Private Investment Behaviour and Trade Policy Practice in Nigeria

By

Dipo T. Busari
United Nations African Institute for
Economic Development and Planning (UNIDEP)
Dakar, Senegal

and

Phillip C. Omoke
Department of Economics
Ebonyi State University, Nigeria

AERC Research Paper 177
African Economic Research Consortium, Nairobi
April 2008

1. Introduction

As part of the effort by many African countries to regain economic and financial balance, government officials have increasingly turned their attention to improving trade policies. These include actions on the exchange rate, import-licensing, tariffs on imports, taxes or subsidies on exports, and institutional export-promotion measures (see Gunning, 1994, and Collier and Gunning, 1994, for detailed discussion on trade and trade policy issues in Africa under reform). How these changes affect private investment is an interesting question for many African countries. The disappointing investment response in Nigeria, as in many sub-Saharan African (SSA) countries, to adjustment reform measures has brought to the fore in economic policy debate the role of private economic agents' perceptions about the credibility and sustainability of the reform measures.[1] There is a large body of cross-country evidence that more outward-oriented developing economies have tended to have higher investment rates and per capita growth rates than less outward-oriented ones (Dollar, 1992; Edwards, 1993; Ng and Yeats, 1997; Harrison, 1996; Chen and Funke 2003). Levine and Renelt (1992) find that the investment share of output is robustly correlated with various measures of openness for a large sample of countries.

Trade liberalization is a core component of the structural adjustment programme (SAP).[2] This entails the removal of all forms of quantitative restrictions on imports, reduction or elimination of tariffs, and so on. The correlation between openness and growth has tended to act as a major incentive for many countries to liberalize foreign trade. Furthermore, since it is part of the larger SAP, trade liberalization is a precondition for enjoying many of the lending facilities of prominent multilateral lending institutions like the World Bank and the International Monetary Fund (IMF). In the belief that more open economies perform better, international lending and donor agencies have attempted to push developing countries in the direction of greater outward orientation by reducing relative price distortions in the domestic market and promoting trade liberalization. However, the results of these programmes have been somewhat disappointing (see Fielding, 1997, and Collier and Gunning, 1999, for detailed discussions on the poor performance of African countries). Detailed assessment reveals a pattern of at best weakly positive effects on growth and a tendency to a negative impact on investment, although export response has typically been strong for some countries (Corbo and Fisher, 1992; Greenaway and Morrissey, 1992; Mosley et al., 1991).

These findings, which appear to be at odds with the results of cross-country comparisons of growth and investment, form the main motivation for this study. Investment represents an area in which the impact of trade policy reform seems to be

weakest in SSA (Chibber et al., 1992; Bleaney and Greenaway, 1993; Hadjimichael and Ghura, 1995; Hadjimichael et al., 1995; Collier and Gunning, 1999).[3] Many SSA countries have implemented far-reaching trade reform measures and are now re-introducing some protectionist policies of different magnitude. In particular, many trade liberalization attempts have been reversed because of the occurrence of severe and unexpected macroeconomic imbalances. The current democratic regime in Nigeria is implementing some protectionist measures despite the fact that it is making serious attempts at liberalizing trade and attracting foreign investment.

The basic question is that if, by international trade theory proposition (and given the encouraging results of cross-country regression analyses), free trade is optimal, why are many African countries re-introducing protectionist policies and what are the implications of such policy shift for capital accumulation? Recently, several authors have argued that one possible explanation for this puzzle (i.e., the poor or even outright negative response of private investment despite massive market-friendly reforms) is the lack of credibility regarding the sustainability of trade liberalization. It is argued that trade policy reforms can be aborted and temporary protection programmes can become permanent because *private economic agents do not perceive the current or future liberalization to be sustainable,* hence non-credible (Burnetti et al., 1997; Fielding, 1997; Collier and Gunning, 1994; Collier and Patillo, 2000). In other words, the expectation that the reform will be short-lived can in itself be self-fulfilling. The argument, for example as forwarded by Calvo (1987), is that the belief that a liberalization is just temporary may nourish an import rush – mainly of durable goods – because of the perceived low intertemporal relative price of current import spending. Pressure will then grow in the country's external position and, if there are limited international reserves (as in many SSA countries) or constraints on external borrowing, a balance of payments crisis might develop. Hence, the government will re-impose trade barriers in order to preclude – or at least delay – the political consequences of a painful devaluation. The point stressed here, and one that should be noted, is that pressure on external balance (and/or acute macroeconomic imbalance generally) could trigger a reversal in trade policy. Hence, the external balance position of the country can signal to private investors the sustainability of a current trade policy regime. This issue is central in this current study.

Thus, uncertainty regarding the sustainability of the trade liberalization might discourage private investment and the allocation of resources. In particular, it is argued that if the sustainability of the liberalization is uncertain, the entrepreneurs will delay investment decisions because they do not want to commit resources to a particular sector (Bertola and Caballero, 1994; Rodrik, 1991; Dixit and Pindyck, 1994; Coy 1999). Consequently, capital accumulation might slow down, hindering economic growth, and the allocation of resources away from the import-substituting sectors and toward the export-oriented activities will not take place.

Stating the problem

The success of a structural adjustment programme (SAP) in bringing about a sustainable recovery in economic activity in a given economy depends crucially on the behaviour of investment in the aftermath of the reform process. In other words, one

of the most important factors determining the potential success of reform programmes is the extent and pace at which private investment responds to the policy changes. Since the expansion of public investment is usually constrained as part of fiscal austerity measures embodied in a SAP, the required recovery of investment has to come largely from the private sector. The behaviour of private investment has therefore been a major focus of attention in assessing the reform outcome. The existing evidence across a wide spectrum of developing countries generally points to a decline or stagnation of private investment during the immediate post-reform years (World Bank, 1988; Harrigan and Mosley, 1991; Greenaway and Morrissey, 1992; Gunning, 1994; Collier, 1995; Dehn, 2000; Lemi and Sisay, 2001). The perceived risk of investment can be reduced in several ways. One is consistent, credible policy formulation that minimizes the likelihood of policy reversal and maximizes its predictability. Credibility is crucial to capital accumulation, growth and overall successful macroeconomic policy. Confusing signals must be avoided, both to the public and among policy makers.

The empirical analysis of credibility issues relating trade and exchange rate policy reforms to private investment has been lacking for Nigeria. The expected investment boom after the SAP commenced in 1986 seems not to have materialized. Private investment share of the GDP is still below 10%. There was an initial rise in private investment share of GDP just after the SAP was adopted, but the ratio has since declined. The country continues to implement far-reaching trade policy reforms with the hope that private investment share will improve and non-oil exports will boom. The results have been disappointing. Studies have been carried out to examine the determinants of private investment behaviour in Nigeria. Here too, the results have been controversial and hence inconclusive. Attention has been focused on the traditional determinants of private investment such as output, relative prices, credit/liquidity and so on. It is interesting to note that domestic credit to the private sector has continued to expand, and relative prices tend to favour investment in such sectors as agriculture and manufacturing. However, the expected investment associated with such favourable environment has been elusive. It seems that some other factors are driving the response of the private sector to investment spending beyond relative prices and current profitability.

It is then important to examine the *perception of the private sector regarding the credibility of the reform measures*. This may well explain why, despite the far-reaching reforms implemented, private investment has responded unimpressively. For policy purposes, then, it is important to know how private perception of trade policy reform affects investment. This will help in the design of more appropriate strategies to stimulate private investment.

Objective of the study

The study investigates if there is any empirical support for the credibility submission in the literature in terms of fixed corporate investment in Nigeria. In this context, the present study aims at examining the determinants of firm-level private corporate investment in Nigeria with emphasis on the trade cum exchange rate policy package implemented since 1986. The study does not construct a measure of trade policy

credibility directly. However, estimated coefficients on measures of macroeconomic instability and uncertainty are used to interpret the notion of credibility in this study. It should be noted that there are several limitations attached to this indirect approach at measuring the impact of policy credibility on investment. The obvious one being that macroeconomic instability and uncertainty can be caused by other factors such as unrest – as it is being witnessed in the Niger Delta area of Nigeria – without necessarily leading to credibility crisis. Such limitations are taken into account as we interpret our results.

Motivation for the study

Several studies exist on the determinants of private investment in Nigeria.[4] Interestingly, many of these studies were undertaken in the last one decade or so. Many of these studies have generally used the traditional determinants of investment found in the literature and have focused on aggregate private investment. Whereas the theory of investment is basically about the investment behaviour of *the firm* (or private corporate business investment), the dependent variable commonly used in the empirical analysis is *total private investment*, which includes both residential investment by households and investment by firms. Total private investment is a poor proxy for business investment because household investment tends to dominate the total private investment series in most developing countries, and there are fundamental differences between household residential investment (which is the key component of household investment) and business investment in terms of the underlying determinants.

Furthermore, none of these studies has attempted to examine the expectation/perception of the private sector in terms of the credibility of policy reform as a determinant of corporate private investment at the sectoral/firm level. This may provide the clue to the puzzle about the disappointing response of corporate private investment to policy reform. Cross-country regressions tend to suggest that trade policy reform and liberalization are correlated with capital accumulation and hence growth (though the direction of causation is still controversial). However, despite the massive reform measures introduced since 1986, the response of private investment has been disappointing, thus contradicting results from cross-country regressions. What are the reasons for such contradictions? This question motivates this study. We seek to examine the role of credibility in this contradiction. It should be observed that this study does not measure the direct impact of credibility, however, it interprets coefficients on macroeconomic instability and uncertainty in this respect. Furthermore, methodologically, we deviate from the approaches adopted in previous studies on Nigeria.

The remaining part of this study is divided into five sections. Section 2 characterizes trade policy regimes in Nigeria and examines the investment response over the different regimes. Section 3 presents a brief review of relevant aspects of the literature, while Section 4 presents the methodological framework. The results from the analysis and the policy implications of such results are presented in Section 5 and Section 6 concludes the study.

2. Characterizing Nigeria's trade policy regimes

In this study we identified three broad trade episodes in Nigeria.[5] The first corresponds to a period in which – except for the fixed exchange rate policy – trade policy in terms of tariff measures and quantitative restrictions could be described as virtually absent. In other words, the structure of tariff did not change over the time period. During the second quantitative restrictions became a prominent tool with exchange rate policy being absent. The final episode is the liberalization era that started with the adoption of the SAP. These are discussed in turn.

Period of highly regulated exchange rate policy: 1960–1974

At independence, Nigeria's trade policy was virtually nonexistent, a trend that continued until about 1967 before the outbreak of the civil war. However, exchange rate measures represented a major policy instrument for controlling trade. This was in terms of allocation rather than in terms of pricing. By 1970, due to the effects of the civil war, there was cause for concern over the state of the country's external payments position. Protection of the external payments position through prudent fiscal management, as well as by enlargement of foreign exchange receipts, was therefore a major objective of policy in the 1970/71 budget. Several measures were adopted. These included the imposition of additional indirect taxes on luxury commodities in high demand; relaxation of foreign exchange controls in respect of repatriation of dividends/profits and management fees; and announcement by the government of its intention to renegotiate the petroleum profits tax agreement. Among other measures were granting of tax exemptions to exporters of manufactured goods in respect of value or volume at a defined level, in order to encourage Nigerian manufacturers to export locally manufactured goods; and scrutiny of import valuation to discourage over invoicing of imports.

Following the suspension of dollar–gold convertability on 15 August 1971 Nigeria adopted a new system of exchange rates with effect from 23 August 1971. Foreign exchange transactions were classified into two broad categories: contracts denominated in US dollars, and contracts dominated in sterling. Also, the CBN maintained a fixed buying and selling rate for the naira. Hence, until 1974 exchange rate policy was the major instrument for controlling international transactions. The level of tariff was quite high, averaging about 47% in the early 1970s (see Figure 1). The level of economic openness (the sum of export and import as a ratio of GDP) was also low (Figure 2). However, investment ratio (the ratio of private investment to GDP) was much higher (see Figure 3).

Figure 1: **Average tariff rate**

Figure 2: Ratio of aggregate investment to total and non-oil GDP

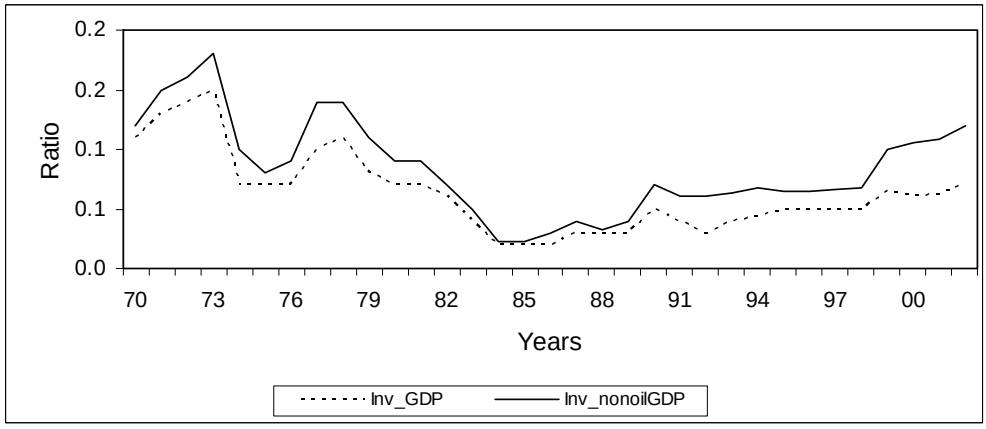
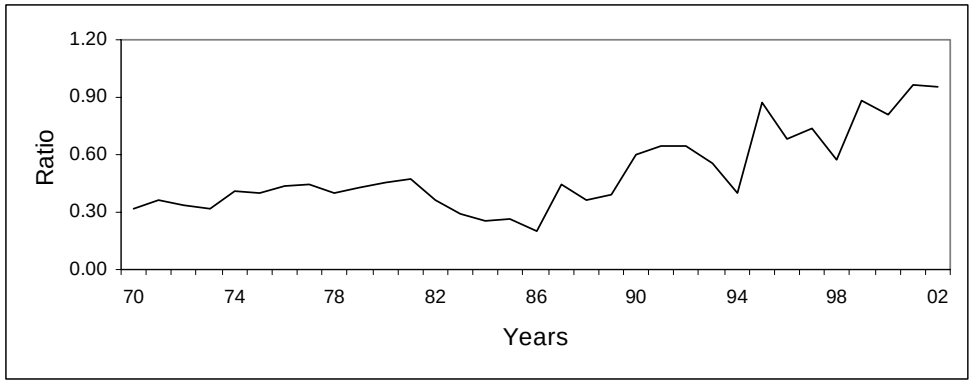


Figure 3: (Export + import) as a ratio of GDP



Era of quantitative restrictions and exchange controls: 1975–1986

In 1975, in order to protect the two new motor car assembly plants in the country, government placed a quota on the importation of cars under 2000cc, representing the difference between demand for such cars and their local production. This marked the beginning of the use of quantitative and stricter tariff measures to control international trade. Import duty reliefs were granted to the extent that was judged not to jeopardize the competitiveness of local industries after taking account of other reliefs in the form of reduction in excise and company profit taxes. Some trade policy measures adopted between 1976 and 1978 were designed to help decongest the seaports, conserve external reserves and moderate imported inflation. The policy of appreciating the external value of the naira was continued during these years. Controls were introduced on remittances.

The heavy drain on the nation's external reserves in 1981, following excessive disbursements of foreign exchange on importation at a time when foreign receipts were declining, called for a tightening of foreign exchange measures and imposition of tariffs, thereby raising average tariff (see Figure 1). Owing to the dangerously low level of external reserves, certain medium and long-term and exchange control measures were introduced, aimed at a structural adjustment and diversification of the country's sources of foreign exchange earnings. The trade policy component of the stabilization measure was essentially exchange control measures. In 1983, under the Economic Stabilization (Emergency Provision) Act of April (as amended in November 1982), Nigeria undertook comprehensive exchange control measures reducing the country's foreign exchange expenditure to a level that would be compatible with its reduced foreign exchange capacity.

Generally, these measures were pursued till 1985 with slight modifications by the military junta that seized power towards the end of 1983. During this period, the ratio of private investment to GDP had nose-dived considerably. The level of economic openness was not particularly different from the previous period. Average tariff was much lower.

The era of economic reform and liberalization: 1987–2004

Because of the deteriorating state of Nigeria's economy, particularly the external reserve position (which could barely finance two months of imports) and the general scarcity of commodities (then popularly called *essenco* – to mean "essential commodities"), the new military junta that seized power in 1985 decided to adopt the World Bank/IMF prescribed reform measures popularly called the structural adjustment programme (SAP). This involved moves towards a more market-friendly trading system and the dissolution of commodity marketing boards. Major trade policy reforms could be described as commencing in 1987. The two-tier foreign exchange market in operation from September 1986 was brought to an end on 2 July 1987 with the establishment of the unified foreign exchange market (FEM). The Dutch auction bidding system was introduced by the Central Bank of Nigeria (CBN). Certain trade policy measures were also taken to strengthen the external sector.

The major aim of trade policy between 1987 and 1990 was, as in the previous years, to reduce pressures on the external sector. Hence, all the liberalization/deregulation measures adopted in 1988 to accomplish this objective were also retained in fiscal 1989. Early in 1989, both the CBN-based auction and autonomous market rates were merged into a single inter-bank foreign exchange market with a single naira exchange rate. The merger was designed to stabilize the naira exchange rate and bring about more rational behaviour in the operations of the market and generally enhance its efficiency. Banks are expected to sell foreign exchange to their customers at not more than 1% above the official rate. In order to enlarge the scope of the official market for foreign exchange transactions, the government approved the establishment of bureaux de change in 1986 to be operated by private entrepreneurs. The daily bidding for foreign exchange by the authorized dealers continued until 13 December 1990. On 14 December 1990, the Dutch auction system of bidding for foreign exchange was reintroduced in order to inject some element of competition into the market. Emphasis continued to be on ordered liberalization of the foreign exchange market as well as active implementation of all existing measures designed to diversity source of foreign exchange earnings other than the oil sector.

The thrust of trade policy between 1987 and 1999 was orderly liberalization and guided deregulation of the foreign exchange market under a close monitoring arrangement, as well as strengthening of the external reserve position so as to effectively defend the value of the naira against pressure from both the domestic and external fronts. The attainment of external balance was the focus of trade policy between 1992 and 1999. Policy measures were directed at strengthening trade liberalization, the further deregulation of the foreign exchange market, and the pursuit of effective external debt management strategies. As a result of the pressures in the foreign exchange market, the official segment of the market was further deregulated on 8 March 1992, by the realignment of the official exchange rate of the naira with the rate in the parallel market. At the same time, the practice of allocating foreign exchange to banks on predetermined quotas was discontinued. Furthermore, the CBN was to enter the foreign exchange market as an active participant, buying and selling foreign exchange from licensed foreign exchange dealers at the going market rate, with a view to influencing the exchange rate of the naira. The restriction on capital transfer was also abolished. Since 1999, the goals of trade policy have been to maintain external balance and attract investment into the country. Various tariff measures have been put into practice. In recent times quotas and bans have been re-introduced, representing a policy shift from the practice of aggressive liberalization.

Since 1995, access to foreign exchange at close to market rates and the lifting of most restrictions on current and capital transfers have significantly improved the trade and investment environment. Nigeria became a founding Member of the World Trade Organization (WTO) on 1 January 1995, following ratification of the WTO Agreement on 6 December 1994 by the Head of State. Nigeria is a signatory to the Lomé Convention between the European Union and developing countries of Africa, the Caribbean and the Pacific area (ACP). According to the Convention, Nigeria is granted duty-free access to the EU market for exports of all industrial products and agricultural products that are not subject to a common market organization in the framework of the EU's Common

Agricultural Policy. Nigeria is the largest ACP exporter to the EU. Nigeria also benefits from the Global System of Trade Preferences (GSTP). Major import liberalization undertaken in 1995 significantly reduced tariff rates and reliance on quantitative restrictions.

A pre-set tariff schedule, introduced in 1995 and valid until 2001, was intended to further decrease existing tariffs and reduce uncertainty for firms. Import liberalization has been pursued to reduce significantly the reliance on quantitative restrictions. Only ad valorem tariffs were used in the new pre-set schedule. Import duties consisted of a basic rate of customs duty modified by an annually set rebate, plus a 7% surcharge. The 1995–2001 tariff structure was designed to stimulate competition and efficiency by reducing tariffs on consumer items relative to tariffs on raw materials and intermediate and capital goods. The reduction of tariffs on final consumer goods was expected to expose domestic manufacturers to import competition, while the relatively higher tariffs on raw materials were supposed to attract investment into raw material and intermediate goods production. In the course of the reform programme, all excise duties levied on domestically produced goods were removed in January 1998. By 2000, most bans on imports were abolished and by 2004 many goods that were hitherto unbanned came under ban again.

In this episode, we observed that average tariff had dropped significantly and the level of economic openness had reached an all time high of over 90%. Although private investment seems to be on the upward direction, it is still below the ratio in the 1970s and highly variable (see figures 1 to 3).

3. Review of the literature

Investment literature abounds with descriptions of the determinants of private investment and the channels through which such variables affect investment. Prominent amongst these are the traditional neoclassical theory, as formulated by Jorgenson (1963, 1971), which postulates the role of the cost of capital; the accelerator model, which postulated the role of rate of change of output; the Tobin's *q*, which argues a role for the value of the firm; and the financial repression framework due to McKinnon (1973) and Shaw (1973). Over time more variables have been observed to affect corporate investment in one way or the other. This study will not attempt to repeat the literature in this respect. However, interested readers are referred to studies like Greene and Villanueva (1991); DeLong and Summers (1991); Chhibber et al. (1992); Serven and Solimano (1993); Bleaney and Greenaway (1993); Bleaney et al. (1995); Ibarra (1995); Bleaney (1996); and Blomstrom et al. (1996). Levine and Renelt (1992) made a classic discussion of the relative impotence and sensitivity of many of such variables. However, during the 1990s, another strand of argument on the determinants of private investment started to gain ground as coherently formulated by Pindyck (1991). This new line of argument in the recent literature on investment interprets a firm as consisting of a portfolio of options, and uses options-based pricing techniques to study the investment decision.[6] We believe that this line of argument is more relevant in the current study and hence attention is focused on it in the following section.[7]

The real options theory of investment

Using options-based pricing techniques to study the investment decision of firms, the real option theory of investment interprets a firm as consisting of a portfolio of options. As argued by Chen and Funke (2003), investment opportunities can be viewed as "option-rights" such that each investment project can be assimilated, in its nature, into the purchase of a financial call option, where the investor pays a premium price in order to get the right to buy an asset for some time at a predetermined price (exercise price), and eventually different from the spot market price of the asset (strike price).

In a similar manner, while making investment decisions, a firm pays a price (the cost of setting up the project) giving it the right to use the capital (exercise price), now or in the future, in return for an asset worth a strike price. The basic implication of this analysis is that the wholesale application of the net present value rule to the expected future cash flows of the firm will give suboptimal results (Chen and Funke, 2003). To avoid this

suboptimal investment decision rule, it is important to consider the following three characteristics of the firm's investment decision:

- There is uncertainty about future payoffs from the investment;
- The investment does not entail a now-or-never decision; and
- The investment is at least partially irreversible.

As argued in the literature, the direct implication of the foregoing characteristics of fixed corporate investment for optimal investment decision making is that the opportunity cost of investment will necessarily include the value of the option to wait that is extinguished when an investment decision is taken (Abel and Eberly, 1994; Abel et al., 1996). Hence, Chen and Funke (2003) argue that the investment decision is affected by the determinants of the value of the option; consequently, an appropriate identification of the optimal exercise strategies for real options plays a crucial role in the maximization of a firm's value. The real options studied in the literature include, among others, operating options (McDonald and Siegel, 1985), the option to wait and undertake an investment later (McDonald and Siegel, 1986), and uncertainty from future interest rates (Ingersoll and Ross, 1992). Other contributions to the literature are Abel and Eberly (1994, 1997) and Abel et al. (1996).[8] The general focus in the literature has been the effect of demand, price and/or exchange rate uncertainty upon investment decisions of firms. On the basis of the objective and focus of this study, we now review the relevant aspects of the real option theory to the macro-policy environment/uncertainty.

Trade policy reform, investment and economic performance

Many reasons why trade liberalization might encourage investment are illuminated in the literature. Corden (1974) pointed out that protection could reduce the rate of capital accumulation because, in the absence of capital flows, investment is determined by the amount of domestic savings out of total income. Hence, as long as protection lowers real income, especially for small countries that lack international market power, investment and the rate of capital accumulation will decline. The new literature on economic growth argues that countries that take advantage of international trade might enjoy higher growth because of faster absorption of foreign technical knowledge (Grossman and Helpman, 1991; Aizenman, 1992; Aizenman and Marion, 1993; Romer, 1994).

In other words, if investment is linked to changes in output (say through the accelerator effect), any policy measure that promotes growth will be a stimulus for an increase in capital accumulation. In an indirect manner, it is argued that in as much as economic growth is linked to faster capital accumulation and growth is associated with openness, then effective trade policy reform will be investment inducing (see OECD, 2001; Rodrik, 1997; Winters, 2001). There is a preponderance of cross-country evidence that trade liberalization and openness to trade increases capital accumulation, the growth rate of income and output (see Sachs and Warner, 1995; Dollar, 1992; Edwards, 1993, 1998; Ben-David, 1993; Frankel and Romer, 1999). In addition, numerous individual country studies over the past three decades suggest that "trade does seem to create, even sustain higher growth" (Bhagwati and Srinivasan, 1999: 8).

It is generally agreed, however, that a country's trade policy is the key link in the transmission of price signals from the world market to the national economy. The literature suggests that the existence of uncertainty regarding the sustainability of trade liberalization might discourage investment and deter resource (re-)allocation. This is usually the case when investors are risk-averse (see Arellano, 1990; Dixit and Pindyck, 1994; Hassett and Metcalf, 1999; Collier and Patillo, 2000). More recently, it has been shown that risk-aversion is not the only way to generate this conclusion: an alternative is provided by the literature on irreversible investment and hysteresis, which shows that the existence of sunk costs, in combination with price uncertainty, might frustrate the use of relative prices as a guide for investment decisions. This lack of credibility regarding the durability of policy reforms on the one hand, and insofar as physical capital is partly or fully irreversible on the other, even if investors are risk-neutral, they tend to favour a "wait-and-see" attitude in the early stages of a reform programme (Rodrik, 1989a/b; Bassanini, 2006; and Rajan and Marwah, 1998).

Given this irreversibility of physical capital, it may pay the investor to delay investments until uncertainty is reduced, even though the postponement option carries a premium. This premium, which gives the investor the *right* but not *obligation* to enter the market some time in the future – akin to a financial call option – is either implicit in terms of loss of market share and/or forsaking other advantages of being a market pioneer, or explicit in terms of initial sunk costs to preserve the advantages it may have from early entrance. Thus, as Metcalf and Rosenthal (1995: 521) state, "part of the cost of making an investment is the value of the option that is lost when the option is killed".

That is, from the firms' point of view, it might be optimal to delay expansion of productive capacity even if the actual price exceeds the long-run average cost–that is there is an *option value* in holding back investment decisions (Dixit and Pindyck, 1994). The reason is that when investment decisions are irreversible and relative prices are uncertain, waiting represents an opportunity cost that should be compared with the currently available profit in order to determine the optimal timing of investment (see Pindyck, 1991, and Chen and Funke, 2003, for a survey of this and related issues). For developing countries, Rodrik (1991) used this framework to show that private investment can fail to take place after the introduction of an economic policy reform if the survival of the policy is uncertain or perceived to be unsustainable by private economic agents.

In essence, there are two fundamental reasons for the observed link between trade and overall economic performance. The first is that both depend on the policies and institutions in place in the transition country and its major trading partners. The second is that increased openness to the world appears to have a strong impact on rates of economic growth (Frankel and Romer, 1999). The first source of the observed correlation highlights the importance of reforming trade policy as part of a more comprehensive package of reforms aimed at achieving economic development. The second highlights the importance of reforming trade policies if the reforms are to succeed in raising living standards and alleviating poverty.

While firms obviously face many more complicated conditions and trade-offs, expectations and perceptions of policy uncertainty do lead them to exercise some real options in their decision making processes. Taking the discussion above to its logical end leads one to conclude that at the extreme, uncertainty about future policy reversals, by "crippling animal spirits" of the private investors (Rodrik, 1989a: 3), may – through the multiplier-accelerator mechanism – leave the economy trapped in a "low investment

equilibrium". Recognizing this, Rodrik (1990: 934) has concluded that from the viewpoint of investment, "liberalization may often need to take a back seat when it places the sustainability of policies...into question".

Macroeconomic policy reforms: Credibility, reversal, and investment behaviour

From the policy viewpoint, an extremely important form of uncertainty faced by investors is the imperfect credibility of policy reforms. Investment-friendly reforms typically raise expected returns, but may also increase uncertainty if investors believe that the reform measures could be reversed. In such a context, investors' perceptions about the probability of policy reversal become a key determinant of the investment response. These issues are explored by Rodrik (1991) using a model in which investment involves sunk costs of entry and exit. He shows that a reform favourable to capital, but regarded as less than fully credible, will fail to trigger an investment response unless the return on capital becomes high enough to compensate investors for the losses they would incur should the reversal take place. Similar qualitative conclusions are reached by van Wijnbergen (1985) who considers the case of a trade reform suspected to be only temporary. An economic (reform) policy enjoys credibility to the extent that relevant actors, such as domestic and foreign investors, believe the government will implement and sustain the programme of reforms that it has announced. The identity of relevant actors may vary across time and space, but the issue of credibility seems inescapable, given the sequential nature of economic decision making. At least in principle, a government that dismantles protectionism today can restore it tomorrow, just as a government that cuts taxes now can escalate them later. The record of trade liberalization in developing countries is replete with examples of governments that promised one policy but delivered another, or implemented reforms that were subsequently retracted (see Michaely et al., 1991, for a detailed discussion of this issue).

If investors doubt the longevity of free trade, for example, they may decide not to shift resources from inefficient, import-competing industries to more dynamic, export-oriented ones. The deterrence to investment arises because exporting involves costs that would be difficult to recover if the government reinstated protectionism. For example, physical capital is typically expensive to install and uniquely appropriate to a particular industry. Likewise, investments in human capital (hiring and training) perform best in the activity for which they were designed. Firms will avoid making export related investments in client networks and physical and human capital, unless they believe that public authorities will persist in keeping the economy open. If investors anticipate a policy reversal, then commercial liberalization will hurt import-competitors without stimulating the growth of exports, and the liberal policy will become unsustainable (Rodrik, 1992).

Sources of policy credibility crisis

Several sources of credibility problems are identified in the literature (for a recent discussion of this issue see Aizeman, 1992; Drazen and Masson, 1994; Agenor and Masson, 1999; Aizenman and Marion, 1999). One is due to the problem of time-

inconsistency. This is a situation in which the government has incentives to deviate ex-post from the optimal trade policy announced ex-ante. In this case private economic agents take into consideration such incentives (see Eaton and Grossman, 1985, and Staiger and Tabellini, 1987, for models in which tariffs are used to redistribute income when there are uncertain terms of trade shocks and some factors are fully or partially immobile). Another source of credibility is the level of political uncertainty. That is, situations in which private economic agents do not know whether trade liberalization will still be an objective of the government in the future. In some cases, the probability of reversal depends on the information held by private economic agents concerning the true intention of the government and in other cases, this probability depends on the likelihood of a political party (or regime) that does not support the liberalization to be elected (Froot, 1988, and Engel and Kletzer, 1987, have adopted models in which, after the start of a trade liberalization, the private agents update continuously the probability of reversal). Hence, a current liberalization effort is perceived not to be entirely credible since there is always a chance that it will be reversed by a future protectionist government. Another source of trade policy reversal is the collapse of the balance of payment. Expansionary fiscal and monetary regimes, declining trends of the real exchange rate, external shocks to the economy, and weak export performance are among the factors that usually lead to a deterioration of a country's external position and, frequently, to the abortion of trade reforms.

The last source mentioned needs further investigation. The lack of sustainability of trade liberalization might arise from the inconsistency with other accompanying economic policies. For example, an expansionary fiscal policy and a fixed exchange regime are likely to induce deterioration in the balance of payments. Hence, to prevent the depletion of international reserves or to avoid politically painful devaluation, the authorities are usually inclined towards re-imposing trade restrictions. In a like manner, the sustainability of trade reform might be in doubt when the government attempts, simultaneously, the stabilization of the economy and the liberalization of trade.

The stabilization effort might require the fixing of nominal exchange rate in order to use it as an anchor for the nominal variables. However, it is observed that if such policy leads to an over-valuation of the real exchange rate, the odds for a successful liberalization are then largely diminished. Hence, in the absence of capital flows, the deterioration in the current accounts might lead to a reversal of the reform effort (Ibarra, 1995). Also, trade liberalization might be reversed as a result of negative external shocks that cannot be adequately handled by the government facing binding restrictions on international borrowing. This is usually the case if the country depends on one or a few major products for most of its export earnings (as Nigeria depends largely on oil earnings). The government will try to cut imports – raising tariffs and re-imposing quotas – to prevent the collapse of the exchange rate or the drainage of foreign exchange reserves. In sum, trade liberalization is less credible when the government pursues inconsistent macroeconomic policies or, in general, when there is a high probability of occurrence of a balance of payment crisis (this issue is central in this study).

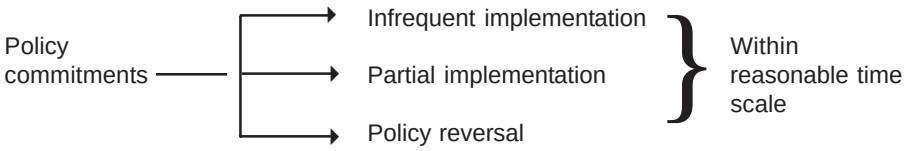
Of course, trade policies can fail by themselves, if they are poorly designed, but the empirical evidence available to date indicates that the absence of companion policies is the principal reason for a reversal of trade liberalization. Companion policies include macroeconomic policies as well as policies that affect the allocation of resources among

different sectors and markets. Exchange rate policies assume a crucial role in a trade liberalization. This is because trade liberalization could lead to a trade deficit since imports respond faster than exports to a change in relative prices. Moreover, the situation prior to trade liberalization is usually one of an over-valued exchange rate maintained with import restrictions, thus a liberalization that allows the allocation of resources based on the prices implies a change in fundamental macroeconomic price such as the real exchange rate.[9] Another reason from the trade practice point of view for policy reversal is the inability of developing countries to secure their export markets. This is usually the case when advanced countries adopt legislation that makes it difficult for developing countries to export to such advanced economies. Hence, the export collapse could initiate a reversal of trade policy. In sum, as McCulloch and McPherson (2002: 18) argued, the circumstances associated with policy reversals in SSA include (but are not limited to):

> external shocks, especially commodity price collapses, over-expansion during booms, slower than expected debt relief, resistance by central banks to the removal of exchange controls, delays in unwinding state-run trading monopolies, need for revenue holding up tariff reform, imposition of new non-tariff restrictions such as quality standards for imports, deterioration of physical infrastructure, especially related to transport, exchange rate appreciation due to donor aid flows, activism by ministries of commerce to "promote industrialization", unwillingness of government officials to eliminate special entitlements for the military, inability to control or reduce smuggling, inability to reduce unit labour costs, thereby improving competitiveness, rising protectionism in developed countries (real or potential), difficulties in penetrating regional markets, and incoherence of donor conditions, so that government operates at cross purposes.

Hence, reversals arise for a wide variety of reasons that may be technical, bureaucratic, institutional and often personal (to the leaders). These causes of reversals can conveniently fit into any of the four sequential elements in the liberalization process: (1) defects of policy design, (2) lack of political support, (3) defects of implementation, and (4) environmental problems that undermine policy effectiveness. This explanation is summarized as a schema in Figure 4.

Figure 4: A schema on credibility concept



Broad credibility crisis sources

- Dynamic (time) inconsistency: Incentives to deviate ex-post from the optimal trade policy announced ex-ante (this includes design and implementation problems).
- Macroeconomic imbalances: For example, collapse of the balance of payment leading to trade policy reversal.
- Political interference (political uncertainty): Would trade liberalization still be an objective of the government in the future?

4. Methodological framework

Our modelling approach is to start first with a theoretical model, which we call the *core model*. The core model follows the neoclassical line of thought that investment spending is determined by two broad elements: the accelerator and the user cost of capital effects (see, for example, Jorgenson, 1971; Ibarra, 1995; and Athukorala and Sen, 1996). The accelerator effect captures the relationship between capital accumulation and the rate of change of output. The user cost captures the degree of substitutability between capital and other inputs.

The core (neoclassical) investment model of the firm

Using a two-factor model of investment behaviour in the tradition of the neoclassical theory – capital and labour – the firm maximizes profit subject to a technology that can be represented by a CES production function – $Y = \gamma(K^{\rho} + L^{\rho})^{v/\rho,}$ where γ is the efficiency parameter, ρ is the substitution parameter and v is the returns to scale parameter. The desired stock of capital that results from the first order conditions can be expressed as follows:

$$K^* = A[Y]^{\phi}[\omega_k/P]^{-\sigma} \quad (1)$$

where K^* is the desired capital stock, Y is real output, ω_k is the user cost of capital services, P is the output price, σ is the elasticity of substitution between capital and labour, ϕ is the elasticity of the optimal capital with respect to output, and A is a scale factor. The user cost of capital can be expressed as

$$\omega_k = P_k\,[(r-\pi)/(1+\pi)+\delta-\kappa-\tau z]/(1-\tau) \quad (2)$$

where P_k is the purchase price of a unit of new capital; r is the nominal financial cost of capital, usually a weighted average of the external and internal cost of funds; π is the rate of inflation; δ is the rate of depreciation of the capital stock; τ is the rate of corporate income taxation; κ is the rate of investment tax credits; and z is the present value of tax depreciation allowances. Taking the differential of the logarithmic transformation of Equation 1, and introducing costs of adjustment using a distributed lag function of the Koyck type, it is possible to get an expression that relates *current investment to past investment, to rate of change of output and to the rate of change in the relative price of capital services.* To transform these mathematical relations into an economic model of

investment behaviour, the actual rates of variation of output and the relative price of capital services are replaced by their expected counterparts. The result is the following equation (see Ibarra, 1995 and Athukorala and Sen, 1996):[10]

$$I_t/K_{t-1} = \kappa_o + \kappa_1[I_{t-1}/K_{t-2}] + \kappa_2 E_t[\Delta ln(Y_t)] + \kappa_3 E_t[\Delta ln(\omega_{kt}/p_t)] + \varepsilon_t \quad (3)$$

$$\kappa_1, \kappa_2 > 0; \kappa_3 < 0.$$

$E_t[.]$ denotes the expectation operator applied to the information set available at the beginning of time *t*, which is usually proxied by an autoregressive process.

Alternative model formulation: The Tobin's *q*

It is generally argued in the literature that uncertainty affects both the timing and the amount of investment. In particular, uncertainty could cause firms to delay capital expenditures – options to wait. The effects of trade policy may also be examined using a model based on forward-looking optimization by firms. The Tobin's *q* model of firm investment is such a model.[11] This model of investment was suggested by James Tobin in 1969 and formalized by Hayashi (1982). The *q* theory of investment states that *q* is a sufficient statistic for summarizing all the information relevant to a firm's investment decision. For empirical purposes, this *q* variable is usually defined as the ratio of the market value of the firm to the replacement cost of its capital stock.

Empirical research typically rearranges the theoretical first order condition as a linear regression under the assumption of quadratic adjustment costs, and then uses the observable Tobin's *q* as a proxy for marginal *q*. Hayashi (1982) shows that under the assumptions of constant returns to scale and perfect competition, marginal *q* is equal to average *q*. If this ratio is less than or equal to unity, then there is no incentive for the firm to invest in plant and equipment. In this case, the firm's shareholders could earn a higher return elsewhere. If the value of Tobin's *q* is greater than unity, then the firm should invest in capital goods in order to maximize the return to its shareholders. From a macroeconomic point of view, Tobin's *q* is presented as the ratio of firms' stock market capitalization to the replacement cost of their physical capital as follows:

$$q = \frac{V}{\rho_K} \quad (4)$$

where V is the stock market capitalization of private firms and ρ_K is the replacement cost of their physical capital. Hence, the core Tobin's *q* investment model is specified as:

$$\left(\frac{I}{K}\right)_{it} = \alpha_{0i} + \beta_1 q_{it} + \beta_2 \left(\frac{I}{K}\right)_{it-1} + \xi_{it} \quad (5)$$

where *I/K* is the rate of capital accumulation and the lag refers to the investment process lags, *q* is Tobin's *q*, and α_{oi} the intercept(s). The residual ξ is usually assumed to be

identically and independently distributed. It is common to add a measure of cash flow, defined by the ratio of earnings before interest and taxes (EBIT) to capital stock, to Equation 5.

The extended investment model

For the purpose of this study we augment these basic (core) models by adding sets of other explanatory variables (see Table 1 for the description of the variables). It should be observed that numerous factors affect investment in theory. Levine and Renelt (1992) argue that these factors are well over fifty. However, a common feature of most studies on investment regressions is that the explanatory variables are entered independently and linearly. This approach is followed in this study. The choice of most of these variables is quite standard in recent literature on determinants of investment. The role of the traditional determinants may be found in the review by Everhart and Sumlinksi (2001). On financial constraints variables, readers are referred to Gertler (1988), Chirinko and Schaller (1995), and Loungani and Rush (1995); and to Ferderer (1993), Pindyck and Solimano (1993), Serven and Solimano (1993), Price (1995), and Serven (1996) for uncertainty variables. Bardhan (1984, Chapter 4) and Blejer and Khan (1984) are sources for the role of public investment, and Asiedu (2002, 2004) and Serven (2002) have studied trade openness and capital control variables. Some variables in Table 1 will require further explanation in the context of this study; this is done in subsequent sections.

Table 1: Description and measurement of the explanatory variables

***CF*, Conventional factors**	• Change in log of real output averaged for *t*-5 to *t*-1 (accelerator effect) • Change in log of cost of capital average for the period *t*-5 to *t*-1 (user cost of capital effect) • Private sector credit as percentage of GDP average for *t*-5 to *t*-1 (proxy for financing constraint)
***UF*, Uncertainty/macro-economic (instability), policy environment factors**	• Standard deviation/coefficient of variation: • Real exchange rate • Inflation/interest rate/nominal money growth • BOP • External reserves • Fiscal variable (budget deficit) • Terms of trade • Output variability • (Proxy for macroeconomic uncertainty, uncertainty about profitability of investment project and policy credibility for period *t*-5 to *t*-1)
***PF*, Policy related factors**	• Government expenditure on infrastructure as percentage of GDP average for *t*-5 to *t*-1 (complementary public investment in sector *i*) • Capital controls (measures the restrictiveness on capital market transactions–another proxy for openness)[a]

Continued

Table 1, Continued

***CR*, Trade, trade policy, exchange rate and credibility factors**	• Real exchange rate depreciation average for *t*-5 to *t*-1 (relative price effect) • Ratio of export plus import to GDP averaged for *t*-5 to *t*-1 (measure of openness) • Average tariff rate and non tariff measure on intermediate and capital goods, average for *t*-5 to *t*-1 (proxy for anti import liberalization attitude of the government and restrictions on trade and investment) • Standard deviation/coefficient of variation of tariff rate/non-tariff barrier index average for *t*-5 to *t*-1 (proxy for lack of credibility of import liberalization efforts of the economy) • Cost of import index (another proxy for openness of trade)[b] • Black market premium, average for *t*-5 to *t*-1 (proxy for exchange rate control) • Number of bilateral investment treaty between Nigeria and all other countries (proxy for policy\political commitment)
***Dm*, Commitment dummy**	• Dummy variable for periods of membership in Multilateral Investment Guarantee Agency (MIGA); takes value of 1 since the year Nigeria signed the agreement (12 April 1988) and 0 otherwise (proxy for policy commitment).

Notes:
a. This measures restrictions on the freedom of citizens to engage in capital market exchange with foreigners - index of capital controls among 13 IMF categories. It ranges from 0 to 10, a higher rating implying fewer restrictions (published by the Fraser Institute and available at www.freetheworld.com/). This corresponds to item 4E:ii of the Economic Freedom of the World (EFW) index.
b. Costs of importing: The combined effect of import tariffs, licence fees, bank fees and the time required for administrative red-tape raises costs of importing equipment by (10 = 10% or less; 0 = more than 50%) (GCR). This is item 4B:ii in the EFW index.

Data and estimation

The data used in the analysis are described in detail in the Appendix. In this study, we will be estimating a regression equation of the form:

$$Inv_{it} = \alpha_{i0} + \alpha_1 Inv_{it-1} + \alpha_2 CF_{it} + \alpha_3 UF_{it} + \alpha_4 PF_{it} + \alpha_5 CR_{it} + \alpha_6 Dm_t + \varepsilon_{it} \quad (6)$$

i=firm, t=1980-1984, 1985-1989, 1990-1994, 1995-1999, 2000-2003

where e_t = the error term and α_{i0} is an unobserved time invariant sector/firm specific effect. The data are averaged for five years. Evidence tends to suggest that five-year averaging in panel data out performs estimates without averaging and it also reduces the possibility of serial correlation in the error term (Ruggiero, 2003; Cruces et al., 2003; Pessoa et al., 2004).

Measuring volatility

The variables used in the measure of volatility are intended not only to capture trade and trade policy related issues, but the entire macroeconomic policy environment.[12] They are defined as follows:

- Aggregate demand variable
  - Percentage real GDP growth
- Fiscal variable
  - Fiscal deficit as a percentage share of GDP
- Monetary variables
  - Percentage nominal money growth (M1)
  - Percentage CPI inflation rate
  - Percentage nominal lending rate
- External sector variables
  - Percentage change in the real exchange rate
  - Percentage change in terms of trade
  - External reserve as a percentage share of GDP
  - Current account balance as a percentage share of GDP

Different approaches, as contained in empirical literature, were adopted in the measure of macroeconomic volatility. These are:

- Standard deviation of the variable over the specific period.
- Conditional-heteroscedastic GARCH(1,1).
- Forecast-error (actual minus linear trend predictions) standard deviation of residual.
- Simple AR(1) order, standard deviation of residual.

Table 2 presents the correlation analysis between the various measures of volatility identified. It can be observed that measures a, c and d are correlated above 0.95. Only the GARCH(1,1) measure shows correlation below 0.75 with other measures. Hence any of the measures defined in a, c and d can be used. The correlations show that they are close alternative measures. In this study, we adopt measure (a) for further analysis. This measure is also widely used in the literature in measuring volatility.

Table 2: Correlation of measures of volatility

	a	b	c	d
a	1.000			
b	0.665	1.000		
c	0.996	0.667	1.000	
d	0.954	0.715	0.956	1.000

Investment treaties and MIGA

Nigeria joined the World Bank Group Multilateral Investment Guarantee Agency (MIGA) in 1988. It is aimed, amongst other things, at multilateral risk mitigation by promoting foreign direct investment into developing countries by insuring investors

against political or non-commercial risks. Coupled to this is the signing of bilateral investment treaties (BITs) with several countries. This initiative started in February 1990 when an agreement was signed with France to take effect in 1991. By December 1990 another agreement was signed with the United Kingdom and in November 1992 an agreement with Netherlands was signed to take effect in 1994. Since then, Nigeria has signed agreements with Germany, Belgium, South Africa, Italy, Argentina, Egypt, South Korea, China, Jamaica, Sweden, Switzerland, Turkey, Uganda and Romania. While a Trade and Investment Framework Agreement (TIFA) has been signed with the United States, a bilateral investment treaty is not in place.

Although the main focus of MIGA and bilateral investment treaties is to attract foreign investment, the initiatives are capable of sending strong signals to domestic investors about the seriousness and commitment of the government in establishing and sustaining an investment-friendly environment. In this study, we use the number of investment treaties as a variable and the year since membership of MIGA as a dummy variable. The role of BITs in attracting investment is still contentious in the empirical literature, but we are not delving into that in this study.

Import intensity and trade policy

To assume that trade policy reform would affect all firms equally could be too restrictive an assumption. Firms have different export/import intensities, hence, they are likely to react to (or be affected by) trade policies differently. Export intensities in Nigeria's manufacturing subsector are generally low, below 10% on the average. Firms are likely to be more sensitive to policies that affect intermediate imports rather then exports due to high import intensity of firms. In this study we define import intensity as the share of value of imports of a firm in value of output at factor cost. There are at least two approaches to incorporating import intensity into the analysis.

First, we could define a threshold above which a firm is regarded as having high import intensity. Hence, a binary variable can be defined such that firms with low import intensity take a value of zero and those with high import intensity take a value of unity. In the literature it is common to assume that a value above 30% implies high import intensity. The second approach is to use the actual values of import intensities of the various firms. The latter approach requires having detailed information about input requirements of each firm. This is quite difficult, but a way out of this is to assign the industry average to each firm in a particular industry. The import intensity values can then be interacted with trade policy variables to examine if there is any differential impact on how trade policy affects firms. In this study, we adopt the first approach: the use of binary variable to classify firms as import intensive.

Trade policy and inter-sector allocation of investment

First it is important to point out that one of the effects of trade policy, particularly trade liberalization, on private investment would largely come about through a shift of resource allocation in response to the changes in relative prices.[13] Hence, an appropriate

way of analysing the behavioural response of private economic agents is to detect inter-sector changes in private investment. There are several ways of estimating inter-sector changes in capital allocation. With availability of a reliable input-output (IO) table this can be derived easily. This is not the case for Nigeria, however. Hence we follow the approach of Galindo et al. (2002) to investigate whether trade policy (defined essentially as trade liberalization) has increased the share of investment going to firms with a higher marginal return to capital.

To achieve this, we calculate a summary index of the efficiency of allocation of investment. It should be observed that in assessing the effect of trade liberalization we want to see whether it succeeds in directing resources towards those uses with higher marginal returns. This is the narrow concept of efficiency we focus on. In measuring efficiency in the allocation of investment amongst sectors it is important to have a measure of the marginal return to investment. Galindo et al. (2002) suggest two approaches. The first is based on the ratio of sales to capital, while the second is based on ratio of operating profits to capital. Based on data availability we chose the latter, that is, the ratio of sales to capital.[14] To measure the efficiency of the allocation of investment in a year, each of the estimates of the total return on investment must be compared with a benchmark. Galindo et al. (2002) suggest that a reliable benchmark is an estimate of total return if investment funds had been allocated to firms in proportion to their share of capital in the economy.

According to Galindo et al. (2002), in every case it is sufficient to use the same estimates of the marginal product of capital for each firm to estimate actual returns, and returns for the benchmark allocation. We divide our measure of total return actually achieved by this benchmark to obtain a measure of the efficiency with which investment funds were allocated in each year. Hence, efficiency of the allocation of investment funds (*EI*), where sales per unit of capital is used as a measure of the marginal product of investment, is given as:

$$EI_t^s = \frac{\sum_i \frac{S_{i,t+1}}{K_{i,t+1}} I_{i,t}}{\sum_i \frac{S_{i,t+1}}{K_{i,t+1}} \frac{K_{i,t}}{K_t^T} I_t^T} \tag{5}$$

where S_{it} denotes firm *i*'s sales at time *t*. I_{it} and K_{it} are, respectively, firm *i's* investment and capital at the beginning of time *t*. I_t^T and K_t^T represent, instead, aggregate investment and aggregate capital at time *t*, respectively. The expression assumes that investment becomes productive with a one-period delay. Furthermore, it uses an individual firm's capital stock at the beginning of year *t* as a fraction of total capital for all firms at the beginning of the same year to measure the proportion of investment funds that the firm would receive if investment funds were assigned in the same proportion as in the past. It should also be noted that each unit of investment in year *t* is assumed to increase the capital stock, and hence generates a return in year *t+1*.

Trade policy and sectoral classification

It should be expected that trade policy will affect firm-level investment differently depending on the type of activity, especially on the degree of exposure to international trade (import of inputs and export of output). Trade policy can have opposite effects in the input and output markets. For example, a firm producing non-tradeable goods but using imported inputs will be negatively affected by exchange rate depreciation, which will cause an increase in the cost of production (input) without any gains on the revenue side, thus reducing incentive to invest.

For a firm that uses domestic inputs and exports its output, a depreciation of the exchange rate will induce investment. To capture this kind of relationship between trade policy reforms (particularly exchange rate reform), we classify firms into tradeable and non-tradeable sectors. A dummy is then created, which assumes the value of unity if the firm is non-tradeable and zero otherwise. For the purposes of our analysis and to avoid ambiguity, the broad inclusions for the non-tradeable goods sector is as follows: hotels and restaurants; transport, storage and communications; financial intermediation; real estate, renting and business activities; public administration and defence; compulsory social security; education; health and social work; electricity, gas and water supply; and other community, social and personal service activities. Others are classified as tradeable goods.

Defining the real exchange rate (ε) as the ratio of the price of tradeable goods (ρ_T) to non-tradeable goods (ρ_N) such that $\varepsilon > 0$ implies depreciation, then we can ask what does depreciation of ε do to profits (π) and cost of capital (ρ_k)? This will allow us to know the direction of investment (I) in each sector when there is a policy change. Naturally, the price of the tradeable sector is the international price of tradeable goods multiplied by the exchange rate and adjusted for import tariff. All that is required to know the expected behaviour of investment in both the tradeable and non-tradeable sectors is to evaluate the following (partial) derivatives (see Table 3.[15]):

$$\frac{\partial \pi}{\partial \varepsilon}\Big|_N \; ; \; \frac{\partial \pi}{\partial \varepsilon}\Big|_T \; ; \; \frac{\partial \pi}{\partial \rho_k}\Big|_N \; ; \; \frac{\partial \pi}{\partial \rho_k}\Big|_T$$

Table 3: Expected impact of exchange rate depreciation on investment

	Goods market	
	N	***T***
Input	$\pi\downarrow \rho_k\uparrow$	$\pi\uparrow \rho_k\uparrow$
T	$I\downarrow$	I ?
Market	$\pi\downarrow \rho_k\rightarrow$	$\pi\uparrow\rho_k\rightarrow$
N	$I\downarrow$	$I\uparrow$

Note: *N* and *T* imply, respectively, non-tradeable and tradeable goods sectors

From Table 3, it is postulated that when a firm belongs to the non-tradeable goods sector in terms of output but its (capital) input is tradeable, then a depreciation of the exchange rate would reduce profit and raise the cost of capital, thereby reducing investment. When the firms' input and output are both tradeable goods, depreciation would increase both profit and cost of capital. Investment direction is uncertain. When both the output and capital input of the firm are non-tradeable goods, then we expect profit to fall but cost of capital to be unaffected. Hence, investment will fall. Furthermore, when the output is a tradeable good and the input is a non-tradeable good, then we expect profit to rise and cost of capital to be unchanged. Hence, investment will rise. The foregoing argument can be extended to deal with other aspects of trade policy beyond exchange rate adjustment, such as tariff adjustment. However, in this study, we restrict our analyses to exchange rate adjustment. The sectoral classification dummy is interacted with the real exchange rate to evaluate the impact of exchange rate and sectoral classification on firm investment in Nigeria.

5. Analyses and results

It has become conventional to view long-run parameters as reflecting cointegrating relationships among a set of *I*(1) variables. The standard methodology in such cases is to first establish the order of integration of the variables in question, and then – having established that the variables are of the same order of integration – test whether there is at least one linear relationship among these variables. There are several ways of testing for unit roots in short panel data. These include Levin et al. (2002), Breitung (2000), Im et al. (2003), Fisher-type tests using augmented Dickey–Fuller (ADF) and Phillip–Perron (PP) tests (Maddala and Wu, 1999; Choi, 2001; Hadri, 1999). While these tests are commonly termed "panel unit root" tests, theoretically, they are simply multiple-series unit root tests that have been applied to panel data structures. Some of these approaches (like the Im–Pesaran–Shin or IPS test) view the panel data regression as a system of *N* individual regressions and is based on the combination of independent Dickey–Fuller tests for these *N* regressions. Generally, in this study, we have just two "truly" panel structured (firm specific) series. These are the dependent variable and the investment allocation index. Other series are macro variables that are assumed to be common to all the firms, hence the regular unit root tests on the variables apply.

Unit root analysis and data poolability

The *Eviews* summary statistics for the various tests as applied to the dependent variable (I_t/K_{t-1}) and the investment allocation index are presented in Table 4. There is strong statistical evidence to suggest that the dependent variable is stationary at level (though the Breitung test tends to show that unit root exists at less than 10% significance level). However, unit root tests show that some of the independent variables are stationary at first difference while others are stationary at levels (see Table 4). Further, at between 5 and 10% significance level, some of the *I*(1) variables can be regarded as *I*(0). This situation of having the dependent variable stationary and some explanatory variables, none stationary at first difference, could pose some estimation problems. We can get round this problem in some ways, which we discuss in the following section.

Generally, there are two traditional methods for estimating panel models: averaging and pooling. The former involves running *N* separate regressions and calculating coefficient means (see for example the mean group estimator method advanced by Pesaran and Smith, 1995). A drawback to averaging is that it does not account for the fact that certain parameters may be equal over cross sections. Alternatively, we could pool the data and assume that the slope coefficients and error variances are identical.

Table 4: Panel unit root summary statistics

Method	Statistic	Prob.**	Cross sections	Obs.
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu *t**	-5.4232	0.0046	67	1594
	-1.2314	0.2142	67	1594
Breitung t-stat.	2.42531	0.0962	67	1598
	0.56913	0.5311	67	1598
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin *W*-Stat	-47.156	0.0017	67	1592
	-3.6131	0.4233	67	1592
ADF-Fisher chi-square	24.7723	0.0052	67	1602
	3.0124	0.2190	67	1602
PP-Fisher chi-square	36.9522	0.0082	67	1604
	6.7132	0.3161	67	1604
Null: No unit root (assumes common unit root process)				
Hadri *Z*-stat	1.3241	0.4263	67	1608
	2.9512	0.0481	67	1608

Note: The foregoing is the panel unit root test summary for the endogenous variable. Sample is 1980 to 2003. Tests are in terms of individual effects (constant only). Automatic selection of lags is based on SIC (0 to 10) and Newey–West bandwidth selection using Bartlett Kernel. The first line of the statistics for each test is for the dependent variable, I_t/K_{t-1}, while the second line (below the first line) is for investment allocation index.

** Probabilities for Fisher tests are computed using asymptotic chi-square distribution. All other tests assume asymptotic normality.

However, whereas there may be theoretical and empirical reasons to presume that the long-run coefficients are homogenous over the cross section, there are very few practical cases in which the short-run dynamics and error variances would be homogeneous, too. In the case of firm level investment, for example, it can be argued that differences in industrial and trade structure that sometimes exist between firms of different sectors would likely affect the short-run rather than long-run responses to trade policy changes (given their effects on the optimal life of capital goods).

Following this point, we consider it appropriate to use the Pesaran et al. (1999) pooled mean group estimation (PMGE) method, which is an intermediate case between the averaging and pooling methods of estimation and involves aspects of both. The method restricts the long-run coefficients to be equal over the cross sections, but allows for the short-run coefficients and error variances to differ across cross sections. This implies that we have to test for homogeneity

There are two popular approaches to examining poolability in panel data analysis. They are the joint Hausman test (see Pesaran et al., 1996, for details), and second a likelihood ratio approach. The Hausman test is based on the null of equivalence between the PMG (pooled mean group) and MG (mean group) estimation. If we reject the null we reject homogeneity of our cross sections' long-run coefficients, while significant statistical difference between our two estimators would be indicative of panel mis-specification. The likelihood ratio test for long-run parameter heterogeneity is also widely used and more conventional in this setting and has homogeneity as the null hypothesis (see Hsiao, 2003). In general, the tests require the estimation of the model under the restriction of common slopes across firms, as well as allowing heterogeneous slopes. This test is a generalization of the Chow test for the N linear regressions case, under the general assumption of non spherical disturbances $\varepsilon \sim N(0, \Omega)$.

Table 5: Unit root test statistics for other explanatory variables

	Level		1st Diff		
Variable	**ADF**	**KPSS**	**ADF**	**KPSS**	**Remark**
∆ln (real GDP)	-2.494	0.366	-5.847	0.337	*I*(0)/*I*(1)
∆ln (user cost of capital)	-1.915	0.303	-3.098	0.193	*I*(1)
Bank credit as percentage of GDP	0.088	0.384	-5.430	0.398	*I*(1)
Real GDP growth (*unc*.)	-1.850	0.411	-3.041	0.270	*I*(1)
Real exchange rate (*unc*.)	-1.150	0.406	-3.680	0.288	*I*(1)
M1 growth rate (*unc*.)	-1.951	0.311	-3.062	0.201	*I*(1)
Share fiscal deficit in GDP (*unc*.)	-0.412	0.543	-2.911	0.321	*I*(1)
Share current account in GDP (*unc*.)	-2.412	0.332	-4.439	0.261	*I*(0)/*I*(1)
Share external reserves in GDP (*unc*.)	-1.409	0.490	-5.144	0.278	*I*(1)
Average tariff (*unc*.)	-0.886	0.493	-6.671	0.138	*I*(1)
User cost of capital (*unc*.)	-1.151	0.558	-3.314	0.181	*I*(1)
Public expenditure on Infrastructure	-0.413	0.481	-2.941	0.278	*II*(1)
Restrictions on International capital	-2.382	0.281	-3.651	0.179	*I*(0)/*I*(1)
Dln real exchange rate	-3.919	0.174	-5.618	0.284	*I*(0)
Ratio (Export + Import) to GDP	-1.144	0.527	-6.592	0.146	*I*(1)
Import restriction: Tariff	-2.413	0.315	-3.219	0.187	*I*(0)/*I*(1)
Import restriction: cost of importing index	-2.201	0.312	-3.961	0.211	*I*(0)/*I*(1)
Black market premium	-2.468	0.112	-5.157	0.078	*I*(0)/*I*(1)

Note: The optimal lag length for the ADF test is based on the Akaike information criterion with an upper lag of 4 and intercept only. The approximate test critical values are -3.029 (5%) and -2.655 (10%). The *KPSS* test is based on Barlett Kernel Spectral estimation method with automatic selection of the Newey–West bandwidth and intercept only. The approximate test critical values are 0.4630 (5%) and 0.3470 (10%). The *unc* in parentheses in the first column implies the variables are measures of uncertainty.

A major reason for utilizing the PMGE in our empirical work is that the estimated coefficients in the model are not dependent upon whether the variables are *I*(1) or *I*(0). Pesaran and Shin (1998) present Monte Carlo evidence that the ARDL approach based on the delta method can be reliably used in small samples to estimate and test hypotheses on the long-run coefficients in cases where there is a mixture of *I*(1) and *I*(0) regressors.

The test statistics (Table 6) show that our panel specification is statistically valid. This result is not too surprising since the explanatory macro variables are the same over the years for all firms. The test of homogeneity across the various cross sections could not reject the null of homogeneity. Also, the chi-square test of random effect in the cross section rejects the hypothesis that the long-run coefficients differ across the cross sections.

Table 6: Poolability tests

Test cross-section fixed effects	
Effects test	**Statistic**
Cross-section F(66, 1448)	0.942517 (0.7315)
Cross-section χ^2 (66)	3.988683 (0.6199)
Test cross-section random effects	
Test summary	
χ^2 (66) statistic	76.668125 (0.0047)

Estimation and interpretation of results

We carried out three panel regression estimations as reported in Table 7. Estimations I and II are dynamic pooled mean group estimation without controlling for unobserved firm-specific effects. Estimation II is derived after removing insignificant variables (using 10% significance level) from estimation I. Estimation III is derived from a fixed-effect estimation of II. Largely, discussion of the results will be based on the estimates reported under III.

From Table 7, it can be observed that the one-period lag of investment ratio is positively related to investment ratio. The relatively large autoregressive value of 0.6 implies that investment ratio adjusts slowly to shocks in Nigeria. It can be observed that amongst the conventional determinants of firm investment, both growth in real GDP and bank credit as a percentage of GDP positively affect investment ratio. The results indicate that in the short run if the economy grows at, say, 5% per annum, the rate of capital accumulation will be about 2.5% per annum. In the long run, such steady growth is capable of generating about 17% rate of capital accumulation.[16] Furthermore, we observed that current level of credit to the private sector (as a ratio of GDP) needs to be doubled if a steady increase in investment rate of about 4% is to be achieved. In the set of volatility variables, we observed that volatility in real GDP, real exchange rate, tariff and user cost of capital were all negatively and significantly related to investment rate.

Table 7: Dynamic pool mean group regression results

	Dependent variable ⇒	**Net investment/capital (I_t/K_{t-1})**		
	Explanatory variables ⇓	**(I)**	**(II)**	**(III)**
	Constant	0.0324 (0.5618)	-0.0151 (-0.3210)	
	One period lagged dependent variable	0.5152 (2.7634)**	0.6221 (3.0312)***	0.6177 (2.9707)***
CF	Dln (real GDP)	0.0634	0.0462	0.0522
conventional factors		(3.0021)***	(2.8013)***	(2.9852)***
	Dln (user cost of capital)	-0.0768 (0.9621)		
	Bank credit as % of GDP	0.0323 (2.7640)***	0.0491 (2.9341)***	0.04121 (3.0650)***
UF, (measured in standard deviation)	Real GDP growth	-0.0712 (-3.0231)***	-0.0234 (-2.7841)***	-0.0202 (-2.8754)**
	Real exchange rate	-0.0076 (-2.6781)***	-0.0097 (-3.1211)***	-0.0109 (-3.1043)***
	M1 growth rate	-0.0011 (-0.6431)		
	Share fiscal deficit in GDP	-0.0891 (-0.6710)		
	Share current account in GDP	0.0648 (0.7851)		
	Share external reserves in GDP	0.0452 (0.7342)		

Continued

Table 7, Continued

	Average tariff	-0.0621 (-2.8171)***	-0.0033 (-3.0121)***	-0.0064 (-3.1162)***
	User cost of capital	-0.0072 (-2.7681)***	-0.0051 (-2.2521)**	-0.0028 (-1.7651)
PF, Policy factors	Public expenditure on infrastructure	0.0087 (1.0016)		
	Restrictions on international capital	0.0363 (2.6733)***	0.0454 (2.9851)***	0.0411 (3.0411)***
CR, Trade policy and credibility	∆ln real exchange rate	-0.0064 (-3.2032)***	-0.0073 (-3.3411)***	-0.0092 (-2.9844)***
	Ratio (export+import) to GDP	0.0703 (1.7699)		
	Import restriction: Tariff	0.0095 (2.9801)***	0.0094 (2.1886)**	0.0105 (2. 5241)**
	Import restriction: Cost of importing index	0.0124 (2.9078)***	0.0131 (3.0652)***	0.0205 (2.8429)***
	Black market premium	-0.0604 (-2.7856)***	-0.0312 (-1.4521)	-0.0279 (-1.0651)
	No. bilateral investment treaties.	0.0322 (2.3227)**	0.0131 (1.4210)	0.0241 (1.6202)
Dummies & interactions	Year since membership of MIGA	0.0767 (0.6761)		
	Import intensity (with real exchange rate)	-0.0423 (-3.7588)***	-0.0623 (-3.3218)***	-0.0676 (-3.6411)***
	Import intensity (with cost of Importing)	-0.0526 (-2.8957)***	-0.0602 (-3.0421)***	-0.0771 (-3.1318)***
	Allocation index	0.0301 (1.3425)		
	Allocation index (with dummy >1985 =1)	0.0337 (2.9532)***	0.0426 (2.8523)***	0.0449 (2.8841)***
	Exchange rate and sectoral dummy	0.1121 (2.8413)***	0.1636 (2.9216)***	-0.2765 (-2.9763)***
No. of obs.		332	332	332
Adjusted R^2		0.77	0.73	0.71
Durbin–Watson		2.09	2.11	1.97
F-stat (p-value)		38.71 (0.000)	31.55 (0.001)	31.01 (0.001)

White heteroscedasticity-Consistent *t*-statistic in parentheses.
***(**) Significance at 99(95)%.

Measured in standard deviation of the relevant variables, it can be observed that real GDP volatility has the highest coefficient (in absolute terms) followed by real exchange rate volatility. The interpretation is that investment reacts negatively to output volatility more than exchange rate volatility. Volatility in average tariff and user cost of capital were also found to be negatively related to investment rate. Looking at the size of the volatility coefficients, we can infer that sustained growth in real output will tend to boost investment rate amongst firms than even a stable exchange rate regime. This is not to suggest that a stable exchange rate is not important in boosting investment, rather the result shows a highly significant coefficient for output volatility. Again, of interest is

the high significance of the coefficient on tariff volatility. Though small in magnitude, it shows that tariff volatility of, say, one standard deviation can cause investment rate to decline by about 0.006 of a unit. In monetary terms, this could be enormous. In terms of macroeconomic volatility, we can infer that real output, exchange rate, average tariff and user cost of capital are important variables that policy makers should watch out for.

Amongst the trade policy and credibility variables, we observed that exchange rate depreciation and black market premium had significant negative impact on investment rate, while import restriction based on tariff index and import restriction based on cost of import index had significant positive relationships with investment rate (this is explained presently). The result indicates that on the average, in the short run, a 10% depreciation of the exchange rate can lead to about 0.1 unit contraction in investment rate.

The coefficient on the tariff-based index of intermediate import restriction is slightly larger than that of exchange rate (in absolute terms), implying that the effect of tariff adjustment on investment rate is larger than the impact of exchange rate depreciation on investment rate. Furthermore, the coefficient on the cost of importing index based restriction on import is larger that that of the tariff based and exchange rate depreciation in absolute terms. Note that the cost of import index is calibrated from 1 to 10 (see note under Table 1), with higher values implying reduced implicit cost of importing capital goods. A unit increase in the index (implying relaxation of import restriction) tends to have more positive impact on capital accumulation than exchange rate depreciation. Another important observation is the relatively high and significant coefficient on restrictions on international capital. The estimate suggests that a unit gain in the index (i.e., further relaxation of capital controls) can lead to about 0.04 unit increase in investment rate. Table 8 shows the result tends to suggest the importance of a liberal international capital regime in spurring investment in Nigeria. An estimate from the interaction of the sectoral dummy with real exchange rate shows that the non-tradeable sector is more negatively affected by exchange rate adjustment than the tradeable sector.

Table 8 presents the results for the Tobin's *q* model. The results are not too qualitatively different in some respect from the results of the neoclassical model presented in Table 7. It should be observed that the dependent variable in the Tobin's *q* is the ratio of fixed investment to capital stock during the current period (and not past period). Second, the firms included in the Tobin's *q* model are only the quoted firms as we require stock market data in calculating the *q* ratio. Hence, the number of observations for the Tobin's *q* is smaller. The results for the core Tobin's *q* model in column 3 and for the extended model in column 4.

The results from the estimate of the core Tobin's *q* model indicate that the one-period lag of the dependent variable and the Tobin's *q* are positively significant in explaining firm investment amongst quoted firms in Nigeria. Based on the value of the lagged dependent variable (0.5), investments response to shock in the *q* model is similar to the neoclassical model presented in Table 7. The cash flow variable is also positively significant at 90% significance level. To this core model, we append other variables. It can be observed that the one-period lag of the dependent variable, the Tobin's *q*, and the cash flow variables are still positively significant in the presence of other variables.

Table 8: Regression estimates of the Tobin's *q* model

	Dependent variable $\Rightarrow (I/K)_{it}$		
	Explanatory variables $\Downarrow$	(I)	(II)
	Constant	0.3771 (1. 7823)	0.0422 (0.5713)
	One-period lagged dependent variable	0.4653 (2.9871)***	0.5166 (2.8660)***
CF, conventional factors	Tobin's *q*	0.4029 (2.4351)**	0.5913 (2.5624)**
	One-period lag of cash flow to capital	0.2284 (1.7761)*	0.3616 (2.0788)**
UF (measured in standard deviation)	Real GDP growth		-0.0141 (-2.8120)***
	Real exchange rate		-0.0078 (-3.0721)***
	M1 growth rate		
	Share fiscal deficit in GDP		
	Share current account in GDP		
	Share external reserves in GDP		
	Average tariff		-0.0110 (-3.0864)***
	User cost of capital		
PF, Policy factors	Public expenditure on Infrastructure		
	Restrictions on International capital		0.0231 (2.9872)***
CR, Trade policy and credibility	Δln real exchange rate		-0.0431 (-3.0266)***
	Ratio (export+import) to GDP		
	Import restriction: Tariff		0.0231 (3.1127)***
	Import restriction: Cost of importing index		0.0337 (3.6690)***
	Black market premium		
	No. bilateral investment treaties.		
Dummies & interactions	Year since membership of MIGA		
	Import intensity (with real exchange rate)		-0.0412 (-2.8776)***
	Import intensity (with cost of importing)		-0.0314 (-3.0721)***
	Allocation index		0.2711 (1.9910)**
	Allocation index (with dummy >1985 =1)		0.0231 (3.0017)***
	Exchange rate and sectoral dummy		-0.2301 (2.8128)***
No. of obs.		235	235
Adjusted R^2		0.32	0.66
Durbin–Watson		2.27	1.93
F-stat (p-value)		5.511 (0.0942)	24.61 (0.0021)

White heteroscedasticity-consistent t-statistic in parentheses.
***(**)(*) Significance at 99(95)(90)%

Uncertainty in real output growth and the real exchange rate were observed to be significant but with smaller coefficients (in absolute terms) than the estimates reported in Table 7. The implication is that uncertainty in output growth and exchange rate affects investment of unquoted firms more than quoted firms. A major reason could be that many of the quoted firms are subsidiaries of multinational corporations whose investment decisions are largely long term, unlike the unquoted firms, which are largely owned by local individuals. Again, we observed that uncertainty about user cost of capital was not significant in this model, while uncertainty about average tariff was observed to be negatively significant and with a larger coefficient (in absolute terms) than in the neoclassical model. In the Tobin's *q* model, a black market exchange rate premium was observed not to be significant in investment decisions of quoted firms. This may be because the quoted firms have relatively easier access to foreign exchange from the official market. In terms of trade policy and credibility variables, it was observed that real exchange rate depreciation (-), tariff measure of import restrictions relaxation (+),

and cost of importing index (+), are the significant variables. The coefficients are relatively larger (in absolute terms) for the quoted firms than for the total firm sample. The implication is that liberalizing the process of importing intermediate capital goods can boost corporate investment in Nigeria.

In terms of the dummies and interactions, the results are not qualitatively different from what obtains in the neoclassical model. The dummies on real exchange rate and cost of importing intermediate capital goods, when interacted with import intensity, are negatively significant, suggesting that the exchange rate system negatively affects the more import intensive quoted firms more than the less import intensive quoted firms. When exchange rate is interacted with the (tradeable/non-tradeable) sectoral dummy classification, we observed that the non-tradeable sector tends to be more negatively and significantly affected by exchange rate policy than the tradeable sector.

These results are important in terms of trade policy credibility issue. Although exchange rate depreciation negatively affects investment, its depressing effect can be compensated for by a more liberal trade tariff regime and measures that reduce cost of importation (as it is observed that the magnitude of the tariff and import restriction coefficients is greater than that of exchange rate depreciation). This implies that when the government announces tariff reduction measures, it is important to stick to it over a reasonable period of time as this will increase credibility and increase investment. Reversal of tariff reduction measures will harm investment as it is observed that tariff volatility is negatively related to investment. Hence, a credible trade policy regime that ensures that an announced liberal policy will be sustained is likely to spur capital accumulation even in the presence of some exchange rate depreciation.

This is not to suggest that a highly variable exchange rate regime is investment inducing, rather the result shows that real exchange rate volatility is negatively related to capital accumulation. The result suggests that a liberal trade tariff regime spurs investment, however, and can even compensate for the adverse impact of exchange rate depreciation on investment. But it is the case that over the past one decade or so, the government of Nigeria has announced several liberal tariff regimes that were later reversed. There are several cases in which goods being banned were later included in the import list and then banned again. This kind of policy inconsistency and reversal will definitely lead to lower policy credibility and hence reduction in investment. From the results, this seems to have been the case in Nigeria.

In terms of dummies and other interactions, we observe that the import intensity dummy when interacted with the real exchange rate and cost of importing index shows significant negative relationship with investment rate. The basic interpretation is that firms with high import intensity tend to react more to exchange rate depreciation and high cost of importing than firms with low import intensity. Unfortunately, most corporate firms in Nigeria (as in our sample) are highly import intensive. This result may be suggestive of why we found that exchange rate depreciation and cost of importing capital goods have a negative impact on investment rate in Nigeria. Our measure of investment allocation is also interacted with a dummy variable that measures the trade liberalization regime in Nigeria. The dummy takes the value of unity for the period since 1985 and zero otherwise. The index is positively significant, which shows that trade liberalization actually caused investment allocation to firms with higher returns. The result shows that

trade policy in Nigeria caused allocation of investment amongst firms in favour of firms with higher efficiency of capital.

Implications of findings

Earlier in this study we described the practice of trade policy in Nigeria since independence, as well as private investment response to the various trade episodes. It was observed that trade policy gained prominence in Nigeria in the 1980s and the commencement of extensive economic reform programme led to deregulation of various prices and entry requirements into businesses. Various trade and exchange rate measures have been introduced since the reform programme began with the aim of boosting proactive growth and investment activities in the non-oil sector. The response of corporate investment has been quite unimpressive. Why is this so?

The significance of private sector credit corroborates the argument in the literature that credit constraint is a major constraint facing domestic firms in Nigeria. Credit to manufacturing firms has squeezed over the years because of high and variable inflation, low investment returns, and high returns from foreign exchange speculations. This is corroborated by the negative coefficient on black market premiums in all the regression estimates. Granting credit to manufacturing firms is seen as less profitable and risky in an environment characterized by uncertainty and large swings in relative prices. Speculative and other short-term investment activities become more profitable.

Furthermore, the results from our analyses show that a poor macroeconomic environment has significantly and negatively affected corporate investment in Nigeria. Uncertainty about the behaviour of key (relative) prices has had significant negative impact on investors' perception of government's macroeconomic policy stance. The volatility of real exchange rate arising from the rapid and variable rates of depreciation has caused significant uncertainty in the system. The study observed the negative and significant impact of volatility in interest rates, tariff rates and the cost of capital. The basic implication is that volatility in key prices has been a discouraging influence on corporate investment. The macroeconomic environment has thus not been very encouraging to investors.

In terms of the practice of trade policy, the results support the proposition that Nigeria has significant potential for improving domestic capital accumulation if appropriate measures are put in place. We observed the significant but negative impact of trade policy (and related) variables such as exchange rate depreciation, import restriction and international capital flows on investment. Volatility in some of these variables – which can signal uncertainty and policy reversal – were observed to negatively affect domestic investment. This can be seen from the behaviour of the real exchange rate, the level of tariffs and their variability, which were observed by their signs to have significantly slowed investment rates in Nigeria. Again, the cost of importing is seen to be prohibitively high.

The index used in this study (see notes under Table 1) shows that firms with high import intensity tend to be more affected by the cost of importing. Although the results show that the variable tends to be negatively significant for all firms, firms with high import intensity are worse off. When combined with rising inflation and rapid devaluation

of the exchange rate, we can conclude that the cost of doing business is prohibitively high and discourages corporate investment. A policy variable that measures degree of international capital mobility (see notes under Table 1) shows that the more liberal is such a regime the higher will be the investment rate. Clearly, the study implies that trade policy has significant allocative effects in terms of investment amongst firms in Nigeria, with investment being allocated to firms with higher returns since liberalization commenced in 1986. What all this points at is that in the practice of trade policy, Nigeria will need to further liberalize international transactions and ensure that the costs of such transactions are reduced drastically. This is important, since many of the firms have high import intensities.

6. Summary and conclusions

In an attempt to reduce dependence on oil exportation, the Government of Nigeria over time has made efforts at increasing investment in other sectors of the economy, particularly manufacturing and agriculture. However, the poor response of investment in these sectors has been widely recognized to be an important policy problem. In this study firm-level evidence has been reported for investment in plant and equipment in the manufacturing sector for 67 firms. We observed the negative impact of macroeconomic uncertainty, as measured by the volatility of key relative prices and other macro variables, on corporate investment in Nigeria. Furthermore, the study observed that trade policy practice in Nigeria has deterred investment by making the cost of importing high, which particularly affects firms with high import intensities.

Particularly, we observed that there are three main channels by which trade policy practice hinders corporate investment in Nigeria. First is through restrictions on international capital movement, the second is through the impact of rapid and variable devaluation of the exchange rate, which has led to a more attractive speculative market and lowers competitiveness of domestic firms and finally through import restrictions in terms of tariff and cost of importing. It is observed that the practice of trade policy in Nigeria, particularly liberalization, has led to investment allocation amongst firms. The study calls for reduced restrictions on international capital controls and taking steps to reduce the cost of importing capital goods. Given the observed negative impact of macroeconomic uncertainty on corporate investment, the study calls for adoption of a more investment friendly macroeconomic environment by reducing uncertainty in the system.

Notes

1. Weber (1991: 62) defines credibility as “the extent to which beliefs concerning a policy conform to official announcements about this policy. ... Credibility may thus also be viewed as a measure of the degree to which policy makers tie their hands on future policies by issuing policy announcements”. Hence, credibility can be regarded as the expectation that an announced policy will be carried out.

2. Trade liberalization in this study does not concentrate on tariffs alone, or even on tariffs and quantitative trade restrictions. Rather, the definition of liberalization, we believe, must encompass exchange rate policy and marketing arrangements as well as the narrower range of policies that affect trade directly.

3. We consider trade reform as a set of economic instruments and institutional arrangements that create an environment for traders (hence transactions) that is predictable, consistent and sustainable in order to achieve better allocation of resources.

4. See, for example, Busari and Fashanu (1998), Ikhide (1994), Atoyebi and Odedokun (1991), Emenuga (1996), Omoruyi (1995), and Soyibo (1996a/b).

5. The discussions and data used in this section are based on various issues of the Annual Report and Statement of Accounts of the Central Bank of Nigeria. Further reading can be found in Olofin (1992) and Agbaje and Jerome (2004).

6. It should be observed that this idea started long before the Pindyck (1991) exposition. However, Pindyck's work could be described as a first attempt to rigorously formalize the various ideas into a unified framework.

7. The authors wish to thank resource persons in group C at the AERC May 2005 biannual for pointing this out.

8. The literature on real options theory is too vast to summarize here. Excellent surveys are provided by Amran and Kulatilaka (1999), Copeland and Antikarov (2001), Coy (1999), Dixit and Pindyck (1994), and Lander and Pinches (1998).

9. This suggests that in modelling trade reversal, other factors like exchange rate, fiscal policy, etc., should be taken into consideration.

10. A classic exercise was also conducted for four African countries by Bigsten et al. (1997). Readers can consult this study to see several investment model specifications.

11. Interested readers are referred to Lee (2005) and Hamida (2000) for detailed discussions on the Tobin's *q*.

12. The authors' attention was drawn to this issue by resource persons at the May 2005 AERC biannual workshop.

13. The authors wish to thank AERC resource persons for pointing this out.

14. Galindo et al. (2002) further discussed the advantages of using the sales-based approach.

15. The authors wish to acknowledge the contributions of resource persons in the AERC May 2006 biannual in bringing out these issues.

16. This is derived by dividing the coefficient on growth by one minus coefficient on the one-period lag of investment rate.

References

Abel, A.B. and J.C. Eberly. 1994. "A unified model of investment under uncertainty". *American Economic Review,* 84: 1369–84.

Abel, A.B. and J.C. Eberly. 1997. "An exact solution for the investment and value of a firm facing uncertainty, adjustment costs, and irreversibility". *Journal of Economic Dynamics and Control*, 21: 831–52.

Abel, A.B., A.K. Dixit, J.C. Eberly and R.S. Pindyck. 1996. "Options, the value of capital, and investment". *Quarterly Journal of Economics*, 111: 753–77.

Agbaje, A. and A. Jerome. 2004.) "Institutional framework and the process of trade policy making in African countries: The case of Nigeria". Final report submitted to the African Economic Research Consortium, January.

Agenor, P.R. and P. Masson. 1999. "Credibility, reputation, and the Mexican peso crisis". *Journal of Money, Credit and Banking*, 31(1): 70–84.

Aizenman, J. (1992) "Trade reforms, credibility, and development". *Journal of Development Economics*. 39(1): 163–87.

Aizenman, J. and N. Marion. 1993. "Policy uncertainty, persistence and growth". *Review of International Economics*, 2: 145–63.

Aizenman, J. and N. Marion. 1999. "Volatility and investment: Interpreting evidence from developing countries". *Economica*, 66: 157–79.

Amran, M. and N. Kulatilaka. 1999. *Real Options: Managing Strategic Investment in an Uncertain World.* Boston: Harvard Business School Press.

Arellano, R. 1990. "On the causes and effects of real exchange rate variability: A comparative analysis of the East Asian and Latin American experience". Unpublished doctoral dissertation. University of California, Los Angeles.

Asiedu, E. 2002. "On the determinants of foreign direct investment to developing countries: Is Africa different?" *World Development*, 30(1): 107–19.

Asiedu, E. 2004. "Policy reform and foreign direct investment in Africa: Absolute progress but relative decline". *Development Policy Review*, 22(1): 41–8.

Athukorala, P. and K. Sen. 1996. "Reforms and investment in India". Departmental Working Papers No. 1996-06. Economics Research School of Pacific and Asian Studies (RSPAS), Australian National University.

Atoyebi, G.O. and M.O. Odedokun. 1991. "Determinants of sectoral fixed investment expenditure by foreign companies in Nigeria: An empirical approach". *Annals of the Social Science Council of Nigeria*, 3: 80–97.

Bardhan, P. 1984. *The Political Economy of Development in India.* Oxford: Basil Blackwell.

Bassanini, Andrea. 2006. "Credibility, irreversibility of investment, and liberalization reforms in LDCs". *Economic Notes*, 35(2): 203–18.

Ben-David, Dan. 1993. "Equalizing exchange: Trade liberalization and income convergence". *Quarterly Journal of Economics*, 108(3): 653–79.

Bertola, G. and R.J. Caballero. 1994. "Irreversibility and aggregate investment". *Review of Economic Studies.* 61: 223–46.

Bhagwati, J. and T.N. Srinivasan. 1999. *Outward-Orientation and Development: Are Revisionists Right?* Discussion Paper No. 806. Yale University Economic Growth Center, New Haven.

Bigsten, A., P. Collier, S. Dercon, B. Gauthier, J.W. Gunning, A. Isaksson, A. Oduro, R. Oostendorp, C. Pattillo, M. Soderbom, M. Sylvain, F. Teal and A. Zeufack. 1997. "Investment in Africa's manufacturing sector: A four-country panel data analysis". Working Paper Series, No. 59 (WPS/97-11). The Centre for the Study of African Economies, University of Oxford.

Bleaney, Michael F. 1996. "Macroeconomic stability, investment, and growth in developing countries". *Journal of Development Economics*, 48: 461–77.

Bleaney, M. and D. Greenaway. 1993. "Adjustment to external imbalance and investment slumps in developing countries". *European Economic Review*, 37: 577–85.

Bleaney, M., D. Greenaway and D. Fielding. 1995. "Investment, trade liberalisation and structural adjustment". *Journal of Development Studies*, 32(2): 175–94.

Blejer, M. and M.S. Khan. 1984. "Government policy and private investment in developing countries". *IMF Staff Papers*, 31: 379–403.

Blomstrom, M., R. Lipsey and M. Zejan. 1996. "Is fixed investment the key to economic growth?" *Quarterly Journal of Economics*, 111: 269–76.

Breitung, J. 2000. "The local power of some unit root tests for panel data". In B. Baltagi, ed., *Advances in Econometrics: Nonstationary Panels, Panel Cointegration and Dynamic Panels*, pp. 161–77. Amsterdam: JAI Press.

Burnetti, A., G. Kisunko and B. Weder. 1997. "Credibility of rules and economic growth: Evidence from a worldwide survey of the private sector". Policy Working Paper No. 1760. The World Bank, Washington, D.C.

Busari, T.D. and F.O. Fashanu. 1998. "Macroeconomic policy regimes and private investment in Nigeria: 1960–1994". *African Journal of Economic Policy*, 5(1): 61–78.

Calvo, G. 1987. "On the cost of temporary policy". *Journal of Development Economics*, 27: 245–61.

Chen, Yu-Fu and M. Funke. 2003. "Option value, policy uncertainty, and the foreign direct investment decision". HWWA Discussion Paper No. 234. Hamburgisches Welt-Wirtschafts-Archiv (HWWA), Hamburg Institute of International Economics.

Chibber, A., M. Dailami and N. Shafik. 1992. *Reviving Private Investment in Developing Countries: Empirical Studies and Policy Lessons.* Amsterdam: North-Holland.

Chirinko, R. and H. Schaller. 1995. "Why does liquidity matter in investment equations?" *Journal of Money, Credit, and Banking*, 27: 527–48.

Choi, I. 2001. "Unit root tests for panel data". *Journal of International Money and Finance*, 20(2): 249–72.

Collier, P. 1995. "The marginalization of Africa". *International Labour Review*, 134(4–5): 541–57.

Collier, P. and J.W. Gunning. 1994. "Trade and development: Protection, shocks, and liberalization". In D. Greenway and L.A. Winters, eds., *Surveys in International Trade*. Oxford: Blackwell.

Collier, P. and J.W. Gunning. 1999. "Explaining African economic performance". *Journal of Economic Literature*, 37(March): 64–111.

Collier, P. and C. Patillo. 2000. *Investment and Risk in Africa.* Basingstoke: Macmillan.

Copeland, T. and V. Antikarov. 2001. *Real Options – A Practitioner's Guide.* London: Texere Publishing.

Corbo, V. and S. Fischer. 1992. "Adjustment programs and bank support: Rationale and main results". In V. Corbo, S. Fischer and S.A.Webb., eds., *Adjustment Lending Revisited: Policies to Restore Growth.* Washington, D.C.: The World Bank.

Corden, W. 1974. *Trade Policy and Economic Welfare*. Oxford: Clarendon Press.

Coy, R. 1999. "Exploiting uncertainty: The real-options revolution in decision making". *Business Week,* June 7: 118–24.

Cruces, G., P. Makdissi and Q. Wodon. 2003. "Poverty measurement under risk aversion using panel data". http://www.usherbrooke.ca/economique/recherche/cahiers/2003/03_06_pm.pdf.

De Long, J. Bradford and Lawrence H. Summers. 1991. "Equipment investment and economic growth". *Quarterly Journal of Economics*, 106(2): 445–502.

Dehn, Jan. 2000. "Private investment in developing countries: The effects of commodity shocks and uncertainty". Working Paper Series No. 2000-11. Centre for the Study of African Economies, University of Oxford.

Dixit, A. and R. Pindyck. 1994. *Investment under Uncertainty.* Princeton: Princeton University Press.

Dollar, D. 1992. "Outward-oriented developing economies really do grow more rapidly: Evidence from 95 LDCs, 1976–1985". *Economic Development and Cultural Chang*e, 40(3): 523–44.

Drazen, A. and P. Masson. 1994. "Credibility of policies versus credibility of policymakers". *Quarterly Journal of Economics*, 109: 735–54.

Eaton, J. and G. Grossman. 1985. "Tariffs as insurance: Optimal commercial policy when domestic markets are incomplete". *Canadian Journal of Economics*, 18: 258–72.

Edwards, S. 1993. "Openness, trade liberalization, and growth in developing countries". *Journal of Economic Literatur*e, 31(3): 1358–93.

Edwards, S. 1998. "Openness, productivity and growth: What do we really know?" *Economic Journal,* 108: 383–98.

Emenuga, C. 1996. "Investment climate in Nigeria: An appraisal". In Ademola Ariyo, ed., *Economic Reform and Macroeconomic Management in Nigeria*, pp. 39–54. Ibadan: Ibadan University Press.

Engel, C. and K. Kletzer. 1987. "Trade policy under endogenous credibility". Center Discussion Paper No. 543. Economic Growth Center, Yale University, September.

Everhart, S. and M. Sumlinski. 2001. *Trends in Private Investment in Developing Countries. Statistics for 1970–2000 and the Impact on Private Investment of Corruption and the Quality of Public Investment.* IFC Discussion Paper No. 44. The World Bank, Washington, D.C.

Ferderer, J.P. 1993. "The Impact of uncertainty on aggregate investment – An empirical analysis". *Journal of Money, Credit and Banking*, 25: 30–48.

Fielding, D. 1997. "Adjustment, trade policy and investment slumps: Evidence from Africa". *Journal of Development Economics*, 52(1): 121–37.

Frankel, J. and D. Romer. 1999. "Does trade cause growth?" *American Economic Review*, 89(3): 379–400.

Froot, Kenneth A. 1988. "Credibility, real interest rates, and the optimal speed of trade liberalization". *Journal of International Economics*, 25: 71–93.

Galindo, A., F. Schiantarelli and A. Weiss. 2002. "Does financial liberalization improve the allocation of investment?: Micro evidence from developing countries". Working Paper No. 467. Inter-American Development Bank.

Gertler, L.M. 1988. "Financial structure and aggregate economic activity: An overview". *Journal of Money, Credit and Banking*, 20(3): 559–88.

Greenaway, D. and O. Morrissey. 1992. "Structural adjustment and liberalisation in developing countries: What lessons have we learned?" *Kyklos*, 46: 241–61.

Greene, J. and D. Villanueva. 1991. "Private investment in developing countries: An empirical analysis". *IMF Staff Papers*, 38(1): 33–58.

Grossman, G.M. and E. Helpman. 1991. *Innovation and Growth in the Global Economy.* Cambridge, Massachusetts: MIT Press.

Gunning, J.W. 1994. "Trade reform in Africa: The role of donors". In J.W. Gunning, H. Kox, W. Tims and Y. de Wit., eds., *Trade, Aid and Development*, pp. 86–98. Basingstoke and London: Macmillan.

Hadjimichael, T.M. and D. Ghura. 1995. "Public policies and private savings and investment in Sub-Saharan Africa: An empirical investigation". Working Paper No. 95/19. International Monetary Fund, Washington, D.C.

Hadjimichael, T.M., D. Ghura, M. Mühleisen, R. Nord and E. M. Uçer. 1995. *Sub-Sahara Africa: Growth, Savings, and Investment, 1986–93*. Occasional Paper No. 118. International Monetary Fund, Washington, D.C.

Hadri, K. 1999. "Testing the null hypothesis of stationarity against the alternative of a unit root in panel data with serially correlated errors". *The Econometrics Journal*, 3: 148–61.

Hamida, L.B. 2000. "The study of Swiss investment expenditures using Tobin's q model 1948–1995". www.ecomod.org/files/papers/1604.pdf. Accessed on 20 July 2006.

Harrigan, J. and P. Mosley. 1991. "Evaluating the impact of World Bank structural adjustment lending". *Journal of Development Studies*, 27: 95–134.

Harrison, Ann. 1996. "Openness and growth. A time-series, cross-country analysis for developing countries". *Journal of Development Economics*, 48: 419–47.

Hassett, K.A. and G.E. Metcalf. 1999. "Investment with uncertain tax policy: Does random tax policy discourage investment?" *Economic Journal*, 109: 372–93.

Hayashi, F. 1982. "Tobin's average q and marginal q: A neoclassical interpretation". *Econometrica*, 50: 213–24.

Hsiao, C. 2003. *Analysis of Panel Data*, 2nd edition. Cambridge: Cambridge University Press.

Ibarra, L.A. 1995. "Credibility of trade policy reform and investment: The Mexican experience". *Journal of Development Economics*, 47: 39–60.

Ikhide, S.I. 1994. "External shocks, savings, investment and credit availability: The evidence from Nigeria". *African Journal of Economic Policy*, 1(2): 35–45.

Im, K.S., M.H. Pesaran and Y. Shin. 2003. "Testing for unit roots in heterogeneous panels". *Journal of Econometrics*, 115: 53–74.

Ingersoll, J. and S.A. Ross. 1992. "Waiting to invest: Investment and uncertainty". *Journal of Business*, 65: 1–29.

Jorgenson, D. 1963. "Capital theory and investment behavior". *American Economic Review*, 53: 247–59.

Jorgenson, D.W. 1971. "Econometric studies of investment behavior: A survey". *Journal of Economic Literature*, IX(4): 1111–47.

Lander, D.M. and G.E. Pinches. 1998. "Challenges to the practical implementation of modeling and valuing real options". *Quarterly Review of Economics and Finance*, 38: 537–67.

Lee, H. 2005. "The impact of uncertainty on investment: Empirical evidence from manufacturing firms in Korea". http://faculty.washington.edu/karyiu/confer/sea05/papers/lee_hy.pdf. Accessed 20 July 2006.

Lemi, A. and S. Asefa. 2001. "Foreign direct investment and uncertainty: The case of African economies". Proceedings of the International Business and Economics Research Conference, Reno, Nevada, 8–12 October 2001.

Lin and C. Chu. 2002. "Unit root tests in panel data: Asymptotic and finite-sample properties". *Journal of Econometrics*, 108: 1—24.

Levine, R. and D. Renelt. 1992. "A sensitivity analysis of cross-country growth regression". *American Economic Review*, 82: 942–63.

Loungani, P. and M. Rush. 1995. "The effects of changes in reserve requirements on investment and GNP". *Journal of Money, Credit and Banking*, 27(2): 511–26.

Maddala, G. and S. Wu. 1999. "A comparative study of unit root tests with panel data and a new simple test". *Oxford Bulletin of Economics and Statistics*, 61(S1): 631–52.

McCulloch, R. and M.F. McPherson. 2002. "Promoting and Sustaining Trade and Exchange Reform in Africa: An Analytical Framework". In Malcolm F. McPherson, ed., *Promoting and Sustaining Trade and Exchange Rate Reform in Africa*, pp. 15–54. Cambridge, Massachusetts: EAGER (Equity and Growth through Economic Research).

McDonald, R. and D. Siegel. 1985. "Investment and the valuation of firms when there is an option to shut down". *International Economic Review,* 26: 331–49.

McDonald, R. and D. Siegel. 1986. "The value of waiting to invest". *Quarterly Journal of Economics,* 101: 707–27.

McKinnon, R.I. 1973. *Money and Capital in Economic Development.* Washington, D.C.: The Brookings Institute.

Metcalf, Gilbert E. and Donald Rosenthal. 1995. "The 'new' view of investment decisions and public policy analysis: An application to green lights and cold refrigerators". *Journal of Policy Analysis and Management,* 14(4): 517–31.

Michaely, M., D. Papageorgiou and A.M. Choski. 1991. *Liberalizing Foreign Trade,* Vol. 7: Lessons of Experience from the Developing World. Cambridge, Massachusetts: Basil Blackwell.

Mosley, P., J. Harrigan and J. Toye. 1991. *Aid and Power: The World Bank and Policy-based Lending.* London: Routledge.

Ng, F. and A. Yeats. 1997. "Open economies work better! Did Africa's protectionist policies cause its marginalization in world trade?" *World Development,* 25(6): 889–904.

OECD. 2001. *The Development Dimensions of Trade*. Policy Brief (October), Organization for Economic Cooperation and Development, Paris.

Olofin, S. 1992. "Trade policies in Nigeria". In D. Salvatore, ed., *National Trade Policies: Studies in Comparative Economic Policies,* Vol. 2. Amsterdam: North Holland.

Omoruyi S.E. 1995. "Trade, investment, and debt accumulation". *Debt Trend,* 1(September): 103–18.

Pesaran, M.H. and Y. Shin. 1998. "An autoregressive distributed-lag modelling approach to cointegration analysis". In S. Strøm, ed., *Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch Centennial Symposium.* Cambridge: Cambridge University Press.

Pesaran, M.H., Y. Shin and R. Smith. 1999. "Pooled mean group estimation of dynamic heterogeneous panels". *Journal of the American Statistical Association,* 94: 621–34.

Pesaran, M.H. and R. Smith. 1995. "Estimating long-run relationships from dynamic heterogeneous panels". *Journal of Econometrics,* 68: 79–113.

Pesaran, M.H., R. Smith and K.S. Im. 1996. "Dynamic linear models for heterogeneous panels". In L. Matyas and P. Sevestre, eds., *The Econometrics of Panel Data.* Dordrecht: Kluwer Academic Publishers.

Pessoa, S.A., S.M. Pessoa and R. Rob. 2004. "Elasticity of substitution between capital and labour: A panel data approach". www.ie.ufrj.br/.../pesquisa/elasticity_of_substitution_between_capital_and_labor_a_panel_data_approach.pdf

Pindyck, R. 1991. "Irreversibility, uncertainty, and investment". *Journal of Economic Literature*. 29: 1110–49.

Pindyck, R.S. and A. Solimano. 1993. "Economic instability and aggregate investment". *NBER Macroeconomics Annual,* 8: 259–319.

Price, Simon. 1995. "Aggregate uncertainty, capacity utilization and manufacturing investment". *Applied Economics*, 27: 147–54.

Rajan, R. and S. Marwah. 1998. "The effects of policy uncertainty on the choice and timing of foreign direct investment: An exploratory firm-level analysis". *Journal of Economic Development,* 23(1): 37–56.

Rodrik, D. 1989a. "Credibility of trade policy reform: A policy maker's guide". *World Economy,* 12(1): 1–16.

Rodrik, D. 1989b. "Promises, promises: Credible policy reform via signaling". *Economic Journal,* 99: 756–72.

Rodrik, D. 1990. "How should structural adjustment programs be designed?" *World Development,* 18(7): 933–47.

Rodrik, D. 1991. "Policy uncertainty and private investment in developing countries". *Journal of Development Economics,* 36(2): 229–42.

Rodrik, D. 1992. "The limits of trade policy reform in developing countries". *Journal of Economic Perspectives,* 6(1): 87–105.

Rodrik, D. 1997. "Why is trade reform so difficult in Africa?" Paper Prepared for the Plenary Session of the AERC Bi-nnual Research Workshop, Nairobi, May.

Romer, P. 1994. "New goods, old theory, and the welfare costs of trade restrictions". *Journal of Development Economics,* 43(1): 5–38.

Ruggiero, J. 2003. "Data envelopment analysis with stochastic data". http://www.sba.udayton.edu/research/working_papers/wp10.pdf. Accessed 5 May 2005.

Sachs, J. and A. Warner. 1995. "Economic reforms and the process of global integration". *Brookings Papers on Economic Activity,* 2: 1–118.

Serven, L. 1996. "Irreversibility, uncertainty and private investment: Analytical issues and some lessons for Africa". *Journal of African Economies,* 6(3): 229–68.

Serven, L. 2002. "Real exchange rate uncertainty and private investment in developing countries". Policy Research Working Paper No. 2823. Washington, D.C.: The World Bank.

Serven, L. and A. Solimano. 1993. "Economic adjustment and investment performance in developing countries: The experience in the 1980s". In L. Serven and A. Solimano, eds., *Striving for Growth after Adjustment: The Role of Capital Formation*. The World Bank, Washington, D.C.

Shaw, E. 1973. *Financial Deepening in Economic Development.* Oxford: Oxford University Press.

Soyibo, A. 1996a. *The Savings–Investment Process in Nigeria: An Empirical Study of the Supply Side*. Research Paper No. 12. African Economic Research Consortium, Nairobi.

Soyibo, A. 1996b. *The Transmission of Savings to Investment in Nigeria*. Research Paper No. 48. African Economic Research Consortium, Nairobi.

Staiger, R. and G. Tabellini. 1987. "Discretionary trade policy and excessive protection". *American Economic Review*. 77: 823–37.

Tobin, J. 1969. "A general equilibrium approach to monetary theory". *Journal of Money, Credit and Banking,* 1: 15–29.

Van Wijnbergen, S. 1985. *Aid, Export Promotion and the Real Exchange Rate: An African Dilemma.* Discussion Paper No. 88. Centre for Economic Policy Research, London.

Weber, A.A. 1991. "Reputation and credibility in the European monetary system". *Economic Policy,* 12: 57–102.

Winters, L.A. 2001. "Trade policies for poverty alleviation in developing countries". In B. Hoekman, P. English and A. Mattoo, eds., *Trade Policy, Economic Development and Multilateral Negotiations: A Sourcebo*ok. Washington, D.C.: The World Bank.

World Bank. 1988. *Adjustment Lending.* PPR Policy and Research Papers No. 1. The World Bank, Washington, D.C.

Appendix – Data description

Table A1: **Industrial distribution of sampled firms**

	Firm category	Number of firms
1	Chemicals and paints	5
2	Conglomerates	6
3	Food, beverages & tobacco	7
4	Industrial/domestic products	9
5	Breweries	4
6	Construction	6
7	Packaging	6
8	Healthcare	8
9	Automobiles and tyres	2
10	Cement & building materials	6
11	Footwear	1
12	Textile	3
13	Machinery marketing	2
14	Printing and publishing	2
	Total sampled firms	67

For the selected firms, we obtained a balanced sample over the specified period. Equipment, plants and machinery were regarded as fixed corporate capital and net changes in the values of these assets are regarded as investment. Stock market capitalization data are as reported by the Securities and Exchange Commission, while for simplicity we use market value for the replacement cost of capital when calculating the Tobin's *q*. In other words, we do not account for technical progress at any particular year of calculation.

For Table A2, growth in GDP is measured as Δlny_t where Δ represents discrete time change, and exchange rate depreciation is measured as Δlne_t. The real exchange rate is measured as nominal domestic price of a unit of USA currency multiplier by ratio of domestic price level to USA price level. The consumer price index (CPI) is used to proxy for price level. Hence, an increase in the value of the real exchange rate implies increased international competitiveness for Nigeria. The black market premium is measured as the simple difference between the price of currency at the parallel market and the price at the official market, using the US dollar as the currency of reference.

Table A2: Descriptive statistics of variables

	Mean	Median	Max.	Min.	Std. dev.	Skew.	Kurtosis	Jarque-Bera	Prob.
Growth in real GDP [a]	1.77	3.87	5.63	-7.39	5.23	-1.35	3.07	1.53	0.47
Real GDP growth volatility	4.31	2.53	14.03	0.24	5.67	1.21	2.85	1.23	0.54
Real exch. rate depreciation[a]	0.38	0.47	0.63	0.16	0.20	-0.08	1.43	0.52	0.77
Real exc. rate depreciation volatility	0.32	0.29	0.76	0.05	0.27	0.94	2.65	0.76	0.68
Nom. exch. rate depreciation[a]	0.22	0.22	0.45	0.05	0.16	0.35	1.81	0.40	0.82
Nom. exch. rate depreciation volatility	0.24	0.21	0.57	0.02	0.22	0.62	2.11	0.48	0.79
M1 volatility	10.83	14.22	15.38	3.15	5.60	-0.53	1.47	0.72	0.70
Fiscal deficit volatility	2.59	2.73	4.62	1.13	1.34	0.52	2.15	0.37	0.83
Current account balance volatility	8.75	6.22	15.37	5.85	4.10	0.95	2.29	0.85	0.65
Nominal interest rate volatility	4.33	3.04	6.98	2.05	2.30	0.33	1.25	0.73	0.69
Inflation volatility	14.70	18.32	20.61	4.35	7.07	-0.63	1.74	0.67	0.72
External reserve volatility	3.91	4.02	5.28	1.68	1.50	-0.52	1.94	0.46	0.80
Average tariff	15.52	12.70	24.98	7.85	7.15	0.34	1.52	0.55	0.76
Tariff volatility	2.85	2.16	5.41	1.13	1.71	0.62	1.97	0.54	0.76
Cost of capital	-2.80	-4.70	6.43	-8.17	5.56	0.99	2.66	0.85	0.65
Cost of capital volatility	12.33	14.46	17.64	5.09	5.31	-0.43	1.55	0.59	0.74
Ratio of (export + import) to GDP [a]	52.70	57.11	70.44	33.83	16.42	-0.19	1.31	0.62	0.73
Black market premium[a]	137.98	130.10	239.49	39.34	82.30	0.07	1.54	0.45	0.80
Cost of import index[b]	4.64	4.60	5.90	3.40	1.03	0.03	1.53	0.45	0.80
Infrastructure expenditure[a]	3.55	3.07	5.86	1.61	2.06	0.20	1.25	0.67	0.71
Share of private sector credit in GDP [a]	9.65	6.84	21.66	5.14	6.79	1.42	3.15	1.68	0.43
International capital restriction index[b]	3.02	3.10	5.40	0.00	2.04	-0.42	2.14	0.30	0.86
Investment treaties[c]	5	3	15	0	6.285	0.844	2.260	0.71	0.70
MIGA[c]	0.8	1	1	0	0.447	-1.500	3.250	1.89	0.39

Notes:
a. Data sourced from Statistical Bulletin of the Central Bank of Nigeria, various issues.
b. Data published by the Fraser Institute (see footnotes 13 and 14).
c. Compiled from www.unctad.org/en/docs/poiteiiad2.en.pdf, www.worldbank.org/icsid/treaties/main.htm, and hotdocs.usitc.gov/pub3741/Table1-9.pdf (all accessed by 27 May 2006). Volatility measures are calculated by authors.

Other recent publications in the AERC Research Papers Series:

External Aid Inflows and the Real Exchange Rate in Ghana, by Harry A. Sackey, Research Paper 110.
Formal and Informal Intitutions' Lending Policies and Access to Credit by Small-Scale Enterprises in Kenya: An Empirical Assessment, by Rosemary Atieno, Research Paper 111.
Financial Sector Reform, Macroeconomic Instability and the Order of Economic Liberalization: The Evidence from Nigeria, by Sylvanus I. Ikhinda and Abayomi A. Alawode, Research Paper 112.
The Second Economy and Tax Yield in Malawi, by C. Chipeta, Research Paper 113.
Promoting Export Diversification in Cameroon: Toward Which Products? by Lydie T. Bamou, Research Paper 114.
Asset Pricing and Information Efficiency of the Ghana Stock Market, by Kofi A. Osei, Research Paper 115.
An Examination of the Sources of Economic Growth in Cameroon, by Aloysius Ajab Amin, Research Paper 116.
Trade Liberalization and Technology Acquisition in the Manufacturing Sector: Evidence from Nigeria, by Ayonrinde Folasade, Research Paper 117.
Total Factor Productivity in Kenya: The Links with Trade Policy, by Joseph Onjala, Research Paper 118.
Kenya Airways: A Case Study of Privatization, by Samuel Oyieke, Research Paper 119.
Determinants of Agricultural Exports: The Case of Cameroon, by Daniel Gbetnkon and Sunday A. Khan, Research Paper 120.
Macroeconomic Modelling and Economic Policy Making: A Survey of Experiences in Africa, by Charles Soludo, Research Paper 121.
Determinants of Regional Poverty in Uganda, by Francis Okurut, Jonathan Odwee and Asaf Adebua, Research Paper 122.
Exchange Rate Policy and the Parallel Market for Foreign Currency in Burundi, by Janvier D. Nkurunziza, Research Paper 123.
Structural Adjustment, Poverty and Economic Growth: *An Analysis for Kenya*, by Jane Kabubo-Mariara and Tabitha W. Kiriti, Research Paper 124.
Liberalization and Implicit Government Finances in Sierra Leone, by Victor A.B. Davis, Research Paper 125.
Productivity, Market Structure and Trade Liberalization in Nigeria, by Adeola F. Adenikinju and Louis N. Chete, Research Paper 126.
Productivity Growth in Nigerian Manufacturing and Its Correlation to Trade Policy Regimes/Indexes (1962–1985), by Louis N. Chete and Adeola F. Adenikinju, Research Paper 127.
Financial Liberalization and Its Implications for the Domestic Financial System: The Case of Uganda, by Louis A. Kasekende and Michael Atingi-Ego, Research Paper 128.
Public Enterprise Reform in Nigeria: Evidence from the Telecommunications Industry, by Afeikhena Jerome, Research Paper 129.
Food Security and Child Nutrition Status among Urban Poor Households in Uganda: Implications for Poverty Alleviation, by Sarah Nakabo-Sswanyana, Research Paper 130.
Tax Reforms and Revenue Mobilization in Kenya, by Moses Kinyanjui Muriithi and Eliud Dismas Moyi, Research Paper 131.
Wage Determination and the Gender Wage Gap in Kenya: Any Evidence of Gender Discrimination? by Jane Kabubo-Mariara, Research Paper 132.
Trade Reform and Efficiency in Cameroon's Manufacturing Industries, by Ousmanou Njikam, Research Paper 133.
Efficiency of Microenterprises in the Nigerian Economy, by Igbekele A. Ajibefun and Adebiyi G. Daramola, Research Paper 134.
The Impact of Foreign Aid on Public Expenditure: The Case of Kenya, by James Njeru, Research Paper 135.
The Effects of Trade Liberalization on Productive Efficiency: Electrical Industry in Cameroon, by Ousmanou Njikam, Research Paper 136.
How Tied Aid Affects the Cost of Aid-Funded Projects in Ghana, by Barfour Osei, Research Paper 137.
Exchange Rate Regimes and Inflation in Tanzania, by Longinus Rutasitara, Research Paper 138.
Private Returns to Higher Education in Nigeria, by O.B. Okuwa, Research Paper 139.
Uganda's Equilibrium Real Exchange Rate and Its Implications for Non-Traditional Export Performance, by Michael Atingi-Ego and Rachel Kaggwa Sebudde, Research Paper 140.
Dynamic Inter-Links among the Exchange Rate, Price Level and Terms of Trade in a Managed Floating Exchange Rate System: The Case of Ghana, by Vijay K. Bhasin, Research Paper 141.
Financial Deepening, Economic Growth and Development: Evidence from Selected Sub-Saharan African Countries, by John E. Udo Ndebbio, Research Paper 142.
The Determinants of Inflation in South Africa: An Econometric Analysis, by Oludele A. Akinboade, Franz K. Siebrits and Elizabeth W. Niedermeier, Research Paper 143.

The Cost of Aid Tying to Ghana, by Barfour Osei, Research Paper 144.
A Positive and Normative Analysis of Bank Supervision in Nigeria, by A. Soyibo, S.O. Alashi and M.K. Ahmad, Research Paper 145.
The Determinants of the Real Exchange Rate in Zambia, by Kombe O. Mungule, Research Paper 146.
An Evaluation of the Viability of a Single Monetary Zone in ECOWAS, by Olawale Ogunkola, Research Paper 147.
Analysis of the Cost of Infrastructure Failures in a Developing Economy: The Case of the Electricity Sector in Nigeria, by Adeola Adenikinju, Research Paper 148.
Corporate Governance Mechanisms and Firm Financial Performance in Nigeria, by Ahmadu Sanda, Aminu S. Mikailu and Tukur Garba, Research Paper 149.
Female Labour Force Participation in Ghana: The Effects of Education, by Harry A. Sackey, Research Paper 150.
The Integration of Nigeria's Rural and Urban Foodstuffs Market, by Rosemary Okoh and P.C. Egbon, Research Paper 151.
Determinants of Technical Efficiency Differentials amongst Small- and Medium-Scale Farmers in Uganda: A Case of Tobacco Growers, by Marios Obwona, Research Paper 152.
Land Conservation in Kenya: The Role of Property Rights, by Jane Kabubo-Mariara, Research Paper 153.
Technical Efficiency Differentials in Rice Production Technologies in Nigeria, by Olorunfemi Ogundele and Victor Okoruwa, Research Paper 154.
The Determinants of Health Care Demand in Uganda: The Case Study of Lira District, Northern Uganda, by Jonathan Odwee, Francis Okurut and Asaf Adebua, Research Paper 155.
Incidence and Determinants of Child Labour in Nigeria: Implications for Poverty Alleviation, by Benjamin C. Okpukpara and Ngozi Odurukwe, Research Paper 156.
Female Participation in the Labour Market: The Case of the Informal Sector in Kenya, by Rosemary Atieno, Research Paper 157.
The Impact of Migrant Remittances on Household Welfare in Ghana, by Peter Quartey, Research Paper 158.
Food Production in Zambia: The Impact of Selected Structural Adjustment Policies, by Muacinga C.H. Simatele, Research Paper 159.
Poverty, Inequality and Welfare Effects of Trade Liberalization in Côte d' Ivoire: A Computable General Equilibrium Model Analysis, by Bédia F. Aka, Research Paper 160.
The Distribution of Expenditure Tax Burden before and after Tax Reform: The Case of Cameroon, by Tabi Atemnkeng Johennes, Atabongawung Joseph Nju and Afeani Azia Theresia, Research Paper 161.
Macroeconomic and Distributional Consequences of Energy Supply Shocks in Nigeria, by Adeola F. Adenikinju and Niyi Falobi, Research Paper 162.
Analysis of Factors Affecting the Technical Efficiency of Arabica Coffee Producers in Cameroon, by Amadou Nchare, Research Paper 163.
Fiscal Policy and Poverty Alleviation: Some Policy Options for Nigeria, by Benneth O. Obi, Research Paper 164.
FDI and Economic Growth: Evidence from Nigeria, by Adeolu B. Ayanwale, Research Paper 165.
An Econometric Analysis of Capital Flight from Nigeria: A Portfolio Approach, by Akanni Lawanson, Research Paper 166.
Extent and Determinants of Child Labour in Uganda, by Tom Mwebaze, Research Paper 167.
Implications of Rainfall Shocks for Household Income and Consumption in Uganda, by John B. Asiimwe and Paul Mpuga, Research Paper 168.
A Modelling of Ghana's Inflation Experience: 1960–2003, by Mathew K. Ocran, Research Paper 169.
Oil Wealth and Economic Growth in Oil Exporting African Countries, by Olomola P. Akanni, Research Paper 170.
Relative Price Variability and Inflation: Evidence from the Agricultural Sector in Nigeria, by Obasi O. Ukoha, Research Paper 171.
Sources of Technical Efficiency among Smallholder Maize Farmers in Southern Malawi, by Ephraim Chirwa, Research Paper 172.
The Determinants of School Attendance and Attainment in Ghana: A Gender Perspective, by Harry A. Sackey, Research Paper 173.
Private Returns to Education in Ghana: Implications for Investments in Schooling and Migration, by Harry A. Sackey, Research Paper 174.
Privatization and Enterprise Performance in Nigeria: Case Study of Some Privatized Enterprises, by Afeikhena Jerome, Research Paper 175.
Determinants of the Capital Structure of Ghanian Firms, by Joshua Abor, Research Paper 176.

THIS RESEARCH STUDY was supported by a grant from the African Economic Research Consortium. The findings, opinions and recommendations are those of the authors, however, and do not necessarily reflect the views of the Consortium, its individual members or the AERC Secretariat.

Published by: The African Economic Research Consortium
P. O. Box 62882 - City Square
Nairobi 00200, Kenya

Printed by: Modern Lithographic (K) Ltd
P. O. Box 52810 - City Square
Nairobi 00200, Kenya

ISBN 9966-778-25-X

Contents

List of tables

List of figures

Abstract

This study presents an empirical assessment of the impact of trade policy practice and its credibility on private investment using firm level data of 67 Nigerian firms over the period 1980–2003. The study draws a distinction between sample variability and uncertainty and constructs measures of the volatility of innovations to key trade and macroeconomic variables. It then examines their association with private corporate investment by adding these constructed measures to an empirical investment equation that is estimated using panel data econometric method. The results underscore the robustness of the links among private investment, trade policy and macroeconomic uncertainty. Many of the trade and volatility measures considered in the paper show strong negative association with private investment. Furthermore, the study observed that trade policy practice in Nigeria has deterred investment by making the cost of importing high, which particularly affects firms with high import intensity. Three main channels are identified through which trade policy practice hinders corporate investment in Nigeria. First is through restrictions on international capital movement. The second is through the impact of rapid and variable devaluation of the exchange rate, which has led to a more attractive speculative market and lowed the competitiveness of domestic firms, and finally through import restrictions in terms of tariff and cost of importing. In addition, the negative impact of real exchange rate uncertainty on investment is significantly larger in firms that are import intensive. The study argues, among other things, that there is the need to liberalize international capital movement in Nigeria and drastically reduce the cost of importing capital goods.

Keywords: Private investment, trade policy credibility, macroeconomic uncertainty, panel data estimation, Nigeria

JEL classification: C23, E22, F13, R42

Acknowledgements

We are immensely thankful to the African Economic Research Consortium (AERC) for funding this study. We also express our gratitude and appreciation to the resource persons and researchers in group C of the AERC Biannual Research Workshops during the period in which we undertook this study. All enduring errors and omissions are solely and entirely our responsibility.