1987 input output data for the United States, Saal(1998) finds that the share of defence procurement in total government procurement demand from the manufacturing industry amounted to 91% of direct government purchases from the manufacturing industry. Given the high militarization of the South African economy, we can assume a similarly high proportion of military expenditure in total government procurement.
[5] See Batchelor, Dunne, and Saal (1998) for a more detailed discussion.

industries on government sales, but as these include government imports some industries can give figures of over 100%. There are also some surprisingly low figures for some of the directly defence-related industries. This can be because the industry is a wider group which contains an important dependent industry, or because of the differences in classification between the US and South Africa when compared to the US. Alternatively it could be that the industry's product is not be directly purchased by the government in South Africa, as is likely to be the case with 'Engines and turbines' . As Table 2 shows, however, the 12 directly defence related industries account for approximately two thirds of all government procurement from the manufacturing industry. Moreover, The directly defence related industries went from accounting for 21% of manufacturing output in 1972 to 29% in 1981, showing the impact of the arms build up on the manufacturing industry.

To considering the performance of these defence related industries relative to the others, Table 3 provides some industry performance measures for 1973-93 and for a number of sub periods. The bold figures indicate a statistically significant difference at 95% between the defence related and other industries from an F test on the means. From this we see that for the whole period the defence related industries had significantly faster output growth, more capital investment, and higher employment growth. They also had higher productivity growth, export growth, and higher import growth, but these were not significant.

This picture for the entire 1973-1993 period does hide variations over the years as shown by the results for the sub-periods. These sub-periods have been chosen to reflect the patterns of procurement expenditure. 1973-79 was the period of the large military build-up, 1980-85 the period of consolidation and decline, 1986-89 was a period of renewed growth in arms production, and 1990-93 was a period of declining procurement resulting from the transition to democracy. The statistically significant differences in employment and capital growth appear to be concentrated in the first two periods, when the arms industry was built up.

This comparison of means from the sub-periods confirms the impression that the defence related industries received major increases in capital investment and employment, and were the strongest sources of output growth in the economy. However, despite being the recipients of high levels of capital investment and despite the fact that many are high tech industries that tend to have faster than normal productivity growth, the defence related industries saw productivity growth that was not significantly greater than for other industries. This picture is further supported by the fact that

in 1990-93, with the transition to democracy and the rapid decline in procurement expenditure, there is no statistically significant difference between the defence and non-defence industries.

In sum, this simple analysis of industrial performance and the changing structure of government procurement suggest that there is some evidence that the development of the arms industry in South Africa led to a channelling resources and output growth into industries that did not generate productivity gains. This suggest a large opportunity cost, but to go further we need to undertake a multivariate analysis and to do so we need to specify a formal model.

4. Modelling Industrial Production.

In order to investigate the relationship between growth and military spending in South Africa's manufacturing industries we employ a modification of the Feder-Ram model which has been widely employed to analyse the relationship between government and military expenditures and aggregate economic growth in developing countries. Dunne (1996) provides an extensive survey). Considering aggregate economic output (Y) is divided into two distinct sectors government (G) and non-government (N), with inputs labour (L) and capital (K) allocated across the two sectors, and assuming the government sector has an externality effect on the rest of the economy:

$$Y = G + N$$

$$G = G(L_G, K_G)$$

$$N = N(L_N, K_N, G)$$

with

$$K = K_G + K_N$$

$$L = L_G + L_G$$

Given the absence of data detailing the sectoral allocations of inputs and the desire to determine the productivity of input usage in the government sector relative to the non-government sector Ram (1986) allows input productivity to differ between the two sectors as a constant proportion. Thus the ratio of marginal productivity of input usage in the government sector relative to the non government sector is assumed to be:

$$G_K / N_K = G_L / N_L = 1 + \delta$$

Government spending has two potential effects on aggregate output. An output effect attributable to differential input productivity δ and an externality effect (N_G) measured by the marginal product of N with respect to G.

Taking the total derivative of Y, assuming that changes in the capital stock ($\dot{K}_t$)can be represented by investment (I_t) in order to overcome the unavailability of capital stock estimates in most developing nations, and then substituting and manipulating the equations gives:

$$(1) \qquad \frac{\dot{Y}_t}{Y_t} = N_k \frac{I_t}{Y_t} + \beta_N \frac{\dot{L}_t}{L_t} + \left(\frac{\delta}{(1+\delta)} + N_G \right) \frac{\dot{G}_t}{G_t} \frac{G_t}{Y_t}$$

As we have data on South African capital stocks and hence $\dot{K}_t$, we can express the capital related coefficient as the elasticity of N with respect to K_N. Given this, and for later convenience, we can express Equation (1) in log differences, resulting in the equation:

$$(2) \qquad \dot{y}_t = \alpha_N \dot{k}_t + \beta_N \dot{l}_t + \left(\frac{\delta}{(1+\delta)} + N_G \right) \dot{g}_t \frac{G_t}{Y_t}$$

While Equation 1' can be readily estimated, it does not allow for the separate estimation of the externality and productivity differential effect of government spending on aggregate output. Equation (1') can be rewritten as:

$$(3) \qquad \dot{y}_t = \alpha_N \dot{k}_t + \beta_N \dot{l}_t + \left(\frac{\delta}{(1+\delta)} - \Theta \right) \dot{g}_t \frac{G_t}{Y_t} + \Theta \dot{g}_t$$

where the marginal externality effect(N_G) from equation (1') is replaced with a measure of the elasticity of the externality effect since θ equals $N_G(G/N)$ which is simply the elasticity of N with respect to G. A simple computation after estimation then allows separate estimates of θ and δ to be obtained.

This model can readily be extended to industry level analysis. As in the aggregate model the capital and labour, coefficients measure the elasticities of non government production with respect to the use of inputs in non government production. However, the fixed productivity differential term δ_i allows us to test whether the types of products purchased by the government from a given industry use production techniques which are more or less efficient than that industry's nongovernmental production. Likewise, in the disaggregated setting, the "externality effect" flowing from

government-oriented production to non government-oriented production measures only the elasticity of nongovernmental production to government oriented production within the same industry. Only the effects of government-oriented demand occurring within the industry of purchase are captured by these disaggregated models.

5. Estimation Results

The data are in panel format and invite estimation by panel data techniques (Hsaio 1986; Greene 1997). These techniques allow us to exploit fully the cross-section as well as the time series dimensions of the data. The model to be estimated is linear and may be written as:

$$y_{it} = x_{it}^{'}\boldsymbol{b} + \boldsymbol{e}_{it}$$

where the index *i* refers to the industry and *t* to time. In general, the error is assumed to follow:

$$\boldsymbol{e}_{it} = \boldsymbol{a}_{i} + \boldsymbol{h}_{it}$$

where $\boldsymbol{a}$ is an industry specific error term and cov($\boldsymbol{h}$,*x*)=0 for all *i*,*t*. Assuming that $\boldsymbol{a}$ is constant across industries will create a *fixed effects* model. The assumption that $\boldsymbol{a}$ is uncorrelated with the regressors assumes a *random effects* model. In the latter case, $\boldsymbol{a}$ is an industry-specific stochastic disturbance, independent of time, and assumed to be uncorrelated across industries, or with the $\boldsymbol{h}$ term.

The choice of assumption regarding $\boldsymbol{a}$ can be made on statistical grounds by employing the one of a number of tests suited to this purpose. Below, we use the Breusch-Pagan LM test for random effects which is a test of the assumption that $\boldsymbol{a}$ has degenerate variance.

Equation 3 was estimated using panel data for the 45 industries identified in Section 3. The growth variable was computed in log difference form where the dependent variable is the growth of value added in production for each industry. A dummy variable for the 12 defence related industries identified in Section 3 was also employed to capture the differences between military and non-military government spending effects.

The estimation techniques employed identify and account for industry specific effects. These effects may be fixed or random and, as is standard practice with such data, the models were estimated both ways. Estimations were carried out for the period 1973 to 1993 and for three subperiods chosen to reflect changes in procurement patterns. 1973-79 saw rapid growth, 1980 to 1989 was a period of relatively stable high expenditure and 1990-93 a period of decline. The Breusch-Pagan Lagrange Multiplier test for random effects was rejected at 5% for the model estimated on the full sample and the subsamples, indicating that the random effects specification is to be preferred. By contrast, when dummy variables were employed to estimate fixed effects they were found to be jointly insignificant.

The results for the random effects model are presented in Table 4. For the whole period, the coefficients on the employment growth rate and the capital stock growth rate are significant at 5%, the government growth rate weighted by the government share in output (G/Y) at 10%. However, the government spending growth rate and the defence related dummy variable are both insignificant.

Thus the full sample results suggest a positive effect of government procurement on manufacturing industry growth over the whole period. There is no evidence of any significant externality effect or productivity effect.

The subsample results suggest that there is a change in the relationship over the period. During the growth in procurement 1973-79 expenditure the employment and capital stock terms are significant and positive and the effect of government procurement negative but not significant. There is no significant externality or product differential effect. During the plateau 1980-9 the employment and both of the government spending terms are significant. This means a significant positive productivity differential effect but a significant negative externality effect. For 1990-93 there is a negative coefficient on the capital stock term and a positive government procurement effect, but neither are

significant. The only significant term is the positive employment one. The defence related industries dummy fails to be significant in any of the samples.

Table 4 Panel Data Estimation Results

	Full Sample		Sub Samples					
Period	1973-93		1973-79		1980-89		1990-93	
	Coeff	t ratio	Coeff	t ratio	Coeff	t ratio	Coeff	t
Employment growth	**0.56**	13.4	**0.36**	6.4	**0.87**	10.2	**0.37**	4.2
K stock growth	**0.10**	2.7	**0.28**	3.0	0.01	0.2	-0.06	0.9
Govt growth * (G/Y)	**0.13**	1.9	-0.06	0.6	**0.21**	2.1	0.39	1.1
Govt growth	-0.00	0.5	0.01	0.6	**-0.03**	2.0	0.01	0.4
Defence related dummy	0.01	0.6	0.01	1.0	+0.00	0.5	0.01	1.0
Constant	**0.14**	30.8	**0.14**	17.7	**0.15**	21.0	**0.11**	16.0
R squared	0.25		0.29		0.28		0.11	
Chi-squared (5)	**310.4**		**123.7**		**168.9**		**20.9**	
$\delta/(1+\delta) - \Theta$	**0.13**		-0.06		**0.21**		0.39	
Θ	-0.00		0.01		**-0.03**		0.01	
δ	0.14		-0.06		0.30		0.61	

6 . Conclusions

This paper has examined the disaggregated impact of military expenditure on industrial development in South Africa using panel data methods on the Industrial Development Corporation's sectoral data. It was found that over the entire period studied, government procurement had a significant and positive effect on industrial growth, but that the relationship changed over the period.

While we need to be careful to read too much into these results, they do suggest that the positive impact of government procurement on growth in manufacturing industries 1973-93 hides a more complex story. The early period in which military spending grew quickly saw a significant impact of employment and capital stock on value added, and a marginally significant direct effect of government procurement. The period of sustained high levels of military spending 1980-89 then saw a negative externality effect despite a high positive productivity differential between government and non-government production. This is consistent with high levels of military spending producing a

stimulus to manufacturing, but one that was targeting the weaker industries in terms of competitiveness. With the end of the growth of expenditure the externality effect of this growth in military industry becomes apparent by 1990. The nature of the capital stock developed as part of a defence industrial base which is not useful for civil production (see Dunne, 1995) removes any positive impact of capital stock growth.

Given that defence procurement makes up a major component of government procurement expenditure, the failure of the defence related dummy is unfortunate but not completely surprising. It suggests that such a simple dichotomous measure is inadequate and that we need to find a more sophisticated way of measuring defence dependence. In the absence of the relevant procurement data, however, it is not clear how this could be done.

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Figure 2: Domestic Arms Procurement: 1961-96

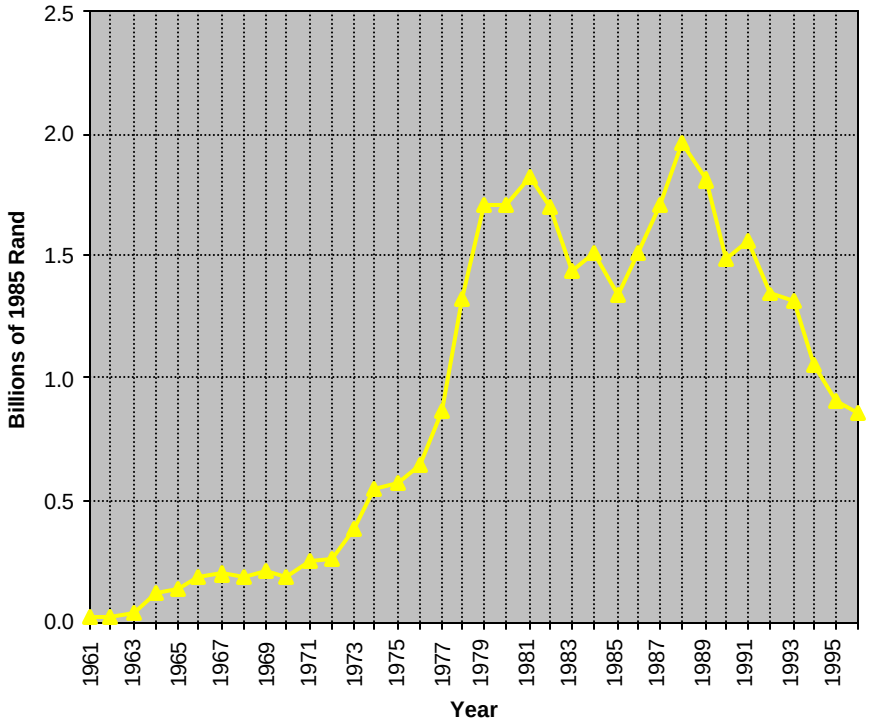

Figure 1: Military Expenditures as a Share of GDP: 1991-96

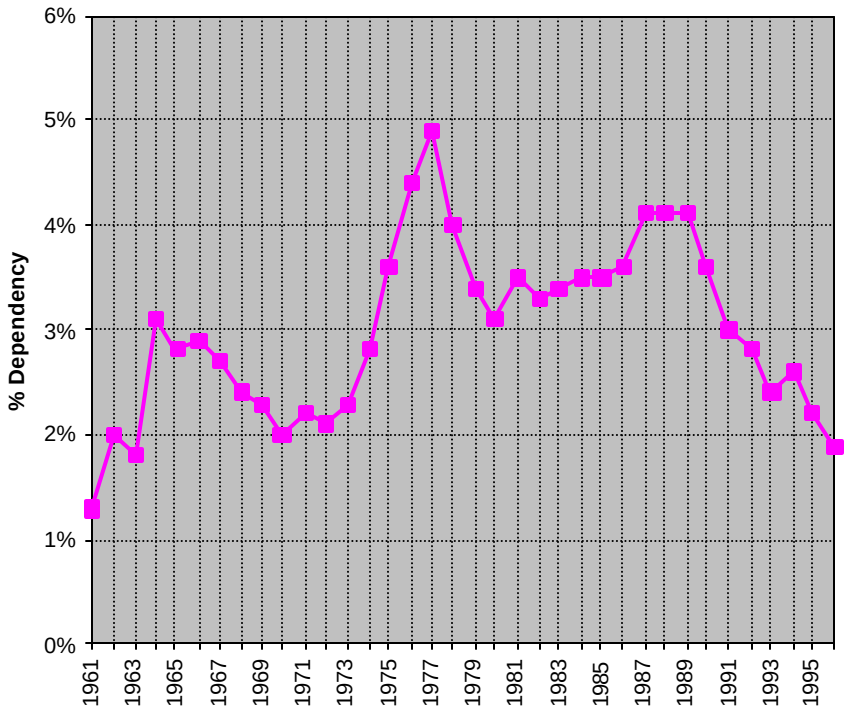

Figure 3: Domestic Arms Production as a Share of Manufacturing Output: 1972-96

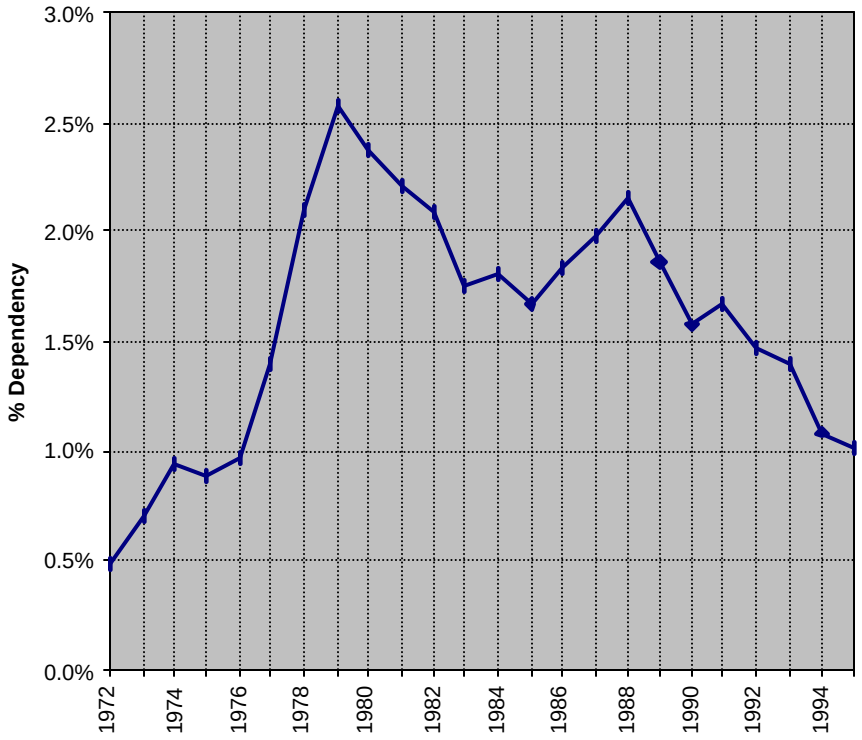

Table 1: Industrial Dependence on Government Sales: Various Years
(percentage)

Industry	SIC	1972	1978	1981	1988	1993
Total Manufacturing		**4.1**	**5.3**	**4.5**	**6.1**	**4.7**
Defence Related Industries		**12.1**	**14.1**	**10.1**	**13.5**	**11.2**
Other chemical products	3529	22.0	31.3	14.2	6.4	8.5
Other basic chemical and petroleum products	3511/30/40	7.0	5.3	2.2	3.9	3.5
Engines and turbines	3821	2.9	8.1	1.5	1.0	0.6
Office and accounting machinery	3825	29.9	30.6	50.1	21.6	51.5
Other non-electrical machinery	3829	4.4	24.4	18.6	17.6	18.8
Radio, television and communication Equipment	3832	20.6	49.1	33.4	41.8	32.0
Motor vehicles and motor vehicle parts	384	5.6	10.3	7.2	8.2	5.5
Other transport equipment	3851/5/9	90.1	80.7	59.0	119.7	89.8
Other manufacturing	386, 3902-9	23.5	31.7	25.7	52.5	38.3
Medicinal and pharmaceutical preparations	3522	25.6	21.7	22.2	29.2	18.5
Furniture and fixtures of metal	3812	8.5	14.8	11.9	26.0	17.6
Tyres and tubes	3551	6.6	5.4	2.8	5.2	2.1
Other Industries		**1.9**	**2.1**	**2.1**	**2.9**	**2.2**
Food	311/2	2.4	1.5	1.5	1.8	1.2
Beverages	313	0.1	0.1	0.1	0.3	0.3
Tobacco products	314	0.1	0.3	0.3	0.1	0.1
Textiles	321	0.5	2.4	0.8	1.3	1.4
Clothing	322	2.7	2.1	1.3	2.7	1.8
Leather products	323	0.1	0.6	0.4	0.8	3.2
Footwear	324	0.1	2.3	1.4	1.9	1.4
Wood and wood products	331	2.3	4.4	3.5	2.3	0.5
Furniture	332	5.5	9.1	6.0	8.5	7.6
Paper and paper products	341	1.1	1.6	1.7	3.6	4.1
Printing and publishing	342	8.7	11.9	8.6	16.7	11.6
Plastic products	356	0.6	2.7	0.1	0.6	0.6
Fertilisers and pesticides	3512	2.5	1.2	0.5	1.6	1.1
Synthetic resins and plastic materials	3513	0.0	0.0	0.0	0.0	0.0
Paints, varnishes and lacquers	3521	6.0	5.8	3.0	6.2	3.3
Cleaning and toilet preparations and cosmetics	3523	0.3	0.7	0.6	1.1	2.2
Other rubber products	3559	0.2	0.9	1.4	1.9	1.4
Pottery, china and earthenware	361	13.7	12.8	9.7	14.5	12.3
Glass and glass products	362	0.8	1.2	2.4	3.5	1.7
Other non-metallic mineral products	369	2.2	2.4	3.6	2.1	1.1
Iron and steel basic industries	371	0.6	0.2	0.1	0.2	0.1
Non-ferrous metal basic industries	372	0.1	0.0	0.0	0.1	0.0
Cutlery, hand tools and general hardware	3811	12.0	11.9	9.7	32.6	19.1
Structural metal products	3813	0.2	1.1	1.2	0.8	0.9
Other fabricated metal products	3819	1.8	2.2	9.5	9.1	7.6
Agricultural machinery	3822	4.9	5.3	5.7	4.2	1.3
Metal and woodworking machinery	3823	9.4	5.6	5.6	14.6	4.6
Special industrial machinery	3824	1.7	1.9	1.2	3.3	1.2
Electrical industrial machinery	3831	1.3	1.3	0.4	1.3	0.3
Electrical appliances and housewares	3833	0.7	0.4	0.2	7.6	8.8
Other electrical apparatus	3839	3.6	5.2	2.0	4.0	1.3
Railroad equipment	3852	0.0	0.2	0.2	0.0	0.0
Jewellery and related articles	3901	0.0	1.5	1.3	1.0	1.8

Table 2: Industrial Distribution of Government Mfg Purchases: Various Years
(percentage)

Industry	SIC	1972	1978	1981	1988	1993
Total Gov Mfg. Purchases(1993 Rand Billion)		**6.9**	**11.4**	**12.0**	**16.7**	**12.5**
Defence Related Industries		**63.3**	**70.7**	**66.5**	**66.6**	**66.3**
Other chemical products	3529	8.1	9.9	5.5	1.8	3.5
Other basic chemical and petroleum products	3511/30/40	12.3	9.9	4.1	7.6	7.9
Engines and turbines	3821	0.0	0.0	0.0	0.0	0.1
Office and accounting machinery	3825	0.2	0.1	0.5	1.0	1.4
Other non-electrical machinery	3829	1.5	7.3	12.0	7.3	8.8
Radio, television and communication Equipment	3832	2.7	6.6	7.3	7.6	8.5
Motor vehicles and motor vehicle parts	384	10.9	19.2	20.2	11.8	8.9
Other transport equipment	3851/5/9	18.3	9.8	8.3	15.6	15.8
Other manufacturing	386, 3902-9	3.9	3.4	4.0	7.3	6.1
Medicinal and pharmaceutical preparations	3522	4.1	2.9	3.5	5.2	4.3
Furniture and fixtures of metal	3812	0.8	1.0	0.8	0.9	0.6
Tyres and tubes	3551	0.8	0.6	0.4	0.6	0.4
Other Industries		**36.7**	**29.3**	**33.5**	**33.4**	**33.7**
Food	311/2	10.2	4.8	4.6	4.5	4.5
Beverages	313	0.1	0.1	0.1	0.2	0.4
Tobacco products	314	0.0	0.0	0.0	0.0	0.0
Textiles	321	0.7	2.1	0.8	0.8	0.8
Clothing	322	1.3	0.8	0.7	1.1	1.0
Leather products	323	0.0	0.0	0.0	0.1	0.3
Footwear	324	0.0	0.4	0.3	0.3	0.4
Wood and wood products	331	0.9	1.3	1.1	0.5	0.1
Furniture	332	1.5	1.7	1.6	1.9	1.9
Paper and paper products	341	1.0	1.1	1.3	3.0	4.7
Printing and publishing	342	7.1	6.0	5.4	7.6	7.5
Plastic products	356	0.1	0.6	0.0	0.2	0.3
Fertilisers and pesticides	3512	0.9	0.3	0.2	0.3	0.2
Synthetic resins and plastic materials	3513	0.0	0.0	0.0	0.0	0.0
Paints, varnishes and lacquers	3521	1.0	0.8	0.6	0.7	0.6
Cleaning and toilet preparations and cosmetics	3523	0.1	0.2	0.1	0.3	0.6
Other rubber products	3559	0.0	0.1	0.1	0.1	0.2
Pottery, china and earthenware	361	0.7	0.4	0.2	0.4	0.3
Glass and glass products	362	0.2	0.2	0.4	0.5	0.4
Other non-metallic mineral products	369	1.8	1.3	2.3	0.9	0.5
Iron and steel basic industries	371	1.3	0.3	0.2	0.2	0.1
Non-ferrous metal basic industries	372	0.0	0.0	0.0	0.0	0.0
Cutlery, hand tools and general hardware	3811	1.3	0.8	1.0	1.4	1.5
Structural metal products	3813	0.2	1.0	1.1	0.3	0.4
Other fabricated metal products	3819	1.8	1.4	9.1	5.0	5.2
Agricultural machinery	3822	0.6	0.4	0.3	0.1	0.0
Metal and woodworking machinery	3823	0.3	0.2	0.3	0.4	0.3
Special industrial machinery	3824	1.6	1.3	0.8	1.0	0.6
Electrical industrial machinery	3831	0.5	0.4	0.1	0.3	0.1
Electrical appliances and housewares	3833	0.0	0.0	0.0	0.2	0.3
Other electrical apparatus	3839	1.2	1.2	0.7	0.9	0.5
Railroad equipment	3852	0.0	0.0	0.0	0.0	0.0
Jewellery and related articles	3901	0.0	0.2	0.1	0.1	0.3

Table 3: Average Industry Performance and Characteristics by Industry Type

All Manufacturing

	% growth MFP	% growth total output	% growth capital stock	% growth total employed	export growth	import growth
1973-79	1.4	4.7	4.5	3.6	7.1	-2.3
1980-85	-2.4	2.1	9.3	1.9	-3.7	6.9
1986-89	1.6	4.2	-0.2	1.1	13.3	1.7
1990-93	-2.4	-0.9	2.4	-1.3	3.8	-0.3
1973-93	-0.4	2.8	4.6	1.7	4.6	1.5

Defence Related Industries

	% growth MFP	% growth total output	% growth capital stock	% growth total employed	export growth	import growth
1973-79	0.4	6.4	**7.6**	**6.8**	4.6	3.6
1980-85	-2.2	**6.4**	**22.0**	**4.9**	-4.4	4.9
1986-89	3.9	**9.0**	0.5	1.2	15.9	2.9
1990-93	-1.5	-1.9	2.7	-1.0	**8.4**	2.2
1973-93	0.0	**5.3**	**9.4**	**3.7**	4.9	3.6

Other Industries

	% growth MFP	% growth total output	% growth capital stock	% growth total employed	export growth	import growth
1973-79	1.7	4.1	3.4	2.5	8.1	-4.5
1980-85	-2.5	0.5	4.7	0.8	-3.4	7.6
1986-89	0.7	2.4	-0.5	1.1	12.3	1.3
1990-93	-2.7	-0.6	2.3	-1.5	2.2	-1.1
1973-93	-0.5	1.9	2.8	1.0	4.5	0.7

Bold Statistics are Significantly different from all other industries at 95% confidence level