Investigating the relevance of supply-side factors for export-oriented investment

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INVESTIGATING THERELEVANCE OF SUPPLY-SIDE FACTORS FOR EXPORT-ORIENTED INVESTMENT

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Abstract

It is important to test the relevance of supply conditions — relative to demand or neutral conditions — for export-oriented investment (EOI). If supply-side factors are not more pertinent, costly measures in place to attract EOI to South Africa might have unintended consequences. Test results suggest supply-side variables are more important for foreign export-oriented investment and not more important for domestic export-oriented investment, but severe data constraints force the construction of crude EOI proxies for the tests. These constraints expose the need for better EOI information and research.

1. Introduction

Firms invest in plant, equipment and people for different motives. Compare for instance recent investments by McDonald’s and Volkswagen in South Africa. For McDonald’s, the motivation is not that South Africans are skilled or low-cost makers of hamburgers, but rather that enough people are willing and able to buy them. On the other hand, Volkswagen, the largest vehicle exporter in Africa (Tully, 1999), located a major factory in this country because South Africa is good at making its Golf IV model, not necessarily because it is a popular car here. This example introduces the difference between McDonald’s market-oriented investment and Volkswagen’s export-oriented investment (EOI).

In the Growth Employment and Redistribution (GEAR) policy document, the South African Government states that its intention to promote export led growth “entails a shift away from demand side interventions, such as tariffs and subsidies, which raise prices received by producers, to supply side measures designed to lower unit costs...” (1996:11). It is precisely the implied relative importance of supply-side measures for EOI that this paper tests.

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Although there is an extensive and rich literature on investment as a whole, very little research has been done explicitly on the determinants of export-oriented investment. No paper has deliberately tested demand or neutral factors to see whether they are less important than supply factors for EOI.

This paper tests the significance of many variables, classified as demand-side/neutral or supply-side, to establish whether supply-side factors really are more relevant. Separate tests are performed for foreign export-oriented investment (FEIOI) and domestic export-oriented investment (DEIOI).

The importance of tests of this sort must not be underestimated. If repeated tests find that supply-side variables are not significant determinants of EOI, or that they are not significantly more important than demand-side variables, then the social costs imposed by GEAR might be in vain. If supply-side measures are needed to promote EOI, careful consideration must be given to its costs and benefits.

This investigation is structured as follows:

- An overview of worldwide trends in investment will show that EOI has increased slightly in the 1990s.
- The literature review will show that the kinds of factors investors consider depend on their motives for investment and suggests that supply-side factors are relatively more important for EOI than demand-side or neutral factors are.
- A method for building satisfactory proxies for EOI and testing for its determinants is presented, but severe data constraints mean less sophisticated proxies have to be used in simpler tests.
- The tests show that supply-side measures are more important for foreign export-oriented investment but not for domestic export-oriented investment.
- Concluding comments will propose some important areas for EOI research.

2. Trends

Global foreign direct investment (FDI) rose more than six-fold from an average of $50 billion a year from 1981-5 to $315 billion a year in 1995. Flows to developing countries increased almost five-fold from $20 billion to $96 billion in the same period (South Centre, 1997). Developing countries’ share of world FDI inflows rose from 17% in 1990 to 37% in 1997 (UNCTAD, 1998b). However, 77% of this share went to the ten highest recipients in 1995 (South Centre, 1997) and Kumar (1998) notes FDI to developing countries excluding China actually fell in the past two decades.

Figure 1 shows inward FDI as a percentage of GDP for high-, middle- and low-income countries from 1980 to 1997. Low-income countries consistently received well below 0.5% of GDP. Middle-income countries steadily attracted more FDI since 1990. It reached 1.4% of GDP in 1997. High-income countries received the most FDI as a percentage of GDP. At 3.1% in 1997, it almost reached the 1990 peak of 3.4% of GDP.
The worldwide rise in FDI is attributed to globalization, bilateral investment treaties and regional initiatives, economic reforms in Eastern Europe, privatization and the worldwide liberalization of rules brought about by more favourable attitudes to investment (Kumar, 1995 and UNCTAD, 1998b). Until the mid 1980s, governments were generally suspicious of FDI, but now they welcome it and have accordingly liberalised investment regulations considerably. The more welcoming attitude has increased competition for FDI; incentives and concessions offered to foreign firms are often greater than those extended to local firms, whereas the reverse applied before (UNCTAD, 1998b).

Figure 1: Trends in FDI
High-income countries attracted the most FDI, middle-income countries steadily increased FDI inflows and low-income countries consistently received the lowest FDI as a percentage of GDP.

Private domestic investment as a percentage of GDP in developing countries rose from an average of 12.2% in 1970 to 15.3% in 1997. According to Bourton & Sumlinski (undated), the rise came largely at the expense of public sector investment. Out of the 48 countries they surveyed, South Africa was 34th with private investment equal to 11.1% of GDP in 1998 (ibid.).

Figure 2 shows recent levels of EOI as a percentage of GDP. FEOI was consistently below 1% and DEOI reached 5% in 1997. Kumar (1997) notes that FDI concentration among a few developing countries is particularly strong for EOI.
Figure 2: Trends in export-oriented investment
FEOI and DEOI in developing countries have increased slightly during the mid 1990s. FEOI is particularly low at below 1% of GDP.
Source: Calculated and averaged using data from the 1999 World Development Indicators and the World Bank Global Development Network Database

3. Investment motives and causes

Central to the tests presented later is the fact that firms have different motives for investing and that the determinants affecting investment location depend on these motives. This section explores these and other complexities by

- differentiating the motives for investment
- discussing the various factors affecting the firm’s investment location decision
- showing that the location of investment with an export-oriented motive depends largely on supply-side factors
- combining country-specific determinants of where to invest with firm-specific determinants of whether to invest
- reviewing theoretical approaches to EOI in particular and highlighting its special characteristics.

Most of the literature reviewed refers to FDI. Although FDI theory is richer and more complex than that treating domestic investment, the majority is equally applicable to domestic investment. According to Agarwal, Gubitz & Numnenkamp (1991, cited in Kumar, 1997), good policy for foreign investment is good policy for local investment.
Gross domestic fixed investment is the addition to a country’s fixed capital stock in a particular period before adjusting for depreciation. Fixed investment is spending on buildings, machinery and equipment that increases production capacity (Department of Finance, 2000). Gross domestic fixed investment can be sourced in the private or public sector.

Foreign direct investment (FDI) “occurs when citizens of one nation (the ‘home’ nation) acquire [sic] managerial control of economic activities in some other nation (the ‘host’ nation)” (Graham, 1987:147). Unlike the definition for domestic investment, FDI need not entail economic investment in productive capacity; it need only be a change in ownership of that capacity.

3.1 Kinds of investment

Reuber (1973) presents three kinds of investment motive.

- The first kind is market-development investment. Firms intend to create or satisfy a market for their product. The output of the investment is destined primarily for the country of production (the host market). Such investment depends on the nature of the market for the good, which includes factors like market size and per capita income.

- The second kind of investment is EOI. Here, the nature of the host market is not important, as output is intended for export back to the investing firm’s home country or to a third market. The main concern is cost, which is influenced by things like cheap labour and established infrastructure. While market-development investment opens new markets, EOI seeks to defend existing global markets by making the firm more competitive (Lal, 1975).

- The third kind of investment identified by Reuber is government initiated investment. When conditions are highly unfavourable for any form of investment, governments might participate in projects or try to attract investment with very generous incentives like custom-built infrastructure or subsidised power costs. Government initiated investment is not addressed in this paper.

UNCTAD (1998a) adopts a more sophisticated way to classify investment. The key difference is the sub-classification of EOI into resource-seeking, efficiency-seeking and asset-seeking investment.

- Natural resource-seeking investment is the oldest form of investment (UNCTAD, 1998a). Such investments are made to get privileged access to natural resources and raw materials (Kumar, 1995). Investments near South African gold deposits or to exploit Kenyan coffee plantations are two examples. Resource-seeking investments are export-oriented because most of the output is exported in its raw form (UNCTAD, 1998a).

- Efficiency-seeking investment also tends to be export-oriented (UNCTAD,
The key criterion is cost; competitive pressure to lower costs is the driving force behind firms’ searching for the cheapest production locations (Kumar, 1995). The original and most common way to invest for efficiency reasons is to take advantage of cheap labour, as done by the United States in Mexico or Japan in East Asia, but efficiency-seeking investment is becoming a search for infrastructure as well as more productive and relatively cheap labour (UNCTAD, 1998a).

- Strategic asset-seeking investment is also generally export-oriented. Firms look for a key capability, such as highly skilled personnel or advanced telecommunications infrastructure. Singapore’s research & development capability and India’s highly-skilled software developers are good examples (UNCTAD, 1998a). Strategic assets are unique or rare, are man-made, and are therefore often called “created assets”. Asset-seeking investment is gaining prominence relative to other investment classifications (UNCTAD, 1998b).

- Market-seeking investment is the same thing as the market-development investment presented by Reuber. It was prominent in the 1960s and 1970s when multinational enterprises entered developing countries that had attractive markets for manufactured goods. Developing countries’ import-substitution policies created favourable demand conditions for local production, as market-seeking investment in a host country is often a substitute for exporting to that country (UNCTAD, 1998a).

Apart from investing in markets to overcome barriers to imports, firms do so to prevent rivals from entering markets. This is critical in a globalizing market where the fight for worldwide market share is important (Kumar, 1995). UNCTAD (1998a) cites American investment in Europe after World War II and Japanese investment in America since the 1980s as examples.

3.2 Locational determinants of investment

Using the UNCTAD (1998a) classifications, natural resources, rare assets and efficiency are supply conditions while an attractive market is a demand condition. UNCTAD analyses these economic determinants within a broader context.

In its 1998 World Investment Report, UNCTAD (1998b) puts the determinants of investment into three groups, namely the policy framework, the degree of business facilitation, and the economic determinants introduced in section 3.1. According to UNCTAD:

- The policy framework groups macroeconomic and political stability; policies on taxation, privatization and trade; competition policy, and rules regarding the entry and operations of foreigners together (UNCTAD, 1998b). The stability of such policies is very important; radical liberalizations can raise doubts about their durability and therefore be counter-productive (UNCTAD, 1997).
• The policy framework is the core enabling framework for FDI and refers mainly to the rules governing it. Recent times have seen notably more liberal attitudes to foreign investment, increasing the choice of locations open to firms and hence reducing the effectiveness of the policy framework. A welcome approach to FDI is now taken for granted (UNCTAD, 1998b).

• Business facilitation is becoming prominent because of increased openness to and competition for investment. Business facilitation includes investment promotion and assistance services, incentives, reduced administration and bureaucratic hassle costs, social amenities like personal standards of living, and after investment services (UNCTAD, 1998b). Many countries have established investment promotion agencies that offer a one-stop shop for administrative requirements. Investors are often prepared to pay for this service as it removes bottlenecks and speeds up processes (UNCTAD, 1997).

• Business facilitation is becoming prominent because of increased competition for investment. It is becoming more sophisticated and now targets specific investors. Post-investment services are especially important because countries want firms to reinvest their earnings (UNCTAD, 1998b).

• By far the most important locational determinants are economic determinants (UNCTAD, 1998b). These correspond to the motives for investment. Market-seeking investment relies on the following economic determinants: market size, per capita income, market growth, access to regional or global markets, market structure and country-specific tastes (ibid.). Resource- and asset-seeking investments depend on the presence of highly skilled or cheap unskilled labour, physical infrastructure, raw materials and/or technological/innovatory capacity.

While resource/asset-seeking investment needs special or unique features, efficiency-seeking investment is based on the productivity adjusted costs of the factors just listed as well as transport and imported input costs and access to global/regional trade networks (UNCTAD 1998b). Weaknesses can also be opportunities, as underdeveloped infrastructure provides a chance for infrastructure investment (UNCTAD, 1997).

Investors rank the presence of markets as the most significant locational determinant, followed by political and social risk, skilled workers, the regulatory framework, resources and low-cost labour (UNCTAD, 1997). Although this ranking does not distinguish between motives for investment, it leaves a fair impression of the relative importance of different determinants.

3.3 The changing locational determinants of investment

Section 3.2 presented what appear to be neat links between investment motives and economic determinants. In practice, it is becoming harder to link economic
determinants to each investment motive. The tests presented later do not account for the complexities in this section, but it is important to be aware of them.

Historically, finding cheap labour to make a product and an economical way to transport it to its market was sufficient for export-oriented investment. As production processes become more complex, the simple relationships described above are being replaced by firms’ having “portfolios of locational assets” (UNCTAD 1998b). In other words, the production process itself is being split into sub-activities or functions located in different regions and transnational corporations are sourcing separate components from different parts of the world (UNCTAD, 1998b).

Globalization forces the creation of transnational corporations because it opens new markets for firms and at the same time increases competition for existing firms in those markets. Pressure to locate production in the cheapest and most efficient places around the world is intensifying. At the same time, technology makes global co-ordination of activities easier and therefore contributes to the process (UNCTAD, 1998b).

The relative importance of economic determinants is changing. Traditional factors like cheap labour and raw materials are becoming less prominent because of the decreasing importance of the primary sector and increasing automation in the manufacturing sector (UNCTAD, 1998b).

Firms are looking for technological access and innovatory capacity to complement traditional factors like low costs and attractive markets. More and more forms of investment are pursuing strategic assets instead of natural resources. The increasing prominence of these created assets is the most significant shift among the relative importance of economic determinants of FDI (UNCTAD, 1998b).

The policy implication is that, unlike natural resources, the existence of created assets can be influenced by governments. The challenge is for them to create a unique combination of country-specific advantages that will attract specialised forms of investment.

3.4 The limited role of incentives

Many studies have been done on how policy makers can enhance and develop locational advantages or overcome disadvantages. The chief aim of incentives is to compensate for markets’ failures to provide returns that reflect the full advantages resulting from investment — like job creation, skills-transfer and access to world markets (UNCTAD, 1997).

and Hazelhurst (2000). The consensus is that incentives are ineffective substitutes for the locational determinants already described in detail.

One specific exception, found by Kumar (1994), is that Export Processing Zones (EPZs) are a significant determinant of EOI in landlocked countries. According to Madani (undated), the most successful EPZs are those that offer firms free trade conditions and an unregulated operating environment; a superior option is therefore overall liberalisation that is not constrained to particular regions. Madani also advances that EPZs offering incentives are too costly to be worthwhile.

Despite having an at best marginal effect on investment, incentives are still prevalent because of the “competitive game in incentives” (South Centre, 1997). Because of the competition for investment among developing countries, they offer increasingly attractive incentives to investors. A classic game theory scenario exists: developing countries would all benefit from cooperating to reduce incentives but they do not. The result is that incentives can influence the location of investment among developing countries, but do not increase it overall.

Many of the authors listed above suggest that the costs of incentives, contributed to by the inefficiency associated with their implementation, now outweigh the potential benefits. The last word belongs to Guisenger and Loree (1995: electronic journal): “There is no reason to believe that a dollar spent on incentives has a higher return, in the form of increased foreign investment, than a dollar spent on infrastructure.”

3.5 Locational determinants within the eclectic paradigm

The factors influencing the decision of where to invest have been discussed in detail, but these country-specific locational advantages must be combined with firm-specific advantages to have a better understanding of what causes investment, especially by multinationals.

The eclectic theory, attributed to Dunning (in Kumar and Siddharthan, 1997), provides a comprehensive and general explanation for investment, drawing together the work of many authors. The eclectic theory is also called the OLI framework as it is built on three concepts, namely ownership, location and internalisation.

An ownership advantage allows a foreign firm to overcome the handicaps associated with being from abroad and therefore makes it competitive with local firms. Some advantages stem from economies of scale, a strong brand, superior management skills and better access to capital (Kumar and Siddharthan, 1997).

If only this advantage exists, then the firm could export its product to the intended market. For production to take place in this market, locational advantages must exist, and these have already been discussed. However, such production can occur through arm’s length licencing agreements that do not require investment.
The choice to invest directly instead of licencing production depends on internalization advantages. Drawing very much from Williamson’s transactions cost approach to the existence of firms, investment occurs if the firm’s internal coordination costs are less than external market imperfection costs (South Centre, 1997).

The OLI framework, also termed the micro-economic theory of investment (South Centre, 1997), therefore provides for interaction between country-specific locational advantages and firm-specific ownership and internalization advantages. Policy makers must therefore examine their country’s locational advantages and see how they can be enhanced or developed to match certain kinds of firms (UNCTAD, 1997). It is no good developing advantages that no firms can take advantage of. For this reason, and because of the increasing complexity and variety of factors sought by firms, it is becoming important to target certain industries or even specific firms for investment (Hazelhurst, 2000).

3.6 Focussing on export-oriented investment

This section presents theoretical approaches to EOI in particular and identifies some of its specific characteristics. Three theories do not fit neatly in the OLI framework.

- Vernon’s product cycle theory (in Kumar, 1994) explains the different forms of investment over the lifespan of a product. As products become established, firms move production abroad to satisfy new markets. Later in their lives, as products mature and become standardised, cost becomes the key basis for competition. Price competition drives worldwide efficiency-seeking investment, so EOI takes place in the latter stages of the product life cycle.

- Kojima (in Kumar, 1994) explains EOI as an international division of labour. Countries move those parts of production in which they are losing comparative advantage abroad. An example of this would be an industrializing country where the workforce becomes more skilled and wages rise. Because its comparative advantage is no longer cheap unskilled labour, the industrialising country moves unskilled parts of production to low wage countries. Production is often set up to export goods back to the industrialising country, as done by Japan in East Asia.

International division of labour theory advocates intra-industry specialization between countries. In other words, countries become specialised in certain stages of production or in producing specific components. Specialisation is being made easier by design advances and production standardization as well as lower transport and communication costs. The increasing proportion of world trade attributed to intermediate goods supports the international division of labour approach to EOI (Kumar, 1994).

- Another approach considers risk and bargaining power. Firms with globally diversified operations are less exposed to country-specific political risks and can take advantage of exchange rate fluctuations to reduce costs. When
negotiating with governments, firms with a global presence are not tied to a specific country and are therefore in a better bargaining position (Kogut, in Kumar, 1994).

These theories do not replace the OLI framework. Kumar (1994) advances that the OLI framework is still a more thorough explanation of investment and that it applies to EOI particularly well.

Competition for EOI is greater than for market-development investment (Kumar, 1994). Markets are not mutually exclusive, so firms could invest to satisfy many attractive markets. In contrast, firms intending to export carefully choose the best place to locate parts of production, so competition for EOI is fiercer (Reuber, 1973). Kumar (1997) finds that multinationals are highly selective when making EOI decisions, so he advances that developing countries can only realistically target specific parts of the production process. Even individual investors must be approached directly with specific packages (Hazelhurst, 2000).

4. Empirical tests

This section comprises four parts.

- The first part formally states the hypothesis.
- The second part summarises Kumar’s 1994 study on EOI.
- The third part presents an alternative way to construct the EOI variable and describes how the test works without data constraints.
- Given the data available, the fourth part presents the results of a simpler alternative test.

4.1 Hypothesis

The hypothesis is that EOI is more related to supply-side factors (like infrastructure or human capital) than to demand-side factors (like per capita GDP or GDP growth). The implication is that, when targeting EOI, policy makers must focus on the supply side of the economy. In other words, it is more important to shift each firm’s supply curve than its demand curve. This is explained in more detail below.

The determinants of direct investment discussed in section three directly influence the firm’s basic investment decision: it will invest if its net discounted cash flows are positive. The three components of its net discounted cash flows are the cash inflows in each period, the cash outflows in each period, and the rate used to discount each period’s cash flows.

Inflows depend on demand conditions, outflows depend on supply conditions, and the discount rate depends on interest rates and risk. Firms contemplating market-seeking investments are predominantly concerned about high cash inflows caused by favourable demand factors. Firms considering export-oriented investment look for supply factors that reduce cash outflows. Factors like political stability and property rights protection affect risk, which together with interest rates affects the
discount rate. These are classified as neutral factors, not because they are unimportant, but because firms with any investment motive want low discount rates.

The principal determinant of export-oriented investment, especially when it is efficiency-seeking, is cost, or the position of the firm’s supply curve. The implication of the hypothesis is that countries targeting EOI need to concentrate on shifting the supply curve, not the demand curve. As quoted in the introduction, this is what GEAR is attempting.

### 4.2 Kumar’s model for EOI

Kumar (1994) develops an empirical model for EOI. He uses the percentage of output exported by affiliates of US multinationals as a measure of EOI. He finds wage rates, the quality of industrial services and infrastructure, the presence of natural resources and the existence of EPZs (in landlocked countries) to be significant explanatory variables.

Kumar only tests for supply-side measures; he does not deliberately include demand-side or neutral variables to test whether they are insignificant or at least less important. Kumar models the proportion of investment in each country that is export-oriented, not the actual value of EOI or its size relative to GDP. Furthermore, his study is confined to FDI coming from the United States; it does not account for FDI from other sources nor does it study domestic investment. The tests in this paper attempt to deal with these limitations.

### 4.3 Building a model for EOI

This section explains how to build an accurate proxy for EOI and use some sophisticated variables as possible determinants.

The analysis is based on a cross country study taken over five years to account for investment volatility. It studies EOI separately as foreign export-oriented investment (FEOI) and domestic export-oriented investment (DEOI).

The most important aspect is the construction of a proxy for EOI. The first step calculates, by sector, how much each country exported as a percentage of GDP. The second step establishes, by sector, how much investment there was as a percentage of GDP. The third step multiplies these values to derive export-oriented investment, again by sector, as a percentage of GDP. Export-oriented investment as a percentage of GDP is the dependent variable. Separate tests are done for EOI in each sector. To describe the construction of EOI mathematically,

\[ EOI_{ij} = E_i * I_{ij} * 100 \]

where

\[ EOI = \text{export-oriented investment as a percentage of GDP} \]
\( E \) = exports as a percentage of GDP
\( I \) = investment as a percentage of GDP
\( i \) = sector
\( j \) = investment origin (foreign or domestic).

For each sector, \( EOI \) is regressed on a variety of variables classified either as supply-side, demand-side or neutral. The hypothesis is supported if the final regression contains highly significant supply-side variables, moderately significant neutral variables and insignificant demand-side variables. The significance of individual supply-side variables should depend on the sector. For example, technology- and capital-intensive sectors should not be significantly influenced by wages or strikes.

The range and quality of explanatory variables are extensive. The World Competitiveness Yearbook (published by the International Institute for Management Development) and the Global Competitiveness Report (published annually by the World Economic Forum) are very promising sources for a study like this one.

In contrast, data on exports by sector are scarce and details of investment by sector are almost non-existent. This constraint means a simpler version of the model had to be used. The actual test performed is presented in detail below.

4.4 Testing for the relative importance of supply-side variables

This section starts by showing how this test is different from the one described in section 4.3. It then outlines some limitations imposed by this necessary simplification. After describing the data used, this section ends by presenting the results of the tests.

4.4.1 How this test differs

There are two main differences between this test and the model in section 4.3.

- Output is not broken down by sector. Each country’s total exports as a percentage of GDP is multiplied by total investment as a percentage of GDP to derive \( EOI \) as a percentage of GDP for that country.

- There are not enough degrees of freedom for a multiple regression because each explanatory variable has missing observations for some countries and because these countries are different for each variable. Therefore, this test cannot build a model for \( EOI \).

- Instead, the test comprises series’ of separate two-variable ordinary least squares (OLS) regressions and non-parametric correlations. If the hypothesis is correct, the supply-side variables will be highly significant, the neutral variables will have moderate significance, and the demand-side ones will be insignificant.
4.4.2 Problems with this approach

Apart from not being able to build a model for EOI, this simplification has two main drawbacks.

• The method cannot divide EOI into resource-, asset- and efficiency-seeking investment. Unlike the model suggested in section 4.3, this measure does not capture the relevance of specific supply-side factors for specific industries or sectors. The number of strikes, an example of a supply-side factor, should not be relevant in highly automated and technology-intensive economies, yet these economies are grouped with labour-abundant countries. This makes it very difficult for variations in EOI to be explained by individual supply-side variables.

• The construction does not isolate EOI well. The explanatory variables could be correlated just with investment or just with exports and not with export-oriented investment. High correlations just with investment could make demand-side variables appear moderately related to EOI in this test. The fine-grained nature of the model presented in section 4.3 reduces this effect, but it does not eliminate it completely.

4.4.3 Data

The number of countries varies according to the variables being tested. In most cases, data for the five years from 1993 to 1997 are used.

Dependent variables

• Export-oriented foreign direct investment (FEOI)
  FDI as a percentage of GDP is extracted from the International Financial Statistics (IFS) database, which in turn sourced it from the 1999 World Development Indicators. Exports, also expressed as a percentage of GDP, are from the 1999 World Development Indicators via the IFS database as well. These percentages are multiplied to derive export-oriented FDI.

• Export-oriented gross private domestic fixed investment (DEOI)
  Gross private domestic fixed investment data is from the World Bank’s Global Development Network Growth Database available on the world wide web. It does not account for changes in inventories. These data, also expressed as a percentage of GDP, are multiplied by the same export data to derive export-oriented gross private domestic fixed investment.

Explanatory variables

A variety of variables are sourced from the World Bank’s Global Development Network Growth Database. The variables are not an exhaustive list of what could influence EOI. The selection has been divided into supply-side factors, demand-side...
factors and neutral factors. For analysis purposes, demand-side and neutral variables are grouped together.

Supply-side variables

Supply conditions affect a firm’s cash outflows. EOI should be more related to these variables than to demand-side and neutral variables.

- Tertiary enrolment
  This is the number of people enrolled at a tertiary institution (regardless of their age) expressed as a percentage of the total number of people of tertiary institution going age. Only four years of data from 1993-1996 are used. Tertiary enrolment proxies the availability of skilled labour and should be positively related with EOI.

- Transport and communication
  The percentage of GDP spent by government on transport and communication proxies improvements in a country’s infra structural capability and should be positively linked with EOI.

- Strikes
  This is the number of strikes of 1 000 or more industrial or service workers that involve more than one employer and that are aimed at national government policies or authority in each year. Data from 1989-1993 were used. Strikes should be negatively correlated with EOI.

- Telephone lines
  The number of telephone mainlines per 1000 people is another proxy for infra structural capability and should be positively related with EOI.

- Landlock
  This series captures the extra transport costs faced by landlocked countries. Landlocked countries are represented by the dummy value of one. There is of course only one observation per country and the link with EOI should be negative.

Demand-side variables

An exporting firm’s cash inflows do not depend on domestic demand conditions, so these variables should in theory not be related to EOI. Because of the way the dependent variables are constructed, a low positive correlation could be observed, but the demand-side variables should be less related to EOI than the supply-side variables.

- GDP
  GDP at market prices is measured in current US dollars.
• GDP growth
  The annual percentage growth rate of GDP at market prices is based on constant local currency.

• Per capita GDP
  Per capita income is measured in constant international prices.

• Per capita GDP growth
  The same per capita GDP data is used to calculate the annual percentage growth rate in per capita GDP.

Neutral variables

Neutral conditions determine the firm’s discount rate and should affect all forms of investment equally. They should yield higher correlations than demand-side variables and lower correlations than supply-side variables.

• Real interest rate
  The Global Development Network Database’s real interest rate is the deposit interest rate less the rate of inflation measured by the GDP deflator. It should have a negative relation with EOI.

• External debt to GDP ratio
  This is the debt payable to nonresidents in foreign currency, goods or services expressed as a percentage of GDP and is a measure of sovereign risk. It should have a low correlation with EOI.

4.4.4 Results

This section will show that supply-side factors are significantly more important for FEOI but not for DEOI.

Most of the data are not normally distributed and most of the two-variable OLS regressions fail to yield normally distributed residuals. As a result, the usual $R^2$ and $t$ statistics cannot be used to draw inferences about the significance of the variables (Gujarati, 1995).

This section is therefore divided in two parts. An analysis using Spearman’s ranked correlations is presented in the first part. These are interpreted in the same way as Pearson’s $r$ statistic, but are based on correlations of the rankings of the observations and do not make assumptions regarding the normality of the data (Van Den Honert, 1997).

In the second part, the coefficients of log form regressions are presented to give an estimate of the elasticity of EOI with respect to these variables. The coefficients are valid despite the non-normally distributed residuals, but measures of their significance are not (Gujarati, 1995).
Ranked correlations

The analysis will show that the average correlation between supply-side variables and FEOI is significantly higher than the average correlation between demand-side/neutral variables and FEOI. Supply-side variables do not have a significantly higher average correlation with DEOI.

It will also show that the mean significance level of the correlations with FEOI is higher for supply-side variables, but the mean significance level of the correlations with DEOI is not.

Table 1 presents Spearman’s ranked correlations between the explanatory variables and FEOI and DEOI. Many of the correlations are significant (as the rows in bold indicate) and have the correct sign (those with incorrect signs are marked). Before making comparisons, the variables are described individually.

Supply-side variables

- Tertiary enrolment is as expected significantly positively correlated with FEOI, but it has an insignificant negative correlation with DEOI.
- Transport and communication yields consistently significant positive correlations.
- Strikes are significantly negatively correlated with FEOI only.
- Phone connections are significantly positively correlated.
- The landlock dummy is insignificant. This could be because landlocked countries have successfully employed EPZs to overcome this disadvantage or simply because there are relatively few observations. The unexpected positive correlation with FEOI has been recalculated and confirmed.

Demand-side and neutral variables

- GDP growth is significantly positively correlated with DEOI, but insignificantly negatively correlated with FEOI.
- In contrast, GDP levels have a significant positive correlation with FEOI, but not with DEOI.
- Per capita GDP produces highly significant positive correlations.
- Per capita GDP growth is insignificantly negatively correlated with FEOI, but significantly positively correlated with DEOI. This is consistent with the observations for GDP growth.
- Interest rates are significantly negative for FEOI only. Easier access to foreign capital should make local interest rates less relevant for foreign than domestic investment.
- The foreign debt-to-GDP ratio is insignificantly negative.
Table 1: Spearman’s ranked correlations

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>R</th>
<th>t(N-2)</th>
<th>p-level</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SUPPLY VARIABLES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tertiary enrolment + FEOI</td>
<td>220</td>
<td>0.210</td>
<td>3.174</td>
<td>0.002</td>
</tr>
<tr>
<td>Tertiary enrolment + DEOI</td>
<td>160</td>
<td>-0.038</td>
<td>-0.474</td>
<td>0.636</td>
</tr>
<tr>
<td>Transport/communication + FEOI</td>
<td>112</td>
<td>0.432</td>
<td>5.022</td>
<td>0.000</td>
</tr>
<tr>
<td>Transport/communication + DEOI</td>
<td>69</td>
<td>0.411</td>
<td>3.691</td>
<td>0.000</td>
</tr>
<tr>
<td>Strikes + FEOI</td>
<td>358</td>
<td>-0.162</td>
<td>-3.100</td>
<td>0.002</td>
</tr>
<tr>
<td>Strikes + DEOI</td>
<td>375</td>
<td>-0.071</td>
<td>-1.371</td>
<td>0.171</td>
</tr>
<tr>
<td>Phones + FEOI</td>
<td>301</td>
<td>0.387</td>
<td>7.248</td>
<td>0.000</td>
</tr>
<tr>
<td>Phones + DEOI</td>
<td>203</td>
<td>0.237</td>
<td>3.452</td>
<td>0.000</td>
</tr>
<tr>
<td>Landlock + FEOI</td>
<td>61</td>
<td>0.182</td>
<td>1.422</td>
<td>0.160</td>
</tr>
<tr>
<td>Landlock + DEOI</td>
<td>41</td>
<td>-0.182</td>
<td>-1.157</td>
<td>0.255</td>
</tr>
<tr>
<td><strong>DEMAND/NEUTRAL VARIABLES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP growth + FEOI</td>
<td>305</td>
<td>-0.050</td>
<td>-0.876</td>
<td>0.382</td>
</tr>
<tr>
<td>GDP growth + DEOI</td>
<td>205</td>
<td>0.151</td>
<td>2.170</td>
<td>0.031</td>
</tr>
<tr>
<td>GDP + FEOI</td>
<td>305</td>
<td>-0.192</td>
<td>-3.398</td>
<td>0.001</td>
</tr>
<tr>
<td>GDP + DEOI</td>
<td>205</td>
<td>-0.008</td>
<td>-0.115</td>
<td>0.908</td>
</tr>
<tr>
<td>Per capita GDP + FEOI</td>
<td>270</td>
<td>0.301</td>
<td>5.163</td>
<td>0.000</td>
</tr>
<tr>
<td>Per capita GDP + DEOI</td>
<td>205</td>
<td>0.316</td>
<td>4.747</td>
<td>0.000</td>
</tr>
<tr>
<td>Per capita GDP growth + FEOI</td>
<td>270</td>
<td>-0.078</td>
<td>-1.279</td>
<td>0.202</td>
</tr>
<tr>
<td>Per capita GDP growth + DEOI</td>
<td>205</td>
<td>0.125</td>
<td>1.792</td>
<td>0.075</td>
</tr>
<tr>
<td>Interest + FEOI</td>
<td>225</td>
<td>-0.178</td>
<td>-2.700</td>
<td>0.008</td>
</tr>
<tr>
<td>Interest + DEOI</td>
<td>150</td>
<td>-0.115</td>
<td>-1.404</td>
<td>0.163</td>
</tr>
<tr>
<td>Debt:GDP ratio + FEOI</td>
<td>285</td>
<td>-0.043</td>
<td>-0.730</td>
<td>0.466</td>
</tr>
<tr>
<td>Debt:GDP ratio + DEOI</td>
<td>200</td>
<td>-0.082</td>
<td>-1.163</td>
<td>0.246</td>
</tr>
</tbody>
</table>

N = number of observations; R = Spearman’s R-statistic; T(N-2) is the t-statistic for (N-2) degrees of freedom; p-level is the probability that the null hypothesis of no correlation is correct. Probabilities in bold denote significant correlations; * marks correlations with the wrong sign.

Figure 3 compares the average absolute values of correlations of supply-side and demand-side/neutral variables. The sample labelled “supply restricted” excludes supply-side variables that have the incorrect sign according to theory. (Demand-side variables can have any sign as they are not supposed to be correlated with EOI and all the neutral variables have the correct sign, so the demand/neutral sample is not restricted.) For FEOI, supply-side variables have a substantially higher correlation. The difference is less pronounced for DEOI.
Mann-Whitney tests determine whether any of the differences are significant. The tests are the equivalent of two-sample t-tests but do not assume the two populations are normally distributed and are particularly useful for small samples (Van Den Honert, 1997). They test the hypothesis that the supply-side and demand-side/neutral variables come from populations that have equal average correlations with EOI.

To perform a Mann-Whitney test, the correlations in table 1 for both supply-side and demand-side/neutral variables are combined and given rankings. The statistic is then calculated as follows:

\[ T = S - N(N+1)/2 \]

where

- \( T \) = test statistic
- \( S \) = sum of the ranked values of the supply-side variables
- \( N \) = the number of supply-side variables and
- \( N(N+1)/2 \) is the lowest possible value for the sum of the ranks given \( N \) supply-side variables.

If the difference between the actual and minimum summed ranks is low, the statistic is low. If the statistic is “low enough”, supply-side variables have significantly lower correlations than demand-side neutral variables. Similarly, if the difference is “high enough”, supply-side variables have significantly higher correlations with EOI (Van Den Honert 1997).
The lower and upper bounds, which depend on the number of supply-side and demand-side/neutral variables and the significance level, are published in Van Den Honert (1997). Table 4.2 compares the actual statistics with the lower and upper bounds at the 10 percent significance level. Both complete and restricted supply samples are tested.

**Table 2: Mann-Whitney tests on correlations**

<table>
<thead>
<tr>
<th>Group</th>
<th>Statistic</th>
<th>Lower bound (10%)</th>
<th>Upper bound (10%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEOI</td>
<td>24</td>
<td>8</td>
<td>22</td>
</tr>
<tr>
<td>FEOI (restricted)</td>
<td>20</td>
<td>6</td>
<td>18</td>
</tr>
<tr>
<td>DEOI</td>
<td>18</td>
<td>8</td>
<td>22</td>
</tr>
<tr>
<td>DEOI (restricted)</td>
<td>17</td>
<td>6</td>
<td>18</td>
</tr>
</tbody>
</table>

If the statistic is lower (higher) than the lower (higher) bound, supply-side correlations with EOI are significantly lower (higher) than demand-side/neutral correlations with EOI at the 10% significance level. Significant T-statistics and the applicable bounds are in bold.

FEOI has significantly higher correlations with supply-side variables (both restricted and unrestricted) than with demand-side/neutral variables. This is not so for DEOI as the statistics are not higher than the upper bounds.

Figure 4 compares the average significance levels of the correlations in table 1. Supply restricted again excludes variables with the wrong sign. For FEOI, probability levels seem much lower for supply-side variables. For DEOI, only the restricted supply sample seems more significantly correlated than the demand-side/neutral sample.

Table 3 presents the results of the Mann-Whitney tests. Here, the supply-side variables are more related to EOI if the statistic is lower than the lower bound and the demand-side/neutral variables are more related to EOI if the statistic is higher than the higher bound. The only significantly lower p-value is for the restricted supply-side sample and FEOI.
Figure 4: Average significance levels of correlations with foreign and domestic export-oriented investment

Table 3: Mann-Whitney tests on p-values

<table>
<thead>
<tr>
<th>Group</th>
<th>Statistic</th>
<th>Lower bound (10%)</th>
<th>Upper bound (10%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEOI</td>
<td>8</td>
<td>8</td>
<td>22</td>
</tr>
<tr>
<td>FEOI (restricted)</td>
<td>5</td>
<td>6</td>
<td>18</td>
</tr>
<tr>
<td>DEOI</td>
<td>16</td>
<td>8</td>
<td>22</td>
</tr>
<tr>
<td>DEOI (restricted)</td>
<td>11</td>
<td>6</td>
<td>18</td>
</tr>
</tbody>
</table>

If the statistic is lower (higher) than the lower (higher) bound, supply-side variables are more (less) significantly correlated with EOI than demand-side/neutral variables are at the 10% significance level. Significant T-statistics and the applicable bounds are in bold.

The graphs and Mann-Whitney tests of the average correlations and the average significance levels of these correlations indicate that supply-side variables are more relevant for FEOI than demand-side/neutral variables are. For DEOI, there is not enough support to suggest supply-side variables are more relevant.

LOG-FORM REGRESSIONS

Series’ of two-variable OLS regressions are run in log form to estimate the elasticity of EOI with respect to the variables. Following Barro (1991), regressions that present White’s heteroskedasticity-consistent covariance standard errors and covariances are run to reduce heteroskedasticity. This affects the t-statistics slightly (Gujarati, 1995), but most of them cannot be used in any case because the
regressions fail to yield normally distributed residuals. Nevertheless, the coefficients can be used and are presented in table 4.

**Table 4: Elasticities of EOI**

<table>
<thead>
<tr>
<th></th>
<th>FEIO</th>
<th>DEIO</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SUPPLY VARIABLES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tertiary enrolment</td>
<td>0.40</td>
<td>-0.04</td>
</tr>
<tr>
<td>Transport/communication</td>
<td>1.27</td>
<td>-</td>
</tr>
<tr>
<td>Strikes</td>
<td>-0.49</td>
<td>-0.02</td>
</tr>
<tr>
<td>Phones</td>
<td>0.45</td>
<td>0.15</td>
</tr>
<tr>
<td>Landlock dummy</td>
<td>0.59</td>
<td>-0.61</td>
</tr>
<tr>
<td><strong>DEMAND/NEUTRAL VARIABLES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP</td>
<td>-0.14</td>
<td>0.03</td>
</tr>
<tr>
<td>GDP growth</td>
<td>-0.11</td>
<td>0.24</td>
</tr>
<tr>
<td>Per capita GDP</td>
<td>0.81</td>
<td>0.41</td>
</tr>
<tr>
<td>Per capita GDP growth</td>
<td>-0.13</td>
<td>0.12</td>
</tr>
<tr>
<td>Interest rate</td>
<td>-0.19</td>
<td>-0.10</td>
</tr>
<tr>
<td>Debt/GDP ratio</td>
<td>-0.23</td>
<td>-0.29</td>
</tr>
</tbody>
</table>

There were not enough observations for a meaningful regression of DEIO on transport/communication; * marks incorrect signs.

FEIO has relatively high correctly-signed elasticities with respect to all the supply-side variables except the landlock dummy, which has an unexplainable negative coefficient. FEIO seems relatively insensitive to demand-side/neutral variables except per capita GDP. DEIO regressions yield inconsistently signed and relatively low elasticities with respect to the supply-side variables. DEIO seems slightly more sensitive to demand-side and neutral variables.

Figure 5 shows the average elasticities of the two investment forms with respect to supply-side, restricted supply-side (where coefficients with the wrong sign are dropped) and demand-side/neutral samples.

The most striking feature is that FEIO seems more sensitive to supply-side variables than DEIO does. This leans against the notion presented in section three that what is good for foreign investment is also good for local investment. While FEIO seems more elastic with respect to supply-side variables than demand-side/neutral variables, DEIO seems equally sensitive to changes in supply-side and demand-side/neutral variables.

Mann-Whitney tests determine whether any differences are significant. Table 5 shows that FEIO is significantly more elastic with respect to both supply-side samples at the five percent level. As predicted by figure 5, DEIO is not significantly more elastic with respect to supply-side variables.
Figure 5: Average elasticities

Table 5: Mann-Whitney tests on elasticities

<table>
<thead>
<tr>
<th>Group</th>
<th>Statistic</th>
<th>Lower bound (10%)</th>
<th>Upper bound (10%)</th>
<th>Upper bound (5%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEOI</td>
<td>26</td>
<td>8</td>
<td>22</td>
<td>24</td>
</tr>
<tr>
<td>FEOI (restricted)</td>
<td>21</td>
<td>6</td>
<td>18</td>
<td>20</td>
</tr>
<tr>
<td>DEOI</td>
<td>10</td>
<td>6</td>
<td>18</td>
<td>20</td>
</tr>
<tr>
<td>DEOI (restricted)</td>
<td>9</td>
<td>4</td>
<td>14</td>
<td>15</td>
</tr>
</tbody>
</table>

If the statistic is higher (lower) than the upper (lower) bound, the elasticity of EOI with respect to supply-side variables is significantly higher (lower) than it is with respect to demand-side/neutral variables at the indicated significance level. Significant T-statistics and the applicable bounds are in bold.

To summarise the empirical findings:

- Non-parametric correlations indicate supply-side variables are more related to FEOI than demand-side/neutral variables are.
- Log-form regressions infer FEOI is more elastic with respect to supply-side variables than demand-side/neutral variables.
- Neither set of tests suggests supply-side factors are more relevant for DEOI.

5. Summary and concluding comments

The OLI framework explains investment in terms of firm-specific ownership and internalisation advantages and country-specific locational advantages. Locational advantages comprise the policy framework, business facilitation measures and
economic determinants. Economic determinants are the most important and depend on the motive for investment.

Investment with a market-seeking motive intends to satisfy or create new markets for a product and should depend on favourable demand conditions. Resource-seeking investment is directed at owning particular natural resources. Asset-seeking investment searches for rare or unique man-made capabilities. Efficiency-seeking investment aims to reduce costs. As forms of export-oriented investment, resource-, asset- and efficiency-seeking investment should be determined by supply conditions.

This paper tests whether supply-side economic determinants are more relevant for EOI than demand-side/neutral determinants are. Severe data availability constraints force the use of simple proxies for EOI, and the nature of the data limits the testing options. Studies of correlations and elasticities support the hypothesis that supply-side factors are more relevant for FEOI than demand-side/neutral factors are. The studies do not suggest supply-side conditions are more pertinent for DEOI than demand-side/neutral conditions are.

As suggested in section 4.2, many explanatory variables will be available soon, but the major concern lies in finding the data to construct satisfactory proxies for EOI. Good proxies are vital to the substantial research that must be done on the determinants of EOI, especially on whether supply-side measures really are more important for EOI. If they are not, then GEAR and similar policies will not attract the export-oriented investment policymakers are hoping for.

Furthermore, pursuing EOI has a cost. There is a tradeoff between supposedly EOI-friendly policies and measures that create attractive demand conditions. Examples are tariff removals and privatization, both of which lead to job losses and lower purchasing power. Poorer demand conditions will reduce the market-seeking investment flows that form the bulk of FDI into South Africa (Dinkleman & Streak, 1999).

Even if the hypothesis is correct — if supply-side factors are more important — it might not be worth pursuing EOI if GEAR’s social costs and the other forms of investment it foregoes are too high. This possibility is embodied in the broader question of what kinds of investment are most beneficial to the host nation.

Finally, having a clear understanding of what causes EOI as opposed to market-seeking investment may provide the answer to the investment/growth causality debate. It may be that EOI causes growth and growth causes market-seeking investment.

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World Economic Forum, details of *World Competitiveness Report* found at www.weforum.com