

3 To Give or Not to Give Incentives to South Africa's Automotive Industry: A Literature Review

3.1 Introduction

This chapter explores economic theory and empirical work that form the basis for the offer of investment incentives to South Africa's automotive industry.

The offer of incentives for investment is based on the assumption that there is a positive relationship between investment and investment incentives. On the other hand, countries or regions do not want investment for its own sake, but rather for benefits derived from it. Economic theory on the relationship between investment and investment incentive is often based on a neo-classical economic model of a profit maximising firm (Brunker et al, 1986, p.4). It is held that a firm will invest up to point where its marginal product revenue of capital equates the cost of additional capital. Investment incentives reduce the cost of capital acquisition, hence motivating more investment, holding other factors constant. In answering the question whether South Africa should offer investment incentives to the automotive industry, literature on investment and investment incentives and on how investment benefits host regions is relevant.

In the first section, the theoretical framework that links investment and investment incentives is examined. Thereafter, the empirical work on benefits to an offering location or entity that emanate from investment is explored. Further, literature on South Africa's automotive investment under the country's Automotive Industry Development Programme (MIDP) is reviewed before making policy recommendations are made.

3.2 Investment and investment incentives: theoretical underpinnings

3.2.1 Flexible Accelerator Model

From the profit maximising neo-classical assumptions on the behaviour of a profit maximising firm, Hall and Jorgenson (1967, p.391) derived a function for investment with user-cost of capital as one of the determining factors. They incorporate postulations on a production function i.e. constant returns to scale, exogenously determined output and an

adjustment mechanism of capital stock to derive a model that captures most of the relevant explanatory variables relating to an investment incentive and actual investment.

The model specifies desired capital stock (K_t^d) as a function of output (Y_t):

$$K_t^d = \alpha(Y_t) \quad \alpha > 0 \quad (1)$$

Investment (I_t) is defined as the difference between desired capital stock and capital stock from the previous capital stock:

$$I_t = K_t^d - K_{t-1} \quad (2)$$

From equation (1) the stock of capital in the previous period will be a function of output from the previous period:

$$K_{t-1}^d = \alpha(Y_{t-1}) \quad (3)$$

Rearranging equation (2):

$$(I_t) = K_t^d - K_{t-1} = \alpha(Y_t) - \alpha(Y_{t-1}) = \alpha(Y_t - Y_{t-1}) \quad (4)$$

Equation (4) expresses investment as a function of the rate of change in output. With the introduction of adjustment lag, equation (2) is modified as follows:

$$I_t = \lambda(K_t^d - K_{t-1}) \quad 0 < \lambda < 1 \quad (5)$$

Using equation (1) we get:

$$I_t = \lambda(\alpha Y_t - K_{t-1}) \quad (6)$$

Equation (6) captures a partial adjustment mechanism where a fraction λ of the gap between desired and actual capital stock is filled within each period by investment.

Because different levels of output can be produced by varying capital-labour ratio, α cannot be a constant. It is assumed that decision on capital-labour mix will depend on the relative cost of labour and capital discounted over the investment life span. The desired capital-labour ratio and therefore capital output ratio (α) will depend on the cost of capital. The investment function, as a result, takes the form:

$$I_t = I(Y_t, CC_t, K_{t-1}), \quad \text{where } CC_t \text{ is the cost of capital} \quad (7)$$

The cost of capital variable in the accelerator model opens the way for the introduction of important economic variables and policy tools, including investment subsidies and incentives, in the investment equation. Theoretically, the cost of capital (CC_t) will depend on real interest rates (r_t), capital depreciation (a_t), expected inflation (p_e), and level of government subsidy on investment (g_i). A more comprehensive and realistic investment function could therefore be specified as:

$$I_t = I(Y_t, r_t, a_t, p_e, g_i, K_{t-1}) \quad (8)$$

Equation (8) provides a framework for capturing relationships between investment incentives, investment and production.

Jorgenson's model is criticised for not being consistent with perfect competition market conditions. The theory fails to determine explicitly the rate of investment but relies on an ad hoc stock adjustments mechanism (Howell et al, 2002, p.1498; Gould, 1968, p.48; Treadway, 1969, p.227).

3.2.2 Tobin's q theory

The alternative neo-classical theoretical approach linking investment incentives and actual investment as proposed by Jorgenson's model is Tobin's 1969 q theory. In the theory, q is

defined as the ratio of market value of capital to its replacement cost. The q value determines incentive to invest (Hayashi, 1982, p.214). In other words, a profit maximising firm will always look at two factors when making an investment decision: how much value will the firm derive from investing an additional unit of capital and how much does it cost the firm to acquire that unit of capital. The theory introduces the cost of installing new investment in the firm's optimisation decisions, thus, capturing the role of tax rules, investment tax credit and depreciation formulas, as these have a direct effect on cost of acquiring capital for investment vis-à-vis value to the firm derivable therefrom.

Formulation of the q theory model starts with an optimisation function of a firm's present value of future after-tax receipts:

$$V(0) = \int_0^{\infty} R(t) \exp \left[- \int_0^t r(s) ds \right] dt \quad (1)$$

where R(t) is net receipts and r(s) is the nominal discount.

R(t), is then defined as profits after tax, plus depreciation tax deductions, minus purchase of investment goods plus investment credits i.e.

$$R(t) = [1 - u(t)]\pi(t) + u(t) \int_0^{\infty} D(x, t - x) p_1(t - x) I(t - x) dx - [1 - k(t)] p_1(t) I(t) \quad (2)$$

where $\pi(t)$ is profit before tax at time t

u(t) is corporate tax rate

D(t) is depreciation allowance per dollar of investment at the time t

x(t) is age of an asset

$p_1(t)$ is price of investment good

I(t) investment

k(t) the rate of investment tax credit

Through specifying fiscal-investment incentive parameters in equation (2) and substituting accordingly in equation (1) the optimal investment level of a profit maximising firm can be influenced. For detailed derivation and specific solution(s), see Hayashi (1982, p.214-218).

Both the Jorgensons' and Tobin's models come to the conclusion that the cost of capital has an influence on investment, and investment incentives are one of the factors that decrease the cost of capital. By offsetting the cost of capital investment, incentives can potentially increase investment, holding other factors constant. The fundamental difference between Jorgenson's model and Tobin's q theory model is that Jorgenson uses the capital-labour substitutability to introduce capital cost considerations. Tobin's argument centres on firm benefit from invested capital. He introduces the cost of capital as being relevant to the investment decision, only to the extent that it influences the point where the marginal value of capital equates the marginal cost of capital.

Both the Jorgenson and Tobin's q theory model are important in providing a theoretical foundation for the relationship between investment and investment incentives; however, the models do not specify conditions under which the relationship would take a particular form. All they say is that based on neo-classical economic assumptions, one can derive expressions linking investment and investment incentives, among many other factors. The models, however, set a foundation for empirical work of establishing how investment incentives (more so fiscal incentives) influence actual investment.

3.3 Fiscal investment incentives and investment: empirical studies

Investment incentives have been widely used as a tool to address industrial development in both developed and developing countries (Hall and Jorgenson, 1967, p.392; Bernstein, 1994, p.56; Bronzini & Blasio, 2006, p.237; Davies, 2005, p.500). Investment incentives often take the form of fiscal concessions hence the common interchangeable use of 'investment incentives' and 'tax incentives' phrases in the literature on the subject. The target for the incentives is often the attraction of foreign direct investment, the rationale being that many of the host countries or regions lack adequate capital to support their development agendas. Investment incentives lure mobile capital to a particular location by providing a signal to potential investors for favourable investment conditions (Raff and Srinivasan, 1998, p.168). Today, virtually all developing countries are using some form of incentives to attract direct investment (Hadari, 1990, p.121). The wide use of tax incentives to attract investment has led to a number of studies on merits of this offer and its impact on

investment. Findings so far are mixed and inconclusive but nonetheless informative (Howell et al, 2002, p.1498; Tung & Cho, 2000, p.105).

3.3.1 Incentives as an effective tool for stimulating investment

Fumagalli (2003, p.964) argues that an offer of incentives facilitates efficient investment location decisions that would not otherwise have taken place without incentives in a particular place. His argument is supported by a number of empirical studies that concluded that the offer of investment incentives did influence investment (Bronzini & Blasio, 2006; Hall & Van Reenen, 2000; Tung & Cho, 2000; Head et al, 1999).

Bronzini & Blasio (2006, p.328) used a descriptive statistical analysis to assess whether the offer of investment incentives to areas of the Italian manufacturing industry which lagged behind had a positive effect on investment. They found evidence that investment incentives did indeed bring forward investment projects in order to take advantage of available incentives. Such investment would not have taken place or could have potentially taken place at a later stage.

With a similar intention of establishing a relation between offer of incentives and investment in a particular location, Tung and Cho (2000, p.105) used Chinese data to test the assertion that creation of special tax incentive zones was effective in inducing foreign investment into such areas. China provided an excellent opportunity to test incentive-investment relationships, as by 1993 the country had become the largest recipient of foreign investment despite its previous non-capitalistic economic strategy. Their regression analysis results showed that tax incentives were effective in attracting investment to China, and did influence the selection of a particular form of investment.

Head et al (1999, p.197) studied Japanese investment in the USA between 1980 and 1992 to assess the effectiveness of investment promotion efforts of US states, using incentives. After controlling for agglomeration and fixed region effects, they found that incentives in the form of tax revenue and job-creation subsidies affected the location of investment. Unilateral withdrawal of investment incentives caused individual states to lose a substantial

amount of Japanese investment. Still in the USA, Hall & Van Reenen (2000, p.449) found that the offer of tax incentives for R&D had a positive effect on actual R&D taking place, but not on investment in general, pointing to the fact it might be useful to disaggregate investment in assessing how incentives affect investment.

The fact that incentives do not homogeneously influence all categories of capital was also observed by Feltenstein & Shah (1995, p.253). They examined the relative efficacy of using a tax instrument to promote private capital formation in Mexico. They found that corporate tax reduction had the most stimulative impact on investment. They however pointed out that if the intention of the incentive offering country is to encourage acquisition of state of the art technology, fiscal incentives may be ineffective as generic fiscal incentives increase the demand for both new and old capital.

Proponents of incentives for investment cite the above and many more such studies to make their case. However, there are as many if not more empirical studies that conclude otherwise, as will be reviewed below.

3.3.2 Ineffectiveness of investment incentives

Many other authors, supported by empirical work, argue against the use of investment incentives. They make a point that the offer of investment incentives, whether fiscal or other special subsidies, plays an insignificant role in influencing investment (Hasset and Hubbard, 1998, p.103; Sethi et al, 2002, p.686; Lim, 1983, p.207; Moore & Swenson, 1987, p.671; Beyer, 2002, p.192; Dunning, 1980, p.14; Globerman & Shapiro, 1999, p.513).

In justifying their case, a number of anti-investment incentive authors have approached the debate on industry incentives by interrogating factors that influence a firm's decision to investment in a particular location. From this perspective, Caves (1971) and Dunning (1980) postulate that investment, specifically foreign investment, is a strategic decision by a particular firm that allows it to exploit resource ownership advantage and has nothing to do with incentives. Dunning (1980) further suggests that a decision to invest in a particular

location is often motivated by the existence of resources, both material and human, that the firm wants to take advantage of, rather than investment incentives.

The position by Dunning (1980) is supported by a number of studies that argue that the offer of an investment incentive is a wasteful exercise. Investment is driven by economic fundamentals such as market potential, economic growth, political stability and dependable legal systems, among others (Ozawa, 1995; Narula, 1996; Dunning and Narula, 1996; Lall, 1995). Investment is a firm level decision that involves strategic considerations. It cannot therefore be explained by one single factor (Sethi et al, 2002, p.691).

Sethi et al (2002) introduced the “push” dimension in terms of factors determining investment location decision, an aspect that is often omitted by many authors on the determinants of investment. He presents a generic model that integrates institutional and strategic factors into investment theory and argues that the two aspects need to be considered in tandem, when considering factors that influence investment and investment location. Incentives are just one of the many investment-determining factors (Table 11).

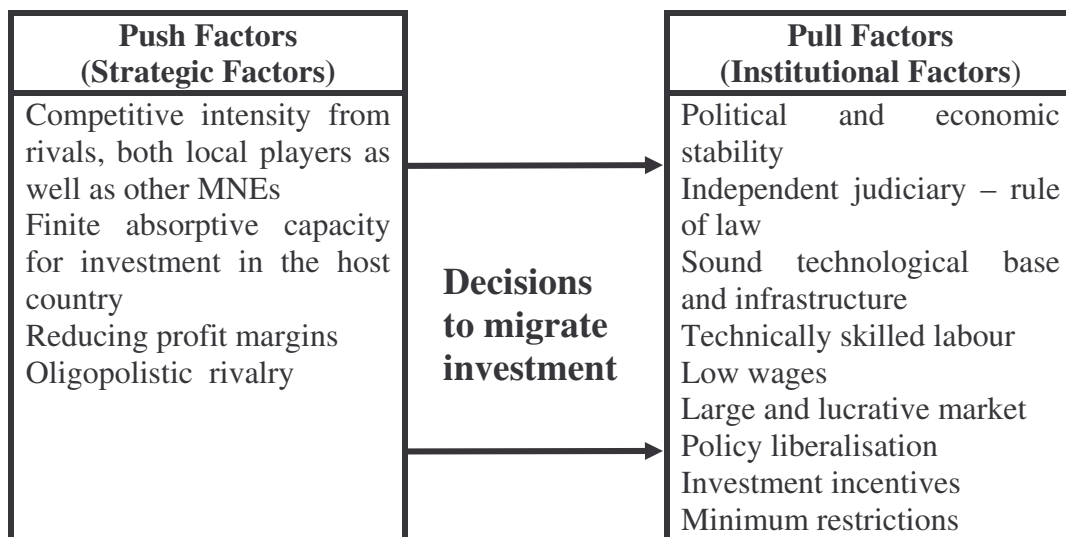


Table 11: Pull and push factors explaining investment location decisions
(Sethi, 2002, p.691)

Sethi et al (2002)’s proposition is supported by empirical work of Bevan & Estrin (2000, p.26) who also found that country risk, unit labour cost, market and gravity factors were

the key determinants for attracting investment to Central and Eastern Europe in the period of transition from socialism to capitalism.

The trivialness of investment incentives was also pointed out by Hasset and Hubbard (1998, p.103). Using US data on investment in 10 developing countries, they found that the effect of investment incentives on the price of capital goods was very small. They claimed that this was due, in part, to price increases by the suppliers of capital goods in the presence of investment incentives. Hasset and Hubbard (1998)'s finding suggests that even if the user cost of capital goods were to be a significant determinant for investment, as proposed by Jorgenson and Tobin's model, the offer of investment incentives may not increase investment.

Beyer (2002, p.191), in a comparative analysis of how successful fiscal incentives were in attracting investment in transition economies found that incentives had little or no value at all. In a correlation analysis of 15 transition European countries between 1993 to 1998, in which all country/time points were combined, Beyer found an insignificant negative correlation coefficient of $r = -0.116$ between fiscal investment incentives and actual investment. He argues that it was the privatisation process, and the subsequent change in economic and political conditions that had the biggest influence on investment in the transition countries. Investors are always looking for investment opportunities and they do not need incentives to find them. (Beyer, 2002, p.193) further points out that host countries or regions face a set of potential investors motivated by different reasons. Since incentives target non-homogeneous potential investors, their effects will always differ. The choice of which incentives to offer has to take into account not only the costs vis-à-vis benefits of intervention but also the overall strategic orientation of the targeted companies (Melin, 1992, p.99).

Empirical work on the effects of investment incentives on investment in developing countries is still limited, though there is a general belief that a country's overall economic character is more important for investment to take place (Howell et al, 2002, p.1500; Tanzi and Shome, 1992, p.31; p.15; Jenkins & Thomas, 2002, p.44). Tanzi and Shome (1992,

p.31-65) contrasted the use of tax incentives in South East Asian economies and came to a conclusion that the positive effect on industrialisation in Taiwan, Korea, and Singapore when compared to a less positive effect in Malaysia, Indonesia and Thailand, was due to economic fundamentals, despite the offer of comparable tax incentives. Specific for Southern Africa, Jenkins & Thomas (2002) conducted a survey, with predominantly European parent countries operating in SADC, to determine the main factors influencing investment in the region. According to their findings, the most important motivation for investment in Southern Africa was the size of local market; more important than cost considerations. Hence, South Africa with the largest domestic market in the region hosted most of foreign subsidiaries' investment in the region. They further claimed that though market size was critical, economic openness, the quality of institutions and physical infrastructure of the host economy, economic growth and stability were correlated with investment inflow in Africa. They did not consider incentives as an important determining factor for investment. Jenkins & Thomas (2002) conclusions are supported by Dupasquier & Osakwe (2005, p.255) who posit that to attract investment, African countries need to image build in terms of political, macro-economic and legal framework stability. Countries should be seen to be supportive and responsive to the needs of their current investors, should aggressively market investment opportunities and open up their economies, rather than simply give selective industry investment incentives.

There seems to be a consensus among anti-incentive authors that the role played by investment incentives in influencing investment decisions is minimal and only relevant when competing locations have almost similar macro-economic and institutional fundamentals. Investment-targeting incentives simply improve bottom lines for the investor since the decision to invest would have been made already based on the region fundamentals.

From both theoretical and empirical work it is clear that whether investment incentives influence investment and how, is still a question that begs to be answered. It calls for further research before a generalised position can be taken.

3.4 Benefits of investment

As previously noted, host countries or regions, do not want investment for its own sake but for benefits that emanate from increased production activity enabled by the investment. Therefore, a further question of interest for an investment host region is whether the enabled investment benefits the host. A few studies have claimed that investment, specifically foreign investment, has positive spin-offs in terms of stabilising economies of recipient countries (Laski, 1998, p.1), increase in trading activities (Brenton et al, 1999, p.96; Deichmann, 2001, p.142), and integration of the domestic market into the global value chain (Lankes and Venable, 1996, p.331). However, the question of whether investment always benefits a host location is far from being answered. A direct relationship between foreign investment and domestic economic growth is not automatic (Kogut, 1996, p.293; Reis, 2001, p.412).

3.4.1 Externalities and investment

The theory of externalities and investment posits that investment will always have benefits that accrue to its location area that the investor will not be rewarded for. Investors, being profit maximisers, will underestimate optimal investment because of the unrealised benefit. In order to avoid this under-investment, potential investors need to be compensated, as a way of correcting this market failure. Incentives act as a tool to fill the gap between social and private returns of investment, thus correcting the market failure and leading to efficient investment decisions (Brewer and Young, 1997, p.177). Further still, countries opt to offer incentives for investment because such investment, particularly foreign investment, is seen as an effective conduit of technology transfer to domestic firms and it is associated with positive spillovers to its new location. By providing additional capital to a host country, foreign investment can create new employment, fill the resource gap between domestic savings and optimal investment, enhance international trade and increased domestic productivity in general (Dupasquier & Osakwe, 2005, p.244). The underlying premise is that multinational corporations possess superior intangible assets including technology, managerial skills, export contacts, reputation and goodwill (Bwalya, 2006, p.514-515).

In line with economic theory, a number of studies claim to have found a positive relationship between foreign investment and positive externalities. Increase in productivity of domestic firms is the commonly cited externality (Kokko, 1994, p.279; Barrell and Pain, 1997, p.1776; Blomström and Kokko, 1998, p.247; Driffield, 2001, p.105). Such studies claim that due to the technology that comes with the foreign investors, domestic firms benefit from business relationships with foreign firms.

On the other extreme end are a few studies that have come up with evidence that foreign capital is detrimental to host economies. Haddad and Harrison (1993, p.55), and Aitken and Harrison (1999, p.605) caution on “market stealing” by foreign firms; a situation where domestic firms do not realize economies of scale and the subsequent reduction in their average sales because output demanded from them would be “stolen away” as foreign firms take over large parts of the market. FDI might also constrain the deepening of domestic R&D capabilities, a situation referred to as “crisis construction” (Lall, 2001, p.192).

Most literature on foreign investment and spillovers, however, seems to indicate that foreign investment will be accompanied by positive spin-offs but under strict conditions in the host economy. The level of foreign ownership, for example, is considered as being critical in determining the nature and level of externalities to host economies (Chhibber and Majumdar, 1999, p.222; and Blomström and Sjöholm, 1999, p.915). Foreign ownership in a domestic firm has to reach a particular threshold to realise positive externalities. Spillovers tend to be stronger in sectors where local competition is higher and technology less advanced. Blomström and Kokko (1998, p.248) maintain that the higher the level of competence and the more the competition in the market, the greater the absorptive capacity of and the positive benefits for the host country. Blomström et al (2001, p.124) report that FDI spillovers will depend on trade regimes and export orientation of the recipient firms.

Investment incentives indeed affect the cost of capital and the cost of capital is a significant determinant of investment. However, without clear evidence that investment will always have positive effects on the host economy and that investment incentives will indeed influence investment, economic analysis is required on the effect of the offering of

investment incentives to the South African Automotive industry to achieve MIDP objectives.

3.5 Incentives in the South African Automotive Industry

Two extreme views have so far emerged in the debate on incentives in the South African Automotive industry. On one hand are authors who claim that the incentive arrangement cannot be considered as a success because its costs exceed the benefits. Flatters (2002, p.13) asserts that such incentives, specifically the import-export complementation incentives under the MIDP, have been costly policy errors and that the attention given to the sector exceeds its contribution to output, export and employment. Given the fact that there are some sectors of South African economy that have realized success without government support, Flatters argues that incentives to the automotive industry may only be increasing the bottom lines of local vehicle manufacturers without necessarily influencing their investment decisions.

On the opposite extreme are authors who claim that the MIDP is an example of a well-designed, successful industrial policy. Barnes, Kaplinsky and Morris (2003, p.20) present the South African automotive sector as a success against the Washington consensus that the role of government, in enabling industrial development through industrial policy, should be minimal. They claim that properly administered incentives can be an effective tool among developing countries to kick-start domestic industrialisation. Their position is supported by Black (2001). He postulates that the offer of investment incentive to the automotive industry played a key role in influencing major foreign firms in the automotive industry to draw their South African operations into their international networks (Black, 2001, p.780). This allowed integration of the local industry into the global automotive value chain without destabilising gains made by the industry under the protected trade regime. He further claims that performance of South African automotive manufacturing industry under the MIDP incentive dispensation is evidence to the fact that clear and stable incentives can positively influence firm behaviour (Black, 2002, p.18).

An observable commonality among authors on the MIDP incentives is the admission that the policy framework of MIDP as driven by the import-export complementation is hard to evaluate. “The extraordinary complexity of the MIDP makes it difficult to determine the effects of changes in the key MIDP policy variables”, say Bell and Madula (2003, p. viii). According to Flatters (2002, p.5), the effectiveness of the system is very hard to evaluate since the MIDP incentives are tied to export promotion, which in turn stimulates importation through earned export credits. The multiple and at times apparent conflicting objectives of the MIDP makes the overall evaluation problematic.

3.6 Synthesis

Economic theory on the offer of investment incentives and the empirical work on the relationship between investment and benefit to host locations are inconclusive on whether and how to offer investment incentives to an industry like the South Africa automotive industry. The situation is further complicated by domestic diverse views on the cost and benefit of the industry incentives.

Notwithstanding the ambiguous relationship between investment incentives and investment as proposed by Jorgenson and Tobin, the theoretical literature rationalises the offer of investment incentives as a means of correcting market imperfections created by investment externalities (Brewer and Young, 1997; Bwalya, 2006, Blomström and Kokko, 1998; Driffield, 2001). In other words, the intention of investment incentives is to remove market distortions created by investment externalities and facilitate investment by potential investors so as not to under invest (Dupasquier & Osakwe, 2005, p.244).

The basic assumption of this conventional literature, that the rationale for offer of investment incentives is the existence of investment externalities and hence taking the offer of investment incentives as market correction mechanism, is not entirely correct. Many countries or entities offer investment incentives, not because there are externalities attributable to investment, but rather to influence investment externalities. Investment incentives are intended to influence investment decisions to the extent that investment serves particular objectives. More often than not, the intention is not to correct market

imperfection but rather to make markets imperfect. In the case of South Africa, one of the national objectives is to ensure that investment in the automotive industry is maintained at levels that sustains employment. This level of investment might not be at a production level that would allow the most effective and efficient way of production.

The question of how to offer investment incentives to the South Africa automotive industry could have been best served by economic literature that addresses how investment incentives influence investment externalities, which literature perspective is unfortunately limited or missing. The same question can however benefit from literature that addresses how investment incentives influence factors known to influence investment externalities. This is a proxy approach to the understanding how incentives may influence investment externalities, specifically positive externalities. In as far a manufacturing is concerned, positive externalities relates to wider societal benefit that accrue to the local productive activities. In this regard, industry competitiveness is a key factor in ensuring sustained benefit from investment made to a particular location. The extent to which competitiveness is enabled by investment incentives is a fair proxy as to how such incentives are influencing investment externalities. For completeness, we extend the literature review to cover theoretical and empirical aspects of investment, investment incentives and competitiveness in the next chapter.

4 The Productive Asset Allowance and South African automotive industry competitiveness

4.1 Introduction

South Africa's adoption of an outward-looking industrial development policy strategy after 1994 was motivated, in part, by the desire to detach domestic industry performance from national economic growth (Black, 2001, p. 779). It was acknowledged that the domestic market was not able to support high production volumes that could allow efficient and competitive domestic production. Given the emphasis put on exports and foreign investment to drive national growth, international competitiveness became an important component of overall national development strategy. South African policy makers hoped to emulate the successful experience of some East Asian countries that had succeeded in achieving high economic rates through exporting (Edwards & Golub, 2004, p.1323). In line with national development strategy, the South African government introduced an investment incentive for the automotive industry, the Productive Asset Allowance (PAA) in 2000. The incentive was intended to support efforts to make the domestic industry competitive in the long term under the country's Motor Industry Development Programme (MIDP). Against the background of reducing import duties, the industry needed additional motivation to encourage domestic investment. Achieving comparative competitiveness was critical for the local vehicle and component manufacturing subsidiaries, as the global structure of the automotive industry dictates that subsidiaries located all over the world compete for business from their parent company.

The chapter explores literature on R&D activities and industry competitiveness. This is followed by an empirical assessment of the prospects of the PAA to support South Africa's automotive industry competitiveness through R&D effort using industry performance data for the period 1998 to 2004. A strong assumption is made that R&D and subsequent innovation are prerequisites for long-term industry competitiveness. Cognisance is taken of the fact that R&D may not always lead to competitiveness (Papadakis, 1995, p.569); however, it is widely accepted that R&D is the most common way through which national industries can acquire independent and unconditional intellectual property rights.

4.2 R&D investment and industry competitiveness

4.2.1 Definitions

R&D can be defined as a formal improvement-driven undertaking to discover new knowledge about products, processes and services. It comprises of the bulk of creative systematic activities undertaken to increase a stock of knowledge and the subsequent use of this knowledge to devise new application (Frankema & Lindblad, 2006, p.304). According to Zhouying (2005, p.38), R&D entails developing of technologies that can be commercialised under independent intellectual property rights. It enables firms to create new technologies and/or to build on existing technologies obtained through technology transfer. R&D is seen as the foundation of technology progress and sustainable competitiveness in the modern era (Solow, 1957, p.320; Lengnick-Hall, 1992, p.399; Lim, 1994, p.834; Wint, 1998, p.281; Frankema & Lindblad, 2006, p.316).

Competitiveness on the other hand refers to the ability of a firm or industry to increase in size, market share and profitability. Quoting the US Presidential Commission on Industrial Competitiveness, Clark and Guy (2000, p.364) define competitiveness as “the degree to which it (a nation) can, under free and fair market conditions, produce goods and services that meet the test of international markets while simultaneously maintaining and expanding the real income of citizens”. The later definition takes cognisance of the welfare effects of increased productive activities as a country captures bigger market shares. Some other authors have linked the definition of competitiveness with an increase in per capita income and employment (Oughton, 1997, p.1486). They claim that competitiveness is a product of increased productivity. To achieve competitiveness, output per each factor of production, including labour has to increase, if all other factors are constant. Assuming perfect market conditions or at least market conditions that support a positive correlation between reward for factor inputs and productivity, wage rates payable will increase with productivity. Competitiveness will therefore lead to an increase in GDP per capita and overall improvement in national welfare.

The definition of competitiveness as it applies to nations is sometimes contested. In the words of Krugman (1994, p.44), “competitiveness is a meaningless word when applied to national economies. And the obsession with competitiveness is both wrong and dangerous”. Despite the divergent views on whether one should attempt to define competitiveness at national level and on the scope of the definition, the meaning of competitiveness when applied to a particular industry producing goods and services for a contested global market is less blurred by controversy. Industrial competitiveness encompasses increase in market share and profitability achieved through provision of goods and services of higher quality at a lower price, compared to that of competitors. It is important to note that for sustainability, the industry need not be subsidised in any way. In the subsequent analysis, the definition of competitiveness is limited to an increase in the South African automotive industry’s share of a free global market.

4.3 Economic theory on R&D and competitiveness

From a macroeconomic perspective, the link between R&D and competitiveness is via technology growth. This theory can be traced in the early work of Solow (1957, pp.312). Using an econometric model based on a neoclassical production function [$Y = F(K, L)$ - where Y is output, K is capital and L labour], Solow calculated the growth in output attributable to change in capital and labour respectively. By totally differentiating the production function, he derived the elasticity of output with respect to capital and labour. Applying a competitive pricing condition ($\frac{\partial Y}{\partial K}$ = price of capital; $\frac{\partial Y}{\partial L}$ = the price of labour) the share of both capital and labour were calculated. Solow’s results showed that growth rates in capital and labour could not account for the overall output growth. He attributed “the uncounted for” growth in output to “residual” factors associated with technological change, including R&D (Solow, 1957, p.320).

Solow’s theoretical conclusions on the role of residual factors, particularly technological progress, are consistent with a more recent large-scale World Bank study of 1991 that showed that labour and capital alone could not account for output growth in both developing and developed countries. According to the study, the most important source of

output growth for developing countries was capital, but for developed countries, it was technical progress. For the developing countries, as a group, capital's contribution to output growth was 65% and that of technical progress was 23%. Developing country results contrasted sharply with those of developed countries where technical progress contribution to output growth was more important than that of capital and labour combined (Table 12). By implication, the growth in output in developed countries was largely a result of growing efficiency in the use of factor inputs (Lim, 1994, p.834). The contribution of technology progress to output growth was greater than that of labour across the board, for all developed countries. An interesting dimension of the study, as quoted by Lim, is that for most of the developed countries, the contribution of labour was negative. Essentially, reduction in employment would increase output growth for these countries. Although this assertion can be contested, it has serious policy implications for developing countries; for such countries to progress towards the "developed country" status labour contribution to national output is likely to decline and at one point it may become negative. So, if high employment levels are to be achieved or maintained, the contribution of technical progress will have to be enhanced significantly, to counteract the negative effect of labour; otherwise, competitiveness will be lost.

Region	Capital	Labour	Technical Progress
Developing Countries, 1960-87	65	23	14
Africa	73	28	0
East Asia	57	16	28
Europe, Middle East & North Africa	58	14	28
Latin America	67	30	0
South Asia	67	20	14
Selected developed countries, 1960-85			
France	27	5	78
West Germany	23	-10	87
Japan	36	5	59
United Kingdom	27	-5	78
United States	23	27	50

Table 12: Contribution of capital, labour and technical progress to output growth (%)
(Lim, 1994, p.835)

The realisation that productivity was not entirely a function of factor inputs triggered efforts by policy makers to focus on the postulated effect of R&D and technological progress on productivity in their quest to guide national competitiveness strategies.

Experiences of countries like Japan and Thailand played a key role in further elevating the importance of R&D and technological capability as national competitiveness-determining factors.

The current conventional thinking is that the link between R&D and competitiveness is via its effect on technological development and subsequent innovation. Innovation, technological advances and country competitive advantage happen to be connected by complex multidimensional relationships (Lengnick-Hall, 1992, p.399). The logic applied here is that competitiveness depends on average production costs. Production costs are a function of price and non-price factors, some of which are R&D capabilities and the ability to adopt and use new technologies. Sustainable competitiveness depends on the ability of a country or industry to offer comparative products to its competitors at lower prices on an open market. It requires that a country or industry is able to lower its production costs without sacrificing quality. Technology innovation offers one of the most practical ways to reduce production costs while at the same time maintaining or even increasing product quality. R&D happens to be perhaps the most widely used innovation approach. R&D investment has a powerful positive correlation with industrial profitability, product quality, return to investment, hence overall competitiveness (Merrifield, 1989, p.72). R&D activities generate knowledge, which is a factor of production, as such an indirect input in the neo-classical production function (Özçelik & Taymaz, 2004, p.410). Stumpf & Vermaak (1996, p.7) also pointed out that technology that results from R&D activities determines the actual value of the physical resource endowment of a country. Through its value adding, technology augments the value of a country resource base and enhances its competitiveness, holding other factors constant. Therefore, there is general agreement that countries seeking to enhance their international competitiveness, have to engage in domestic R&D and subsequent innovative activities (Wint, 1998, p.281).

It must be noted, however, that there are alternative means to acquire technological capacity other than undertaking R&D investment. An industry may opt for external license agreements, strategic alliances or partnerships (Lengnick-Hall, 1992, p.407). Such acquired technological potential, however, cannot be considered a national resource, and is less

likely to serve the national interest for a country like South Africa. Based on the Chinese experience, Fan (2006, p.359) contends that development of innovative capability and self-developed technology are the key factors leading to domestic firms catching up with multinational corporations. She emphasises that domestic firms need to prioritise building innovative capabilities from the beginning in order to withstand competitive pressure from multinational companies as well as other domestic companies. Externally sourced technology puts pressure on the local human resource capabilities of a country, often requiring that the local labour force adapt to new production techniques in a very short time. Often, external experts are brought in to implement the new processes, with little technical knowledge being passed to the local labour force. Further still, external technologies tend to disempower local management in steering industry in a direction that serves national interests. It is, therefore, important that there is clarity on the part of policy makers as to what they want to achieve. If the intention is simply to participate in international business without a strong need for developing national capabilities, then efforts could be directed toward acquiring already available technology through licence and partnership agreements. However, if the intention is to develop a fairly independent and sustainable national competitiveness, domestic R&D efforts and intra-firm innovation among domestic firms are inevitable.

The link between R&D effort, innovation, technical progress and competitiveness has to be qualified; it is not straightforward and is characterised by time lags. For competitiveness to be realised, R&D generated knowledge has to be adopted and commercialised by industry; otherwise, the knowledge remains valueless. R&D is an input in the long process of achieving competitiveness. Like any other input in a chain of interrelated activities of a system, the relationship between input and output may be hard to establish. One has to consider time lags and control for other “competitiveness-determining” factors that simultaneously change with R&D efforts over time. Another challenge in the R&D and competitiveness analysis relates to measuring the effectiveness of R&D. Frankema and Lindblad (2006, p.316) point out that “Figures on R&D activities and numbers of people employed in R&D activities, the commonly used indicators of R&D activity, merely inform us about the scope of efforts and financial commitments but do not offer insight into

the effectiveness of R&D efforts”. The R&D success rate is dependent on a range of intermediary factors like knowledge management, technology absorptive capacity of the environment, and other soft technological variables. Zhouying (2005, p.36) claims that soft technological factors that relate to the emergence of new business technologies and cultures, such as modern management techniques, venture capital, virtual technology, incubators, etc. constitute soft technology that provides an environment for innovation and effective application of technologies, hence attainment of competitiveness. This explains why the United States with the highest expenditure on R&D and new technology in the world was less competitive than Japan on a number of product global markets (Zhouying, 2005, p.39). Institutional structures that support absorption and commercialisation of R&D output play a critical role in ensuring that R&D efforts lead to competitiveness attainment. Many developing countries rarely benefit from technology transfer because of the low efficiency they exhibit in absorbing the technologies required. The low absorption capacity is a direct result of incompleteness of the soft technology environment in these countries (Zhouying, 2005, p.40).

Notwithstanding the above concern on R&D and competitiveness, there is no doubt that new knowledge drives innovation and new knowledge is rooted in R&D activities. Innovation and technological capability are important assets for any country or industry in getting a competitive edge over its rivals in free contestable markets.

4.4 Need for local R&D and technological progress for the South African automotive industry

The new democratic government of South Africa inherited a considerable technology base from the past that could be improved upon to support the country’s general competitiveness (Stumpf & Vermaak, 1996, p.3). The country as a whole boasted of a good physical infrastructure network and pool of local engineers and research institutions. Economic isolation had motivated development of reasonable local research capabilities in order to withstand effects of external trade embargoes.

The automotive industry was one of the many local industries that had to adapt to efficient means of production and doing business in order to hold out on external competition following the country's re-integration into the global economy in 1994. Apart from the historical industry inefficiencies perpetuated by many decades of protectionism, the South African automotive industry has a location disadvantage in terms of major global markets. Located at the Southern tip of the African continent, it is further away from both European and American markets than most of its global competitors, such as the former socialist Eastern European countries and Brazil. Yet exports are supposed to be drivers of the automotive industry growth. To effectively compete on the global scene, the local industry has to find a way to compensate for the distance disadvantage. The implementation of the "Just-In-Time" (JIT) supply concept under which components have to reach the assembly plants just in time to be used on the assembly line, has further exacerbated the location disadvantage for component supply. Component manufacturers have to be within easy reach of assembly plants; otherwise, they have to be supported by extremely efficient and robust logistical systems. The local component-manufacturing sector has to contend with this challenge.

Again, the nature of global automotive business configuration is such that subsidiaries of the major global vehicle manufacturers compete for business based on their respective business case. Without the previous market protection that had sustained inefficient domestic production, as a way to "jump the tariff wall", future business for domestic subsidiaries is very vulnerable. Local subsidiaries of global vehicle manufacturers have to achieve efficiency levels comparable to their counterparts all over the world that have been operating under competitive market conditions while the local industry was under protection. The local industry has to come up with creative means to catch up with its competitors.

Finally, as South Africa has no international vehicle brand there is a general realisation that component supply to international vehicle brands provides a crucial means for the country to participate in the global automotive value chain. However, the global automotive industry configuration is such that vehicle manufacturers are delegating more of the design

responsibilities to component manufacturers. The tendency is for the vehicle manufacturers to provide the overall performance specifications and information about the interface with the rest of the car. The component manufacturer then designs a solution using its own technology. The new supply dynamics put enormous pressure on the component sector to acquire world-class technological competencies in order to participate competitively in the global automotive business. Profitable and long-term survival of the domestic automotive industry is highly dependent on acquiring technological competencies. This requires R&D efforts, not only to come up with new technology but also to create an environment that can absorb new technologies.

According to Stumpf & Vermaak (1996, p.8), countries like South Africa could mitigate against production location disadvantages by increasing their productivity through technology upgrade given its high percentage contribution towards production productivity (Table 13). It is not impossible for a country like South Africa that has some advantage in terms of resource endowment, to offset historical production inefficiencies by increasing the contribution of technology to its overall industry productivity.

Factor	% Contribution
Technology	38.1
Capital	25.4
Labour quality	14.3
Economies of scale	12.7
Resource allocation	9.5

Table 13: Factors contributing to productivity increase
(Stumpf & Vermaak, 1996, p.8)

Quoting Porter (1990) Stumpf & Vermaak, (1996, p.15) emphasised that: “National productivity is created not inherited. It does not grow out of a country’s natural endowment, its labour pool, its interest rates or currency value as classical economists often insist. A nation’s competitiveness depends on the capacity of its industry to innovate and upgrade”.

Technology plays a bigger role in the creation of national wealth than physical resources and it assumes a self-multiplier effect. It is important that decision makers, including

politicians, educationists, industrialists, organised labour etc. fully grasp and understand the interaction between the elements of economic growth, resource utilisation, and technology and that national policies are tailored towards this end (Stumpf & Vermaak, 1996, p.6).

Achieving competitiveness is closely related to and intertwined with technology progress. Global competitiveness is inseparably linked to productivity improvement and technology upgrade (Stumpf & Vermaak, 1996, p.7). Carayannis & Roy (2000, p.287) postulate that a firm's long-term competitiveness is directly proportional to its speed and acceleration of innovation. Global technology improvement has led to a decrease in product life cycles. Facilities, equipments and worker skills are rendered obsolete long before their useful lives have been realised (Merrifield, 1989:p.71). In order to remain competitive, firms have to innovate continuously and need to ensure that they realise a positive return to innovation-related investment over shorter periods. Innovation, however, requires substantial R&D layouts, which small firms may not be able to afford or rationalise. As such, innovation is more feasible with big firms (Özçelik & Taymaz, 2004, p.410). Frankema & Lindblad (2006, p.316) point out that because R&D often requires substantial investment with a high risk on its returns, governments have to play a key role in encouraging and facilitating R&D.

Specific to the automotive industry, there is a general tendency for R&D and innovative activities to be centralised at the headquarters of the parent company for both strategic and economic reasons. This tendency is a major constraint to national government efforts to kick-start R&D activities and innovation in the domestic industry. Innovation is a long-term, high-risk form of investment, but one which is necessary for industrial survival and profitable growth (Merrifield, 1989, p.73; Papadakis, 1995, p.571). Innovation is a necessary activity that late developing countries, including South Africa, have to undertake in their quest to become competitive. It was against this background that the South African government introduced the PAA as a separate incentive based on the value of investment related to state-of-art asset investment, R&D and technical expertise capitalised expenditure. The assumption was that the incentive would encourage the above forms of

investment and hence contribute towards efforts to make the domestic automotive industry competitive in the long term.

4.5 Investment under the PAA

The PAA was introduced in 2000 but investment as far back as 1996 was eligible for the incentive. A wide range of investments, including advanced production equipment and world-standard water-based paint plants, have benefited from the PAA.

The nature of investment undertaken has a bearing on the process towards achieving competitiveness by an industry. According to Waddock & Graves (1994, p.11), R&D investment as opposed to capital investment is associated with improved industry competitiveness. Investment in plant, machinery and tooling is important in the realisation of short to medium term profitability of firms, but in the long run it is the R&D investment and the subsequent potential to innovate that is likely to determine industry competitiveness (Fan, 2006, p.367; Özçelik & Taymaz, 2004, p.410; Koschatzky et al, 2001, p.312; Lee, 2000, p.493). From both the perspectives of developing technological capabilities or facilitating assimilation of new external technology, R&D is a critical determinant of industry competitiveness in the long term (Gustavsson et al, 1999, p.1501). R&D investment intensity can also be indicative of the willingness of firms to commit themselves to new products and improved processes within a particular location (Waddock & Graves, 1994, p.4). By deciding to undertake R&D and innovation activities, enterprises signal the importance they attach to a location in terms of future competitive strategy.

Investment in R&D is one of the main determinants of innovative capacity. According to Gustavsson et al (1999, p.1501), cumulative R&D expenditure is a proxy for knowledge capital stock, an important determinant for new technology diffusion, an aspect critically important in the automotive business. For a domestic automotive industry to continue supplying automotive products competitively, it has to keep pace with the ever-improving technological specifications of global automotive vehicle manufacturers. Innovation is a critical element in achieving both production processes and resultant products that meet

global standards (Koschatzky et al, 2001, p.312). Hence, for any industry that is focussed on the achievement of global competitiveness, there should be some indication that R&D and innovative activities are taking place or at least that there are efforts to facilitate easy diffusion of new external technologies.

In the realisation of the role that R&D and innovative activity can play in the domestic production of competitive automotive products, the South African government widened the scope of investment that could benefit from the PAA incentive dispensation to include R&D and related expenditures such as technical assistance and external expertise expenditures. The generic nature of the PAA, in terms of the investment that could qualify for the incentive, meant that the decision on the form of investment to be undertaken was left to the local industry. The industry could opt to invest more in plant, machinery and equipment or could decide to dedicate a reasonable budget to R&D activities. Since the offer of a generic industry investment incentive and an increase in investment does not guarantee increase in R&D investment, Government had to simply watch and see what type of investment would be enabled by the incentive. The PAA being a non-targeted investment incentive could, contrary to its objective, potentially lead to enterprises switching to less costly technological investment that yields quicker returns on investment in the short term at the cost of long-term competitiveness (Zhu et al, 2006, p.51). In this regard, the nature of investment that has taken place under the PAA dispensation can provide insights on the extent to which the PAA is supporting the process of realisation of the competitiveness objective of the South African automotive industry.

Since the inception of the PAA, investment in the industry has accelerated. Between 2000 and 2004, total investment increased more than twofold. However, corresponding investment in R&D activities has been minimal. Investment in plant, machinery and tooling constituted more than 80% of the total annual investment of vehicle manufacturers. Investment in support infrastructure that included R&D was less than 10% of total expenditure (Table 14). Land and buildings accounted for the rest of the investment.

Year	Total Investment (Rm) ¹	Investment in support infrastructure (incl. R&D) as a % of total OEM investment	Investment in plant, machinery and tooling - as a % of total OEM investment
1995	847	9.2	86.6
1996	1,171	11.1	85.0
1997	1,265	8.8	81.0
1998	1,342	10.4	85.2
1999	1,511	7.6	87.0
2000	1,562	9.0	83.9
2001	2,078	11.8	86.6
2002	2,726	9.6	84.8
2003	2,325	8.3	85.5
2004	3,577	10.1	86.9

Table 14: Investment expenditure by South African vehicle manufacturers - 1995 to 2004

(Department of Trade and Industry South Africa, 2004 and NAAMSA Annual Report 2001/2006, p.15)

The low level of R&D in the automotive industry is in line with the findings of the South African Innovation Survey of 2001, which showed that 51% of firms in the country were not engaged in R&D in terms of persons working on R&D activities (Table 15). On average firms in South Africa allocated less than 2% of their annual turnover to R&D innovation activities (Oerlemans et al, 2003, p.60). The percentage of gross domestic expenditure on R&D has remained below 1% of the country's gross domestic product, lower than most developed countries (Department of Science and Technology, 2005). On average, developed countries spend 2% of their GNP on R&D.

R&D Intensity*	Percentage of firms	Cumulative percentage
0%	51.2	51.2
0.01 to 1.50%	14.9	66.1
1.50 to 3.00%	16.9	83.0
3.00 to 4.50%	8.9	91.9
4.50 to 6.00%	1.4	93.3
6.00% or more	6.7	100

*R&D intensity refers to the percentage of workers in the total workforce of an organisation performing R&D activities

Table 15: South Africa's R&D intensity in 2000
(Oerlemans et al, 2003, p.60)

Considering the type of investments that have benefited from the incentive thus far, as well as the national effort towards R&D, the potential of the PAA to support the industry's progress towards sustainable global competitiveness appears to be weak.

In terms of actual industry competitiveness, industry performance indicators show mixed results. According to the European Competitiveness Report (2004), industry competitiveness can be adjudicated based on the extent to which an industry has defended, and/or gained market share in open markets relying on price and/or quality of its goods. Hence, common indicators for assessing industry competitiveness include the growth rate or increase in domestic market share of locally produced vehicles and export growth rates (Narayanan, 1998, p.219). The weak support of the competitiveness process by the PAA seems to be compounded by diminished ability of the domestic industry to defend its share of the domestic automotive market. The domestic market share of locally produced vehicles decreased from 93.2% in 1995 to 71.6% by 2004 (Table 16). According to the 2005 sale figures released by NAAMSA, the sale of locally-produced vehicles increased by 19.6% only, while the sale of imported cars increased by 155% from 2004 to 2005.

Year	Domestic market share of locally produced vehicles (%)	Vehicle export – Annual growth rate
1995	93.2	-
1996	88.7	-26.7
1997	85.6	69.4
1998	81.1	32.3
1999	81.5	130.6
2000	81.3	13.9
2001	77.9	59.2
2002	75.8	15.7
2003	77.0	1.1
2004	71.6	-12.8

Table 16: Domestic market share of locally produced vehicles and vehicle export growth rate in South Africa

(Calculations based on data from NAAMSA Annual Report 2006)

On the other hand, industry realised reasonably high growth rates in vehicle exports between 1997 and 2001 (Table 5), indicating that more automotive products from South Africa were being put on the global market. In the context of the automotive industry in

South Africa, however, export growth rates can be a weak proxy for international competitiveness. The offer of export-based import rebate credit certificates, as an incentive under the MIDP, cushions domestic vehicle manufacturers from competitive pressure. Although increase in exports is a desirable effect of the MIDP, one has to take into account government support received on exports before a statement on industry competitiveness based on an increase in exports can be made.

Still, if one is to consider the industry trade balance, as another proxy of industry competitiveness, it is unambiguous that the industry still has a long way to go before it can be considered competitive. Oughton (1997, p.1486) recognises that deterioration of trade balance and reducing world export are indicative of declining competitiveness, citing the case of the UK between 1985 and 1995 as a period characterised by the UK becoming less competitive. “In short, the malaise of the UK economy was poor competitiveness” (Oughton, 1997, p.1486). South Africa’s automotive industry trade balance has been deteriorating since the inception of the MIDP and the status quo was not helped by the introduction of the PAA. Continued deterioration in the industry trade balance puts into question sustainability of industry growth and achievement of the competitiveness objective.

It should, however, be noted that the PAA has played a role in supporting the industry rationalisation process. To the extent that rationalisation of production can contribute towards industry competitiveness through reduction of average costs, the PAA might have had an indirect impact on supporting industry competitiveness. Applicants for the incentive have to present a business plan in which they have to state their planned rationalisation process. Issuing of subsequent certificates is dependent on performance not deviating excessively from or showing an improvement on the initial projection. Effectively, the PAA provided a mechanism through which Government could observe some details associated with the performance of vehicle and component manufacturers towards achieving MIDP objectives. Nevertheless, despite the increase in domestic vehicle production, market penetration of imported vehicles brings into question the extent to

which realisation of higher production volumes through the rationalisation process can translate into industry competitiveness.

4.6 Impact of the PAA on an industry performance

Industrial policies like the PAA dispensation that support technological progress work in tandem with other factors, including but not limited to macroeconomic, education, science and technology policies (Figure 6). It is therefore important to note that how the PAA affects industry performance, in terms of competitiveness-oriented investment, is influenced by a number of other national policy stances that are not industry specific.

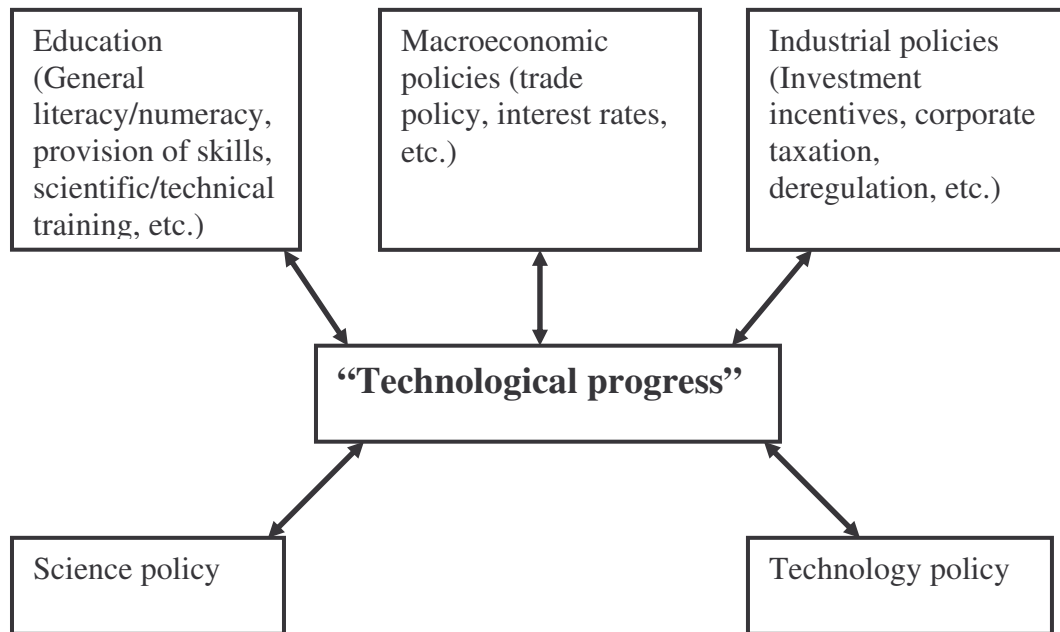


Figure 6: Policy and technological progress
(Clark & Guy, 2000, p.381)

From an industry perspective, the PAA does not operate in isolation of other MIDP incentives and the general automotive policy framework in South Africa. The theoretical underpinnings of the MIDP are complex. The dynamic relationship between various incentives and industry performance indicators is unclear. It is quite difficult to identify the cause and effect of the various industry variables of the MIDP policy framework (Flatters, 2002, p.2; Bell & Madula, 2003, p.vii). The PAA adds to this complexity. To make an unqualified statement on the effectiveness of the incentive requires untangling the

complexity of all factors at play in the industry as a starting point. The immediate industry variable that the PAA impacts on is the level of industry investment, yet the offer of investment incentives alone is not a significant determinant in the local investment decision in the automotive industry (Rhys, 2000, p.3). The reasonable investment by global OEMs in the South African automotive industry, despite comparatively low levels of investment incentives, attests to the fact that some other fundamentals necessary for attracting investment could be in place. Again, the increase in investment does not guarantee industry competitiveness.

Another important dimension relevant to our analysis is the recognition that the South African automotive manufacturing industry cannot be viewed in isolation of global automotive dynamics. With the automotive industry being highly integrated globally, national sovereignty is almost inapplicable. One can no longer talk of a South African automotive industry but rather of the automotive industry in South Africa (Rhys, 2000, p.1). The structure and trends in the global automotive industry reveal that continued participation in and benefit from the global value chain will be dependent on the extent to which entities at each level of the industry hierarchy enhance their productive capabilities to meet increasing demands placed on them by the market dynamics. Local vehicle manufacturers will operate according to strategies set by their parent companies in the developed world. Component manufacturers will carry the biggest share of investment activities. In South Africa vehicle manufacturers make most industry investments. This may have to change if the industry is to align itself to global trends. Strategic access to vital core competencies will play a major role in survival in the future global automotive business. Building lasting relationships with the right partners in the global automotive business will also play a critical role. The success of the PAA is dependent, in part, on how the incentive will fit in and affect global automotive dynamics at play in the domestic industry.

Our analysis is based on a *ceteris paribus* principle, but points to the complexity of supporting automotive competitiveness and that some industry competitiveness-determining factors are outside the MIDP framework. It is important that policy makers

acknowledge the limitation to support industry competitiveness via the MIDP in general and the PAA in particular. The existence of other competitiveness-determining factors and other industrial policies does not refute the observation that industry performance under the PAA shows no concrete evidence of progress towards sustainable competitiveness. According to Clark and Guy (1998, p.364), industry profitability and survival remain the ultimate indicators of competitiveness. Without evidence that the South African automotive industry can remain profitable and survive without Government support, one cannot conclude that the industry is on the global competitiveness graduation path.

4.7 Synthesis

Sustainable industry competitiveness is achieved by advanced technology, and developing such technology is costly in terms of time and financial resources (Zhu et al, 2006, p.66). The offer of an investment incentive may not be influential enough to motivate a profit-oriented industry to invest in R&D and innovation activities. This seems to be the case with the PAA for the South African automotive industry. The industry has increased its investment in production equipment and tools to produce vehicles and components to meet international standards, but with no visible effort to improve competitiveness in the long term. The offer of a generic investment incentive like the PAA, seems to have a significant and positive effect on industry investment, but has revealed limited ability to support the process of long-term industry competitiveness through R&D and innovation activities. The success of the PAA in supporting the competitiveness objective of the South African automotive industry will ultimately depend on the extent to which the incentive will facilitate the integration of the local industry into the global value chain. Trends in the global automotive business reveal that acquisition of technological capabilities to meet 'new' supply and market requirements will be a decisive factor in this regard. Government needs to have a formal means to assess the extent to which its policy intervention is indeed supporting the industry's competitive objective. This requires having formal models in place that links government interventions and competitiveness indicator variables.