EXPORTS AND ECONOMIC GROWTH IN SOUTH AFRICA

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MAURA FEDDERSEN

Supervisor: Professor Hugo Nel

Co-supervisor: Mr Ferdi Botha

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DECLARATION

Except where explicitly stated otherwise and acknowledged, this thesis is wholly my own work and has not been submitted to any other University, Technikon or College for degree purposes.

ABSTRACT

Various studies conclude that accelerated economic growth and development are necessary in South Africa to make a significant contribution towards reducing high levels of unemployment, inequality and poverty. Moreover, in theories of economic growth the export sector is frequently accorded a special role in encouraging faster economic growth, which is often supported by empirical evidence. Nonetheless, a question that remains unresolved is whether higher export growth leads to higher economic growth in South Africa and what particular role exports may play within the overall economic growth process of the country. This study applies Johansen's cointegration procedure, impulse response functions, variance decomposition analysis and Granger causality tests to shed light on the channels through which export growth may impact South Africa's economic growth rate. Quarterly time series data ranging from 1975q1 to 2012q4 is employed in the study's empirical tests. The empirical results lend support to the idea that the role of exports in the economic growth process fundamentally lies in their ability to encourage investment and capital formation. While export growth supports higher economic growth in the short-run, it does not have the same effect in the long-run. Nonetheless, with export growth supporting faster capital formation in South Africa, and capital formation, in turn, significantly increasing economic growth in the long-run, the impetus to growth stemming from exports has been found to lie in the channel to capital formation. On the basis of the empirical results, not only are exports a critical requirement of higher investment, but they are also anticipated to play a prominent role in lifting the balance of payments constraint that would make investment-led growth possible in the first place. Overall, a strategy of export-led growth that does not explicitly emphasise the export-capital-growth connection is likely to fall short of reflecting the dynamics contained within the exports-growth relationship in South Africa.

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INTRODUCTION

1.1 BACKGROUND TO THE STUDY AND RESEARCH QUESTION

Although export promotion is regarded as a key driver of economic growth within the New Growth Path (NGP), National Development Plan (NDP) and industrial policy documents such as the 2013 Industrial Policy Action Plan (IPAP), export-oriented growth has been pursued only relatively recently in South Africa (gradually from 1972 and markedly since South Africa's offer to the 1994 Uruguay Round), replacing the previously dominant strategy of import-substitution industrialisation (Cassim, Onyango and van Seventer, 2004:7). From 1925 onwards, South Africa embarked on an import substitution growth path that was implemented to reduce South Africa's reliance on primary exports such as agricultural produce and gold, together with its dependence on Britain (Lemon and Gibb, 2002:292). When growth had begun to slow by the 1970s, as a result of the worldwide recession and rising oil prices, some negative implications of the import substitution programme also became increasingly apparent. Consequences such as the anti-export bias and considerable import dependence, particularly on capital goods, were increasingly seen as prohibitive (Alves and Edwards, 2009:87). In view of the economic successes of the newly industrialised countries, especially the Four Asian Tigers[1], the possibility of export-oriented industrialisation gained ground with economic policy makers in South Africa (Hirsch, 2005:117). With South Africa's re-entry into the global marketplace in the early 1990s, policy thus made a decisive shift away from import protection towards economic growth via trade liberalisation and the promotion of exports (Rangasamy, 2009:605).

Today, the export sector is a focal point of economic and industrial policy in South Africa. Released in December 2010, the NGP for example, provided a strategy to place the South African economy on a trajectory of faster, more inclusive GDP growth that makes a significant contribution to raising the level of equality, defeating poverty and reducing unemployment levels from 25% to 15% by 2020 (Patel, 2010:1). A core element of the economic strategy set out in the NGP was to widen the market for South African goods and services through a stronger pursuit of exports to rapidly growing economies such as China, India and Brazil. The NDP, released by the National Planning Commission in November 2011, is another critical economic policy document that was adopted by the ruling African

[1] Hong Kong, South Korea, Singapore and Taiwan.

National Congress (ANC) at its elective conference in Mangaung in December 2012. It was implemented as a blueprint informing economic policy formation in South Africa going forward (ANC, 2013:9). Similarly to the NGP, the NDP views export promotion via the development of competitive infrastructure, expertise, and market access as an opportunity to raise the level of economic growth and the share of employment in tradable activities through the transition towards a more diversified industrial base (NPC, 2011:106-7).

The IPAP 2013/14 - 15/16, drawn up within the framework of the National Industrial Policy Framework (NIPF), offered clear guidelines as to how the South African economy could be moved into non-traditional tradable goods and services that compete in export markets and against imports (DTI, 2013:8). Furthermore, the successive iterations of the IPAP stress the importance of 'locking in' access to export markets with growing demand for South Africa's exports (DTI, 2010b:36). Regarding South Africa's efforts to expand market access, as well as its commercial presence in key export markets, the inclusion of South Africa in the global partnership of BRICS[2] is a crucial step forward in South Africa's foreign policy interaction that builds on the on-going economic and trade cooperation efforts of the Department of Trade and Industry (DTI, 2011:9).

Additionally, the 2013 IPAP emphasised the need for developmental trade policies in the form of selected and strategic trade measures, such as tariffs, enforcement and Standards, Quality Assurance, Accreditation and Metrology (SQAM) measures that were envisioned to assist in shifting the economy towards expanding the productive side of the economy especially towards value-add activities. The 2013 IPAP also highlighted that the success of scaled-up industrial policy especially in the area of trade policy depends on an alignment of macro- and micro-economic policies. Specifically, a competitive and stable exchange rate structure is emphasised as a pivotal element of a successful expansion of the tradable sector in South Africa (DTI, 2013:41).

While current economic policy plans recognise that export production plays an important role in the overall growth process in South Africa (Rangasamy, 2009:603), a question that remains unresolved is what exactly this role is, that is, *how* exports may support economic growth in South Africa. By understanding the way in which exports link to other macroeconomic variables, some light may be shed on the question whether export-led growth

[2] Brazil, Russia, India, China and South Africa.

is a possibility in South Africa and thus whether higher exports can make a significant dent in helping to achieve the growth and employment targets envisioned by the NGP and NDP.

Despite continuous developments in the field of economic growth theory, there is still little agreement as to how exactly an economy can achieve higher levels of economic growth and what role exports can play in this regard (Hussain, 2006:36 & Thirlwall, 2011:319). Empirical evidence suggests that economic policies that may work in one environment may not work in another, which implies that there may not be a panacea providing the ultimate solution (Martin and Sunley, 2011:367). In this regard, Grindle (2004:525) highlights that any successful development strategy must be based on a nuanced view of the specific conditions of that country. Thus, there is particular scope for further research into the economic relationships that underlie the developing economy's growth process, with special emphasis on the unique situation faced by South Africa.

As Chapter 4 will show, in spite of the theoretical appeal of the export-led growth hypothesis, which asserts that export production is a key driver of economic growth, and despite continuous developments within the area of econometric modelling, the empirical findings on the export-led growth strategy have been mixed and differ considerably from country to country (Rangasamy, 2009:606). Due to continued uncertainty relating to the effectiveness of the export-led growth strategy, further research is required to provide additional insight into the way in which exports may support economic growth in South Africa.

1.2 GOAL OF THE RESEARCH

The goal of the research is to investigate empirically the relationship between exports and economic growth in South Africa. Stated differently, the aim is to analyse the role played by exports in the overall growth process in South Africa.

1.3 METHODOLOGY AND PROCEDURE

In the tradition of Durkheim's (1938:141) philosophy of social research, this study applies the positivist paradigm to explore the underlying dynamic processes that govern the relationship between exports and economic growth in South Africa. More specifically, a production function-type specification will be used to model economic growth as a function of labour, capital, exports and a variety of other relevant variables. This specification, which will be used mostly due to its practical appeal, was adopted in earlier studies (Balassa, 1978; Ram, 1985 & Tyler, 1981) and continues to be popular in more recent studies (Awokuse, 2003; Cipamba and Cipamba, 2013; Narayan, Narayan, Prasad, and Prasad, 2007 & Siliverstovs

and Herzer, 2006). Furthermore, to assess not simply the positive relationship between exports and economic growth that generally arises from the national accounting identity, which states that exports form part of GDP, the study will adopt Rangasamy's (2009:607) procedure "to net out exports from GDP" when analysing the link between exports and economic growth.

A key question that is still disputed in export-led growth studies is the direction in which causality may flow. Furthermore, the question is whether it is more applicable to describe export expansion as merely a handmaiden of accelerated economic growth or rather an "autonomous engine of growth", as many of the proponents of the export-led growth strategy argue (Kravis, 1970:850). In econometric terms, the question that continues to be debated by economists is whether the role that export expansion plays in the overall growth process is that of an "exogenous forcing variable or an endogenous responding variable" (Srinivasan, 2001:8). With this in mind, the study will make use of Granger causality tests to test for the direction of causality between exports and economic growth. In addition, the study will include cointegration and error-correction modelling to determine whether export performance is important for economic growth both in the short- and in the long-run. Similarly to a study by Britto and McCombie (2009) testing the applicability of Thirlwall's Law[3] to Brazil, Johansen's cointegration procedure will be applied to model several endogenous variables in a VAR framework. The study will use Johansen's cointegration procedure to reflect potential causal effects of specified variables and to allow for the derivation and evaluation of innovation accounting techniques, such as, impulse responses functions and variance decompositions (Lütkepohl, 2011:13). The study is based on quarterly time series data drawn from the South African Reserve Bank and Thomson Reuters DataStream for the period 1975q1 to 2012q4.

By applying Johansen's methodology, it is expected that the complexities of dynamic growth processes can be captured, thus shedding light on the question, which trade strategy will optimally foster economic growth and development in South Africa.

1.4 OUTLINE OF STUDY

As a foundation of the study's own empirical analysis, it is important first to gain insight into the theoretical background to the connection between exports and economic growth and to

[3] Thirlwall's Law states that "in the long-run, no country can grow faster than the rate consistent with balance of payments equilibrium on the current account unless it can finance ever-growing deficits which, in general, it cannot" (Thirlwall, 2011:310).

analyse the empirical evidence on the topic. The theory underlying the export-led growth hypothesis will be structured according to three major points of departure: the neoclassical, demand-side and development theories, which will be covered in Chapter 2. Chapter 3 will investigate the evolution of trade policy in South Africa since 1925. Chapter 4 will provide a short overview of existing empirical studies on the export-led growth theory. An empirical analysis that aims to investigate the link between exports and economic growth in South Africa will be provided in Chapter 5. Chapter 6 concludes with the main findings and recommendations for further research.

Chapter 2

THEORIES OF EXPORT-LED GROWTH

2.1 INTRODUCTION

In Chapter 2 the theoretical literature on the relationship between exports and economic growth will be covered from three main points of departure: the neoclassical, demand-side and development frameworks. Section 2.2 offers a discussion of theories of exports and economic growth within the neoclassical framework. Demand-side growth theories and the role of exports will be covered in Section 2.3 and Section 2.4 will outline key theories of the role of exports in economic growth from the perspective of Development Economics. Finally, Section 2.5 concludes the discussion on the main theories of exports and economic growth and presents the foundation for the discussion of the evolution of trade policy in South Africa that follows in Chapter 3.

2.2 THE NEOCLASSICAL FRAMWORK OF EXPORTS AND ECONOMIC GROWTH

2.2.1 Introduction

The neoclassical theory of export-led growth argues that export promotion is the "ideal cure for stagnation in an uncompetitive and low-productivity protected economy" (Abedian and Standish, 1992:100). Proponents of the 'new conventional wisdom' of the neoclassical trade strategy believe that export-led growth generates flexibilities that shift an economy's resources according to patterns of comparative advantage (Tyler, 1981:1 & World Bank, 1987:81). However, the effect of trade liberalisation according to comparative advantage also implies that current production patterns will be entrenched, whether this is beneficial for the long-run development path of the economy or not (Krugman, 1987:41). In the context of the South African experience, the enforcement of the current dominance of the minerals-energy complex (MEC) is unlikely to be desirable, since potential for significant labour absorbing growth instead lies in the expansion of the manufacturing sector (Hirsch, 2005:112).

A review of the notable supply-side theories of export-led growth will follow below. First, the precursors of neoclassical theories of export-led growth will be outlined in Section 2.2.2, followed by the key supply-side arguments in support of export-led growth, which will be discussed in Section 2.2.3. A production function-type model, which is commonly used in empirical studies on the topic, will be discussed in Section 2.2.4. This model is particularly relevant for this study, as it will also form the basis of the study's empirical analysis for

South Africa. Section 2.2.5 will conclude with common criticisms of the export-led growth model within the neoclassical framework.

2.2.2 Precursors to neoclassical theory of export-led growth

Classical Economics provided the bedrock ideas that allowed for the emergence of economics as a separate field of enquiry. As Cypher and Dietz (2004:104) highlight, the classical economists were interested in addressing a wide range of economic and social questions from a highly macro-oriented point of view. The possibility of mutual gains from trade contributing to higher economic growth was first considered by them, laying the foundations for subsequent investigations of the links between exports and economic growth (Myint, 1958:318). In particular, the writings of Adam Smith (1776) and David Ricardo (1817) were central in establishing the concept of specialisation, that is, the division of labour both within and among economies, and its role in allowing for the enhancement of the skills and knowledge required for production (Szentes, 2005:147). The idea was that through the process of international trade arising out of an 'absolute advantage' (Smith) or 'comparative advantage' (Ricardo), specialisation could contribute to the social surplus and hence the accumulation of wealth (Szentes, 2005:147). In contrast, the neoclassical economists shifted their attention away from the macroeconomics of growth towards a pragmatic exploration of the market economy with a strong focus on the issue of efficiency that was analysed from a static and marginalist perspective (Cypher and Dietz, 2004:105). Thus, neoclassical economists tended to stress the role of factor endowments and their related marginal productivities within the growth process of the economy (Szentes, 2005:152). It follows that the rate of growth a country could achieve depended not only on factor endowments and the marginal productivity of these factors, but also on the efficiency of these factors of production, which in turn was determined by technological progress, human capital, income distribution, and so on. (Szentes, 2005:152). Therefore, neoclassical growth theory is decidedly supply-oriented.

It is important to note that although supply-oriented growth economics attaches great importance to the role of trade and export expansion within the overall growth process of an economy, neoclassical economics, at first, focused less on growth and development questions and instead emphasised the importance of static, allocative issues (Cypher and Dietz, 2004:120). As Cypher and Dietz (2004:105) highlight, growth and development "disappeared from view for quite some time." When neoclassical economics did address growth questions, such as through Solow's (1956) growth model and its extensions, it retained the closed

economy as a critical assumption (Boianovsky and Hoover, 2009:20). Moreover, several authors have noted that developments in the field of growth economics and international trade economics following in the neoclassical tradition have tended to remain remarkably disconnected (Cuñat and Maffezzoli, 2004:707 & Myint, 1987:116-18). Few integrated models exist, although studies by Cuñat and Maffezzoli (2004), or more recently Bajona and Kehoe (2010) and Kiyota (2012) address the need to bridge both fields through the derivation of stylized dynamic macroeconomic models, which incorporate the results of the dynamic Heckscher-Ohlin model and allow for the possibility of multiple equilibria and multiple cones, such that countries' factor endowments occur in different cones of diversification. Hence, free trade equilibrium is no longer linked to factor price equalisation and instead factor price differences are sustained, as is often observed in reality (Bernhofen, 2009:266).

2.2.3 Supply-side arguments in support of export-led growth

Despite reluctance to integrate these two fields, trade economics and growth economics within neoclassical economics, supply-oriented economics has put forward a number of reasons why export expansion is beneficial to economic growth and could even serve as an exogenous driving force.

In the tradition of Smith's (1776) theory that openness to trade encourages the accumulation of wealth, neoclassical economists have since emphasised the role of exports in driving higher economic growth (Srinivasan, 2001:7). It is thought that the exposure to large foreign markets leads to an improved allocation of given resources in accordance with comparative advantage – an idea regularly associated with David Ricardo (Ram, 1985:415 & Szentes, 2005:147). Thus, the expansion of export industries leads to increases in total factor productivity (TFP) by shifting resources from sectors of low-productivity to sectors of higher productivity (Yaghmaian and Ghorashi, 1995:39). 'New' new trade theory, which emphasises the role of the firm in international trade and hence emphasises the trade-productivity nexus (Ciuriak, Lapham, Wolfe, Collins-Williams and Curtis, 2011:1), also suggests that trade promotes productivity improvements by reallocating output shares towards more efficient firms (Harrison and Rodríguez-Clare, 2009:59). The model developed by Melitz (2003) incorporates firms that are endowed with varying productivity levels, remaining constant over time. The model showed that a country that opens up to trade will find that only the productive firms stay in the market, whereas the least productive firms are forced to exit (Melitz, 2003:1695). The study also showed that through trade-induced productivity growth following from such reallocations, trade can add to the welfare gain (Melitz, 2003:1718).

Furthermore, productivity gains may be derived from the adaptation and reshaping of the economy's productive structure that results from the trade-induced process of specialisation (Cypher and Dietz, 2004:107). In the words of Adam Smith (1776:413), expanding export industries implies that:

> "…the narrowness of the home market does not hinder the division of labour in any particular branch of art or manufacture from being carried to the highest perfection. By opening a more extensive market for whatever part of the produce of their labour may exceed the home consumption, it encourages them to improve its productive powers…"

Since Myint's (1958) seminal paper on classical development theory and international trade, Smith's idea that by widening the extent of the market, exports can facilitate further division of labour, hence raising the overall level of productivity in the economy, is referred to as the 'productivity theory'. Importantly, Smith's productivity theory puts forward a dynamic view of trade-induced productivity growth that goes beyond the static gains from specialisation reflected by a movement along the production possibilities frontier (PPF). Thus, the productivity theory views exports as a dynamic force that through extending the market and thus scope for the division of labour, improves the skills of workers, fosters technological innovations, and hence generally allows the trading country to benefit from increasing returns to scale and economic development (Myint, 1987:121). As such, the productivity gains, which irreversably shift the PPF outwards, are indirect gains that go beyond the once-off gains realised via comparative advantage (Myint, 1987:121).

Increased specialisation may not only induce higher capacity utilisation (Tyler, 1981:127), but could also promote greater X-efficiency (Bhagwati, 1988:38). In contrast to import-substituting regimes, it is believed that export-promoting economies would find that sheltered and monopolistic industrial structures are dismantled when trade is liberalised (Bhagwati, 1988:39). As such, following in the tradition of Adam Smith, the power of increased competition via free trade is highlighted, as it is seen as a regulating force that optimises the operation of the market, thereby maximising the social benefit (Cypher and Dietz, 2004:106). Intensified competition may foster innovative activity, or could result in reduced prices for consumers (Harrison and Rodríguez-Clare, 2009:59). Furthermore, enhanced competition through increased trade is also likely to minimise unproductive profit-seeking and rent-seeking activities (Bhagwati, 1988:37). Directly unproductive profit-seeking (DUP) activities divert resources from their most productive use towards unproductive yet profitable activities

for lobbies working to change policies in their favour (Moreno-Brid and Caldentey, 2011:407). Bhagwati (1988:37) identifies import-substituting regimes as most likely to trigger DUP activities, since rent-seeking activities, where lobbies chase rents associated with import licenses, are generally more pronounced in import-substituting regimes than export-promoting regimes. Overall, the diversion of resources into DUP activities adds to losses that already tend to arise from the chaotic pattern of incentives associated with import-substituting strategies (Moreno-Brid and Caldentey, 2011:406). To illustrate the chaotic nature of differential incentives on different activities within import-substituting economies, the concept of effective rates of protection (ERP) is often used to highlight the distortions in incentives against the export sector (Holden, 2005a:778). Export-oriented industrialisation is usually suggested as a strategy for overcoming the potential costs associated with import-substituting regimes (Moreno-Brid and Caldentey, 2011:407).

For economies operating below full capacity, Smith's (1776) 'vent for surplus' theory offers particularly relevant insights. As Myint (1958, 1987) highlights, international trade overcomes the restrictions of the domestic market and offers an outlet for the surplus product over and above demand at home. In the words of Smith (1776:413), export expansion

> "…carries out that surplus part of the produce of their land and labour for which there is no demand among them, and brings back in return for it something else for which there is demand. It gives a value to their superfluities, by exchanging them for something else, which may satisfy a part of their wants, and increase their enjoyments."

Therefore, from the perspective of a country adopting an export-oriented industrialisation strategy, moving out of isolation, the surplus of productive capacity fit for the global market presents itself as a virtually 'costless' way of attaining imports and expanding economic activity at home (Myint, 1958:322). Thus, it may even be the case that the immediate gains from using previously underutilised capacity, that is, moving from within the PPF towards the theoretical optimum will far exceed the gains from a more favourable allocation of given resources according to comparative advantage (Myint, 1987:121). Hence, the role of export expansion is crucial regarding aims to increase employment in labour surplus countries (Balassa, 1978:181).

Particularly in relation to import-substituting countries, export-oriented economies may find that foreign investment is more forthcoming. By not being aimed merely at the domestic market, as in the case of an import-substituting economy, foreign investment would no longer be constrained by a lack of effective demand in the long-run (Bhagwati, 1988:38).

Econometric evidence tends to support the contention that foreign investment is positively related to export expansion and openness to trade (see, for example: Culem, 1988 & Sharma, Nayagam and Chung, 2012). Not only foreign investment could exhibit a positive relationship with export expansion, but so could domestic investment. Indeed, the export-investment relationship tends to hold empirically, particularly when export expansion is centred on manufacturing goods (Ibarra, 2010:439). In general, 'export-led investment' may play an important role in an economy's growth process. It is clear that faster economic growth depends on strong investment spending (Gutiérrez, 2005:5 & Kwan, Yangru and Zhang, 1999:67), both because investment is an important source of aggregate demand (a channel that will be discussed in the next section) and because it expands productive capacity and encourages the integration of new technology (Ibarra, 2010:457). The idea that export-expansion could promote faster economic growth by triggering the necessary investments in technological improvements, which result from pressures of international competition, is well documented in studies of export-led growth (Balassa, 1978:181 & Bhagwati, 2007:63-4).

Further arguments in support of the pursuit of export-led growth include the idea that an export-oriented economy allows firms to reap the benefits of economies of scale (Balassa, 1978:181; Bhagwati, 1988:38 & Harrison and Rodríguez-Clare, 2009:59), as well as positive inter-sectoral externalities associated with a booming export industry (Tyler, 1981:127). For example, stronger competition in the export sector may raise efficiency for non-exported products, thus contributing to higher overall welfare at home. Furthermore, there are potential technological, managerial and informational spill overs from the export sector that could lift productivity in the domestic non-export sector, as well as encourage domestic firms to start competing globally, thus raising overall productivity (Hutchison and Singh, 1992:79 & Kneller and Pisu, 2007:131). The idea that export expansion supports the formation of knowledge and human capital in a manner that benefits all firms and leads to economy-wide productivity gains is closely linked to the endogenous growth theory, which emphasises external economies of scale in a neoclassical growth model (Marin, 1992:678).

Technological and informational spill-overs are also possible internationally and are not limited to one particular economy. Harrison and Rodríguez-Clare (2009:58) argue that gains from trade may be derived from imported goods that embody new technology. Thus, trade functions as a vehicle for 'international R&D spill-overs'. By importing capital and intermediate products, an economy can benefit from technological progress achieved in the exporting country (Eaton and Kortum, 2001:754). The idea is that trade enhances the

movement of ideas and flow of technical know-how in particular (Harrison and Rodríguez-Clare, 2009:58). Export-oriented growth and openness to trade may also support economic growth via productivity gains that accrue when firms gain access to intermediate inputs from abroad. Empirically, it has been found that increased access to intermediate inputs is linked to large productivity gains (see, for example: Halpern, Koren and Szeidl, 2005).

Learning by doing through exporting is another likely channel through which export expansion can promote higher levels of productivity and hence economic growth (Harrison and Rodríguez-Clare, 2009:61). It has been found that the most productive firms are selected into exporting, leading to a significant correlation between productivity levels and export status (see, for example: Delgado, Farinas and Ruano, 2002). However, particularly in the context of developed economies, exporting firms do not necessarily exhibit improvements in productivity over time (Pavcnik, 2002:264). For developing countries, stronger evidence of learning through exporting has been detected than in developed countries (Harrison and Rodríguez-Clare, 2009:61). The idea is that lower productivity firms (more likely to be located in developing economies) will tend to invest and learn in order to achieve the required level of competitiveness necessary to compete in international export markets – in contrast to high productivity firms (likely to be situated in developed economies) that are immediately able to export without further investment efforts (Lileeva and Trefler, 2010:1053). The significant causal link between export status and productivity in developing economies could suggest that such countries have much more to gain from exposure to export markets than developed and middle income countries (Harrison and Rodríguez-Clare, 2009:62). As a result, Harrison and Rodríguez-Clare (2009:63) conclude that learning from exporting and hence gains from openness to trade are more likely in technologically less developed economies and among less productive firms.

2.2.4 A production function-type model of export-led growth

The positive influence that export growth can have on total factor productivity warrants the inclusion of exports as an additional variable in a production function-type relationship (Michalopoulos and Jay, 1973:4). In other words, due to concepts of comparative advantage and production efficiency, it can be argued that exports are a production input, since exports affect the amount of aggregate output for a given level of capital and labour (Ram, 1985:418). Using a production function-type model that includes explanatory variables such as domestic and foreign investment and labour together with exports has the advantage of

overcoming the obvious model misspecification error that occurs when attempting to explain economic growth in terms of export growth only (Balassa, 1978:185).

In the standard neoclassical growth model, if marginal productivity rises as a result of technological progress for example, then a sustained increase in output is possible (Solow, 1956 & Swan, 1956). Such a process is illustrated by a shift upwards of the production function and a shift rightwards of the aggregate supply curve, reflecting the resulting increase in output. The export-led growth hypothesis in neoclassical growth theory is thus based on the premise that the positive externalities induced by an expansion of the export sector will lead to faster growth in factor productivity, which in turn causes a long-term increase in aggregate output, such as in the case of technological progress (Dutt, 2005:100; Michalopoulos and Jay, 1973:2 & Myint, 1987:118).

In sum, the basis for higher growth rates within the supply-side view of economic growth is the expansion of productive capacity, in other words, supply-side factors determine the rate of growth. The relevance of the neoclassical perspective on economic growth for South Africa can easily be highlighted by using the example of the mining and energy sectors. The exploitation of mineral resources in tandem with lavish use of water and electricity for purposes of extraction and beneficiation are likely to be unsustainable in the future. This means that supply factors play a significant role either in enabling the economy to achieve its capacity growth rate, or holding it back from its potential. Similarly, the impact of the electricity crisis of 2008 highlights that supply constraints can represent a significant limit to higher economic growth, as neoclassical growth economics predicts (Freund and Witt, 2010:63).

(i) Model specification

Given that export production within the neoclassical model of export-led growth is often treated as similar to a production input, Ram (1985:417) proposes that the aggregate production function would simply take the form:

$$Y = f(L, K, X) \tag{2.2.1}$$

where Y is aggregate real output, L is labour input, K is capital input, and X represents exports.

Equation 2.2.1 can be rewritten in terms of growth rates, where a dot over a variable shows its rate of growth:

$$\dot{Y} = \beta_0 + \beta_1 \dot{L} + \beta_2 \dot{K} + \beta_3 \dot{X} \quad (2.1.2)$$

where $\beta_1, \beta_2, \beta_3$ are the elasticities of output with respect to the factor inputs $L, K,$ and X.

Since the rate of change of capital input is difficult to determine, Ram (1985:417) proposes replacing $\dot{K}$ by the more available variable $\Delta K/_Y$, which reflects the investment-income ratio. Thus, Equation 2.2.2 can be transformed as:

$$\dot{Y} = \beta_0 + \beta_1 \dot{L} + \frac{\partial Y}{\partial K} \times \frac{K}{Y} \times \frac{dK}{K} + \beta_3 \dot{X} \quad (2.2.2a)$$

or replacing dK by I,

$$\dot{Y} = \beta_0 + \beta_1 \dot{L} + \alpha_2 \frac{I}{Y} + \beta_3 \dot{X} \quad (2.2.2b)$$

where α_2 is the marginal physical product of capital.

Though the model specification is not all encompassing, it may nevertheless be a sufficiently reasonable specification to investigate the direction and magnitude of the effect that export growth has on economic production by analysing the estimated coefficient of $\dot{X}$ (Ram, 1985:418). Using the model estimated in Equation 2.2.2b, Michalopoulos and Jay (1973:7) suggest that it is possible to test the hypothesis that, *ceteris paribus*, the greater the rate of growth of exports, the faster the rate of growth of productivity, and hence the rate at which overall efficiency in resource utilisation rises over time due to participation in international trade. The crucial link between economic growth and export growth thus appears to be exports-induced productivity growth (Michalopoulos and Jay, 1973:22).

A similar approach of modelling export-led growth is used by Cipamba and Cipamba (2013:6), who base their model on the assumption that a successful expansion of the export sector of an economy can raise long-run growth through increases in total factor productivity (TFP) – a distinctly supply-side perspective of economic growth. Contrary to the model developed by Ram (1985), the derivation shown below provides a more explicit understanding of the transmission of productivity gains to economic growth as a result of expanded trade activities, including the impact of both exports and imports. The idea that TFP spill overs from the export sector into the rest of the economy exist, raising the returns of production, mirrors the arguments of several authors going back to Smith (1776) for example, but continues to be relevant in recent studies such as Harrison and Rodríguez-Clare (2009) and Ibarra (2010). In such studies of exports and economic growth, growth is modelled as follows:

$$Y = Af(L, K) \tag{2.2.3}$$

where A represents TFP, Y is output (GDP), L is labour and K is the stock of capital.

Since A accounts for the dynamic productivity gains derived from exporting and importing, similarly to Herzer, Nowak-Lehmann and Siliverstovs (2006), Cipamba and Cipamba (2013:6) propose that A be modelled as a function of both exports and imports. Thus:

$$A = f(X, M) \tag{2.2.4}$$

where X denotes exports and M represents imports.

Why it makes economic sense that productivity would be positively affected by larger trade flows was discussed in Section 2.2.3. Cipamba and Cipamba (2013:7) proceed to substitute Equation 2.2.4 into Equation 2.2.3 and taking logarithms, the authors arrive at the following model:

$$logY_t = \alpha + \beta logK_t + \gamma logL_t + \delta logX_t + \theta logM_t + \epsilon_t \tag{2.2.5}$$

where α is a constant, the coefficients β, γ, δ and θ are elasticities of production with respect to K, L, X and M, and ϵ_t is the stochastic error term that captures the impact of all other explanatory factors.

Herzer *et al.* (2006:311) argue that it is problematic that the national accounting identity of output already includes exports as a component thereof. The natural positive correlation between exports and output that would arise automatically could be misinterpreted as necessary improvements in productivity (Herzer *et al.*, 2006:312). A common strategy to overcome this problem and thereby to isolate the influence of exports on economic growth beyond the natural positive influence that is assured in the first place, is to use a measure for economic growth that excludes exports from its calculation, for example GDP net of exports or NY= Y-X (Cipamba and Cipamba, 2013:7; Herzer *et al.*, 2006:312 & Rangasamy, 2009:607). Therefore:

$$logNY_t = \alpha + \beta logK_t + \gamma logL_t + \delta logX_t + \theta logM_t + \epsilon_t \tag{2.2.6}$$

where NY is output net of exports $(Y - X)$.

Equation 2.2.6 may be estimated to measure the impact of rising exports on economic growth via the channel of increased productivity (Herzer *et al.*, 2006:312). The model in Equation 2.2.6 will form the basis of this study's empirical analysis of exports and economic growth in

South Africa. However, the model will be adjusted slightly to account for a wider range of important explanatory factors within South Africa's growth process (see Chapter 5).

2.2.5 Criticism of the export-led growth model within the neoclassical framework

Dodaro (1991:1162) contends that 'getting the prices right' by pursuing export-led growth is likely to be more successful when countries have achieved a certain level of development, which is reflected by the level of per capita GNP. This view is based on the positive link that has been found to exist between the level of development and the proportion of manufactures in a country's export basket and in turn the link between the proportion of manufacturing goods and economic growth. This suggests that support for the export-led growth hypothesis depends on the achievement of a minimum level of economic development and industrial efficiency that allows countries to compete in world markets (Dodaro, 1991:1159). Yaghmaian and Ghorashi (1995:40) argue that only after firms have gained a competitive edge will they enter the international market in pursuit of higher demand for their products. Thus, the expansion of the exports market follows logically from the successful industrialisation and development of the economy. An alternative to the export-led growth theory is therefore that both exports and GDP growth are preceded or caused by a process of economic development and structural change (Yaghmaian and Ghorashi, 1995:40). Furthermore, this could mean that for poorer developing countries, the benefits of export-led growth may be far less pronounced, since they have not reached a phase of industrialisation that allows them to take advantage of economies of scale and the positive externalities associated with a larger export market (Dodaro, 1991:1162). In other words, there is a caveat related to the neoclassical argument of export-led growth, which is that certain preconditions such as sufficient development are necessary to drive the successful realisation of export-driven growth (Jurajda and Mitchell, 2003:137). This conclusion stands in contrast to that of the new orthodoxy, which assumes that the efficiency and specialisation effects of the international trading system will contribute to growth regardless of the developmental stage that a country has reached. In the context of persistent trade barriers to international trade, export-led growth may be particularly challenging if it is based on a passive strategy of getting the prices right that essentially involves only "limited government intervention in the resource allocation process and low levels of price distortion" within the export sector (Dodaro, 1991:1153).

2.2.6 Conclusion

The question whether the neoclassical theory of export-led growth is perhaps less applicable in the developing country case than in the developed country scenario will be further discussed in the following sections and particularly in Section 2.4 outlining development theories of export-led growth. Although there may be caveats related to the neoclassical approach, as outlined in Section 2.2.5, it is nevertheless clear that it offers highly valuable insights into the ways in which stronger export growth could be linked to improved productivity and hence higher economic growth. Furthermore, the simplicity of the production function-type model explains why the majority of empirical studies prefer to make use of the neoclassical model for empirical tests, in spite of an awareness that such models may not always provide a fit that perfectly mirrors the real dynamics of economic growth. Since a number of measures can be taken alleviating the imperfections inherent to the production function approach to testing the export-led growth hypothesis empirically, the benefits of applying the production function approach prevail. The adoption of the production function-type model, as well as measures employed to improve the applicability of the model to the case of South Africa, will be discussed further in Chapter 5.

2.3 DEMAND-SIDE GROWTH THEORIES AND THE ROLE OF EXPORTS

2.3.1 The Kaldorian Growth Model

Several economists have criticised the application of neo-classical models to the analysis of the link between exports and economic growth (Chenery, 1960; de Melo and Robinson 1992; Harrod, 1933 & Prebisch, 1950). Neoclassical growth theory, developed by economists such as Solow (1956) and Swan (1956), accords no role to balance of payments considerations or the growth of demand (Thirlwall, 2011:311). Within the orthodox model of long-run economic growth, the balance of payments is seen as self-adjusting and growth of supply is believed to generate sufficient demand (Thirlwall, 2011:311). In the words of John Stuart Mill (1844:48), “consumption never needs encouragement”.

Major protagonists of the discussion on the export-led growth strategy, such as Kaldor (1966), disagree with the view that demand does not matter for growth and instead adopt the Hicksian view that the growth of autonomous demand determines the long-run rate of output (Hicks, 1950:61). Kaldor (1966:114) argues that in the open economy the main aggregate demand factor that will fundamentally determine the growth of demand and therefore overall growth will emanate from outside the region, in other words, demand for exports is the key

driver of regional growth. Moreover, Kaldor (1966) proposes that a fast rate of growth of exports and output can kick-start a virtuous cycle of growth, via the link between output growth and productivity growth, which is summarised by Verdoorn's Law (Thirlwall and Dixon, 1979:346). The standard Kaldorian growth model, describing the virtuous growth cycle linking export growth and output growth, is based on four structural equations (Roberts, 2007:623):

$$g_t = \gamma x_t \tag{2.3.1}$$

$$x_t = -\eta \pi_{t-1} + \delta \pi_f + \epsilon g_f \tag{2.3.2}$$

$$\pi_t = w + \tau - r_t \tag{2.3.3}$$

$$r_t = r_e + \lambda g_t \tag{2.3.4}$$

As Roberts (2007:623) outlines, output growth, g_t, is a positive linear function of the growth rate of real demand for exports, x_t. Export growth, in turn, is determined by changes in the relative price competitiveness of the domestic economy relative to foreign economies and the growth rate of real income in foreign export markets, g_f. Changes in competitiveness are represented by the negative effect of domestic price inflation, π_{t-1}, and the positive effect of price inflation of foreign trade partners, π_f. The income elasticity of demand for the economy's exports, ϵ, which is a function of the non-price competitiveness of domestic exports, determines the magnitude of the change in x_t that results from a change in world income, g_f (Thirlwall, 1997:383). Equation 2.3.3 reflects that price competitiveness, π_t, is a function of the rate of growth of nominal wage inflation, w, the rate of growth of mark-up pricing, τ, which is expected to arise in an imperfectly competitive export sector, and the rate of labour productivity growth, r_t. The final equation of Kaldor's model, Verdoorn's Law, describes the long-run positive relationship between r and g. The link between labour productivity growth and output growth is given by the 'Verdoorn coefficient', λ, assumed to arise out of static and dynamic economies of scale and r_e, which captures exogenous determinants of labour productivity growth.

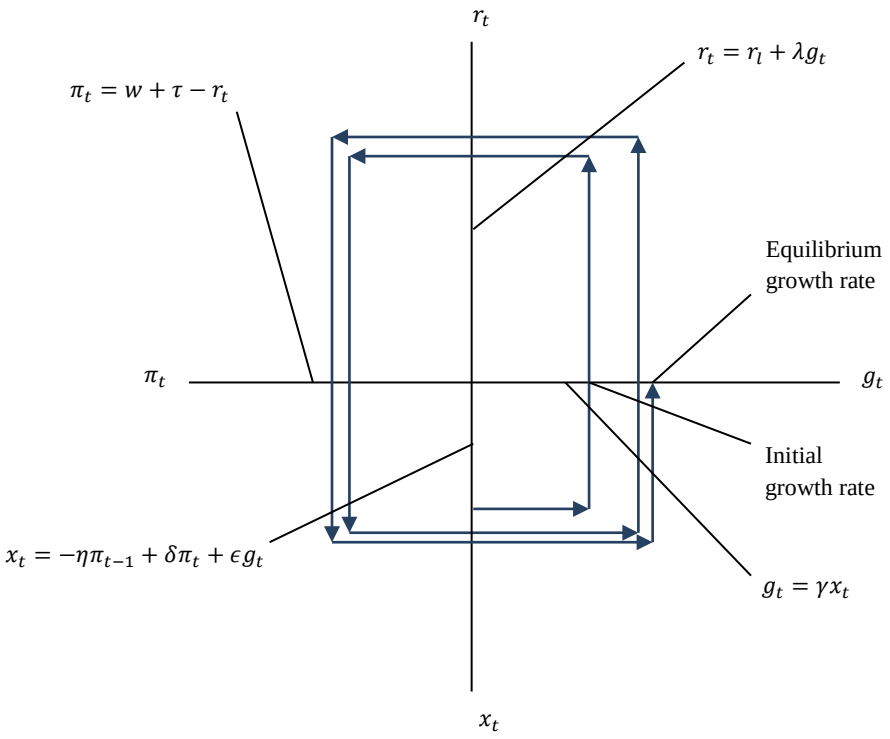

Figure 2.1. Kaldorian growth model
Adopted from Dixon and Thirlwall (1975:207)

Figure 2.1 illustrates Kaldor's circular, causative process of growth, initiated by export growth (Dixon and Thirlwall, 1975:207). The equilibrium growth rate is shown to depend on the parameters of Kaldor's growth laws and the Verdoorn effect (Equation 2.3.4) (Dixon and Thirlwall, 1975:207). Furthermore, the specification of Kaldor's four equation model assumes that changes in competitiveness (π_t) affect exports (x_t) with a lag of one period. This lag, which introduces the transitional dynamics of the model, can easily be justified by the presence of recognition and delivery lags in the export sector (Roberts, 2007:623). The circular, causative growth model shows that more rapid export growth ($\uparrow x_t$) is directly linked to faster output growth ($\uparrow g_t$) via Keynesian multiplier effects, increased capacity utilization and stimuli to investment (Blecker, 2013:5). While export growth already directly causes a rise in output growth, the transmission mechanism that follows leads to further ripple effects, which support higher economic growth. Hence, faster output growth ($\uparrow g_t$) causes faster labour productivity growth ($\uparrow r_t$) due to increasing returns to scale and induced technological innovation – a process that is encapsulated by Verdoorn's Law (Blecker, 2013:34). In turn, faster labour productivity growth ($\uparrow r_t$) leads to mark-up pricing above unit labour costs that in turn leads to increased competitiveness or faster real currency depreciation ($\uparrow \pi_t$). Exports will benefit from increased competitiveness and the cycle would start again. Dixon and

Thirlwall (1975:203) employed the above circular structural equation model, as well as other, early models of export-led growth within the demand-side paradigm, as a basis for their derivation of a balance of payments constrained model of export-led growth.

In Section 2.3.2 the early models of export-led growth within the demand-side perspective will be outlined, which will be followed by Dixon and Thirlwall's (1975) algebraic formalisation of the Kaldorian export-led growth model in Section 2.3.3. Sections 2.3.4 to 2.3.7 will derive Thirlwall's Law and will draw parallels between his growth law and other models of economic growth and trade. Particularly important extensions of Thirlwall's model will be reviewed in Section 2.3.8 and the implications of this model for policy formation in the developing economy setting, outlined in Section 2.3.9, will conclude the discussion of export-led growth in the demand-side framework.

2.3.2 Additional early models of export-led growth within the demand-side perspective

Several other authors, including Lamfalussy (1963) and Beckerman (1962), put forward models aiming capture the dynamics of growth in open economies, thereby laying the foundation for later efforts to derive a balance of payments constrained growth model. Lamfalussy (1963), one of the first economists to advocate the export-led growth theory, bases his model of growth on the idea that higher exports are likely to induce higher investment spending that leads to improvements in productivity, lower export prices and thus higher export demand. Therefore, he proposes that exports can set off a virtuous circle of growth that is essentially self-sustaining (Lamfalussy, 1963:110). In addition, Lamfalussy (1963:57) notes that imports should be seen as a requirement for growth. If exports rise too slowly in relation to import requirements, growth has to be curtailed to avoid running into balance of payments difficulties, holding all else constant. If achieving a consistent capital account surplus to counteract the trade deficit is not possible and the exchange rate is unlikely to weaken sufficiently, then consumer demand (and growth) must be reduced in order to lower the imbalance between exports and imports and the resulting trade deficit. Another important reason Lamfalussy (1963:129) puts forward in support of the export-led growth theory, which echoes that of the neoclassical perspective, is that a small domestic market necessitates export-driven production in order to enable firms to reap economies of scale in production.

Similarly to Lamfalussy, Beckerman (1962:923) envisages a virtuous growth circle that is triggered by export growth. If demand is a fundamental determinant of investment and

growth and an important component of aggregate demand is exports, then a high level of export demand is favourable to economic growth. Beckerman (1962:920-1) suggests that faster export growth can lead to faster productivity growth. Accelerated productivity growth produces lower relative wage costs (if wages do not rise in line with productivity) and lower rates of domestic price increases that will stimulate export growth. Increased economic growth, in turn, contributes to increases in competitiveness and hence export demand. Beckerman's model, which has been adjusted and developed further by Thirlwall and Dixon (1979:178), reveals the possible links between export growth, labour productivity and competitiveness.

Let export growth be:

$$x = a_0 - b_0(p_d - p_f);\ a_0 > 0, b_0 > 0 \tag{2.3.5}$$

where x is the rate of growth of exports, p_d is the rate of growth of domestic prices, p_f is the rate of growth of foreign prices, a_0 is the rate of growth of exports determined by other factors (e.g. the growth of world income).

Estimating the rate of growth of labour productivity yields:

$$r = a_1 + b_1(x);\ b_1 > 0 \tag{2.3.6}$$

where r is the rate of growth of labour productivity.

The growth of wages is estimated as:

$$w = a_2 + b_2(r); 0 < b_2 < 1 \tag{2.3.7}$$

where w is the rate of growth of wages and $p_d = w - r$.

Substituting gives an expression for the equilibrium rate of growth of exports:

$$x = \frac{a_0 - b_0(a_2 - a_1 + b_2 a_1) + b_0(p_f)}{1 + b_0 b_1(b_2 - 1)} \tag{2.3.8}$$

It is important to note that in the above model (Equation 2.3.8), the virtuous circle of growth through exports depends critically on the condition that the rate of wage increases is lower than the rate of productivity increases. In other words, if $b_2 = 1$, then the circular process

would cease to exist and there would be "no induced rate of growth of exports from the initial expansion of exports itself" (Thirlwall and Dixon, 1979:178).

2.3.3 Dixon and Thirlwall's (1975) algebraic formalisation of the Kaldorian export-led growth model

To clarify the structure of the demand-side growth model and to highlight the main determinants of growth-rate differences among different economies, Dixon and Thirlwall (1975:203-5) further formalise Kaldor's views on the export-led growth model. Consider:

$$g_t = \gamma(x_t) \quad \textbf{Error! Bookmark not defined.} \tag{2.3.9}$$

where g_t is the rate of growth of output in time t, x_t is the rate of growth of exports in time t and γ is the elasticity of output growth with respect to export growth.

The export demand function is estimated such that the rate of change of export demand is related to the rate of change of domestic and foreign prices and the rate of growth of world income, therefore:

$$X_t = P_{dt}^{\eta} P_{ft}^{\delta} (Z^{\epsilon})_t \tag{2.3.10}$$

where X_t is the quantity of exports in time t, P_{dt} is the domestic price in time t, P_{ft} is the competitor's price in time t, Z_t is the level of world income in time t, η is the price elasticity of demand for exports, δ is the cross elasticity of demand for exports, and ϵ is the income elasticity of demand for exports.

From Equation 2.3.10, the rate of growth of export demand can be estimated as:

$$x_t = \eta\,(p_d)_t + \delta\,(p_f)_t + \in (z)_t \tag{2.3.11}$$

where lower case letters represent rates of growth of the variables of Equation 2.3.10.

To estimate domestic (export) prices, Dixon and Thirlwall (1975:204) use a mark-up pricing equation:

$$(P_d)_t = \left(\frac{W}{R}\right)_t (T)_t \tag{2.3.12}$$

where P_{dt} is the domestic price in time t, W_t is the level of money wages in time t, R_t is the average product of labour in the export sector in time t and T_t is the $1 + \%$ mark-up on unit labour costs in time t.

The rate of change of domestic export prices is estimated as:

$$(p_d)_t = (w)_t - (r)_t + (\tau)_t \tag{2.3.13}$$

where lower case letters represent rates of growth of the variables of Equation 2.3.8.

In order to make the model circular and cumulative, Verdoorn's Law, which is that "the growth of labour productivity is partly dependent on the growth of output itself" (Dixon and Thirlwall, 1975:205), is integrated into the model:

$$r_t = r_\alpha + \lambda(g)_t \tag{2.3.14}$$

where r_α is the rate of autonomous productivity growth and λ is the Verdoorn coefficient.

By integrating Equations 2.3.9, 2.3.11, 2.3.13 and 2.3.14, Thirlwall and Dixon (1975:205) obtain the equilibrium growth rate:

$$g_t = \gamma \frac{[\eta(w_t - r_\alpha + \tau_t) + \delta(p_f)_t + \epsilon(z)_t]}{1 + \gamma\eta\lambda} \tag{2.3.15}$$

The algebraic model in Equation 2.3.15 shows that since the price elasticity of demand for exports, η, is expected to be negative, the growth rate, g_t, varies positively with r_α, z, ϵ, δ, p_f, and λ, and negatively with w and τ (Dixon and Thirlwall, 1975:205). Equation 2.3.14 provides the crucial connection between exports and economic growth via productivity growth. It is because of the Verdoorn effect that rising growth rates (via a high income elasticity of demand, ϵ, for example) would lead to higher productivity growth through a reduced pace of price increases, thus leading to a higher rate of growth of exports and hence output. In that way, the proposed model shows that the Verdoorn relation can play a sustaining role in the overall growth process (Dixon and Thirlwall, 1975:206).

2.3.4 The relevance of the balance of payments constraint in export-led growth models

A major reason in support of the export-led growth strategy is that export growth is the only component of aggregate demand that can relax the balance of payments constraint on economic growth (Thirlwall and Dixon, 1979:173). Caves (1970:234), for example, questions

why exports are given such a prominent role in driving growth compared to other components of aggregate demand. As Thirlwall's model of export-led growth clarifies, only exports can lift a balance of payments constraint on aggregate demand, whereas the growth of any other component of demand has strictly negative balance of payments implications (Thirlwall, 2011:327). Nevertheless, it is important also to consider the possibility that the rate of growth, which is achieved via export growth, induces import growth that exceeds the rate of growth of exports. This would impose a constraint *even on export-led growth*, given that the balance of payments equilibrium must be maintained (Thirlwall and Dixon, 1979:173).

Thirlwall and Dixon (1979:175) discuss the idea that for countries with perpetual balance of payments difficulties and high unemployment, the attractiveness of export-led growth lies in the possibility of moving from a scenario where actual growth is constrained by both the growth rate consistent with balance of payments equilibrium and by the capacity growth rate, to a scenario where the balance of payments equilibrium growth rate exceeds the capacity growth rate (see scenario (v) below). This would allow countries to achieve their respective capacity growth rates without first running into balance of payments difficulties that put a ceiling on growth. The likely scenarios are (Thirlwall and Dixon, 1979:175):

(i)	$y_B = y_A = y_C$	Balance of payments equilibrium and full employment
(ii)	$y_B = y_A < y_C$	Balance of payments equilibrium and growing unemployment – a long-run possibility
(iii)	$y_B < y_A = y_C$	Increasing balance of payments deficit and full employment
(iv)	$y_B < y_A < y_C$	Increasing balance of payments deficit and growing unemployment – a short-run possibility
(v)	$y_B > y_A = y_C$	Increasing balance of payments surplus and full employment

where y_B is the balance of payments constrained growth rate, y_A is the actual growth rate, and y_C is the growth of productive capacity (the maxiumum growth rate).

As Felipe, McCombie and Naqvi (2010:479) explain, a country experiences balance of payments constrained growth when its actual growth rate, y_A, balances the current account in the long-run and y_A is below the capacity growth rate, y_C (ii). If a country can sustain a growing balance of payments deficit for a limited amount of time, then balance of payments constrained growth may also be denoted by representation (iv). The idea behind the above

representations of balance of payments constrained growth is that there are underutilised resources in every economy that production could draw upon if there were sustained increases in the growth of demand (Felipe *et al.,* 2010:479). In addition to promoting scenario (i) or (v), export-led growth has the potential to create a general upswing in an economy at full employment, such that the capacity growth rate is pushed outwards further (Thirlwall and Dixon, 1979:175). In the case of Japan, for example, export growth raised the capacity growth rate by encouraging investment that contributed to accelerated technical progress (Thirlwall and Dixon, 1979:175). The supply of labour increased, as people entered the workforce who were previously outside. Factors of production moved from sectors of low productivity to high productivity and the economy's ability to import more goods and services improved productive capacity by making domestic factors of production more competitive (Felipe *et al.,* 2010:481). However, the growth process up to the capacity growth rate, when full employment has not yet been achieved, is particularly relevant for emerging market economies such as South Africa. In this case, the emphasis lies on the export sector, because it promotes economies of scale and serves as the sole component of aggregate demand that relaxes the balance of payments constraint and thereby allows countries to reach their capacity growth rate (Felipe *et al.,* 2010:481). Felipe *et al.* (2010:481) highlight that this view of export-led growth is termed as demand-oriented, since export growth will increase output growth (if $y_B < y_C$) by working through the Hicks super-multiplier, or more specifically, the dynamic Harrod foreign trade multiplier.

Considering the above system of relationships between y_B, y_A, and y_C, Thirlwall and Dixon (1979:173) argue that any export-led growth model that does not explicitly incorporate a balance of payments equilibrium constraint[4] cannot have much predictive power. Since most previous models of export-led growth lack such a balance of payments constraint, Thirlwall and Dixon (1979:173) derive a model, based on earlier demand-side export-led growth models and Kaldor's theory of export-led growth that is extended to include the necessary balance of payments constraint.

[4] It is important to note that Thirlwall and Dixon (1979) assume that the capital account is fixed, thus the trade deficit that can arise as a result of income growth will unequivocally lead to a balance of payments problem.

2.3.5 An export-led growth model that captures exchange rate and balance of payments effects

Based on Kaldor's descriptions of export-led growth, Thirlwall and Dixon (1979:181) derive an algebraic model that includes the impact of exchange rate changes and that is then extended to account for the balance of payments constraint.

Let the export demand function equal:

$$X_t = (\frac{P_{dt}}{E_t P_{ft}})^{\eta} (Z^{\in})_t \tag{2.3.16}$$

where X_t is the quantity of exports in time t, P_{dt} is the domestic price in time t, P_{ft} is the competitor's price in time t, Z_t is the level of world income in time t, $1/E$ is the foreign price of home currency, η is the price elasticity of demand for exports, $\eta < 0$ and $\in$ is the income elasticity of demand for exports, $\in > 0$.

The quantity of exports is linked to prices measured in foreign currency. To account for the effect of exchange rate changes, the rate of growth of export demand is modelled by:

$$x_t = \eta(p_{dt} - p_{ft} - e_t) + \in (z)_t \tag{2.3.17}$$

where lower case letters represent rates of growth of the variables of Equation 2.3.16.

While the changes in the exchange rate are taken as exogenous, the rate of growth of domestic (export) prices p_{dt} is assumed to be endogenous and is estimated in the same way as in the earlier model by Equations 2.3.12 and 2.3.13. Again, Equation 2.3.14 (Verdoorn's Law) is incorporated into the model to make it circular and cumulative and hence, the higher the rate of output growth the faster is the rate of productivity growth. A higher rate of productivity growth implies lower relative rates of increase in production costs and hence, higher rates of growth of export demand and output (Thirlwall and Dixon, 1979:181).

Combining Equations 2.3.13, 2.3.14 and 2.3.17 gives:

$$x_t = \eta(w_t - r_{at} - \lambda y_t + \tau_t - p_{ft} - e_t) + \in (z)_t \tag{2.3.18}$$

At this stage, Kaldor's model lacks the balance of payments equilibrium growth rate condition and as a result could overpredict the possible rate of growth depending on the

assumed relationship between x_t and y_t, that is, export and economic growth (Thirlwall and Dixon, 1979:182).

Let export revenue be defined as:

$$P_{dt}X_t = P_{ft}M_tE_t \tag{2.3.19}$$

where M_t is the quantity of imports, E_t is the domestic price of foreign currency, and P_{dt}, X_t and P_{ft} are defined as before.

The rate of growth of income from exports is thus defined as:

$$p_{dt} + x_t = p_{ft} + m_t + e_t \tag{2.3.20}$$

where lower case letters represent rates of growth of the variables in Equation 2.3.19.

Thirlwall and Dixon (1979:182) specify the quantity of imports as a multiplicative function of the price of imports (measured in domestic currency to incorporate exchange rate changes), the price of import substitutes (which is assumed to be approximated by the domestic price level), and domestic income. Thus:

$$M_t = \left(\frac{P_{ft}E_t}{P_{dt}}\right)^{\psi} Y_t^{\pi} \tag{2.3.21}$$

where Y_t is domestic income, ψ is the price elasticity of demand for imports ($\psi < 0$), and π is the income elasticity of demand for imports ($\pi > 0$).

Let the rate of growth of imports be:

$$m_t = \psi(p_{ft} + e_t - p_{dt}) + \pi(y_t) \tag{2.3.22}$$

Substituting Equation 2.3.22 into 2.3.20, the condition for balance of payments equilibrium can be specified as:

$$p_{dt} + x_t = p_{ft} + \psi(p_{ft} + e_t - p_{dt}) + \pi(y_t) + e_t \tag{2.3.23}$$

Thus, the rate of increase consistent with the balance of payments requirement can be defined as:

$$y_B = \frac{x_t + (1 + \psi)(p_{dt} - p_{ft} - e_t)}{\pi} \tag{2.3.24}$$

Therefore, an increase in the rate of export growth x_t will raise the balance of payments constraint on output growth, y_B.

In the simplest case that does not include the Verdoorn effect of export-led growth $\lambda = 0$, Equation 2.3.17 could be used to model balance of payments constrained growth. Within this framework, any export demand function could be used (Thirlwall and Dixon, 1979:182). For example, consider:

$$y_B = \frac{(1 + \eta + \psi)(p_{dt} - p_{ft} - e_t) + \epsilon(z_t)}{\pi} \tag{2.3.25}$$

If the specification of the rate of change of export demand in Equation 2.3.18 is used, which contains the idea of a virtuous circle of growth led by exports, then:

$$y_B = \frac{(1 + \eta + \psi)(w_t - r_{at} + \tau_t - p_{ft} - e_t) + \epsilon(z_t)}{\pi + \lambda(1 + \eta + \psi)} \tag{2.3.26}$$

Both Equations 2.3.25 and 2.3.26 show that if domestic prices rise at a faster pace than foreign prices, then the balance of payments equilibrium growth rate will be lower, if it is assumed that the absolute value of the sum of the export and import price elasticities exceeds unity, or $(\psi + \eta) < -1$. In other words, the Marshall-Lerner condition[5] would have to be satisfied for the above to hold (Hussain, 2006:24). It is also interesting to note that the equilibrium growth rate is positively related to the growth of world income (z_t) and negatively related to the income elasticity of import demand (π) (Thirlwall and Dixon, 1979:183). Overall the virtuous circle version of the export-led growth model (Equation 2.3.26) will give a higher equilibrium growth than the model of Equation 2.3.25, if $|\psi + \eta| > 1$. If this is not the case, the growth rate consistent with the balance of payments equilibrium condition will be lower than it would have been without the virtuous circle. If there is no virtuous circle through the Verdoorn effect, so that $\lambda = 0$, then the two models are the same (Thirlwall and Dixon, 1979:184). Caves (1970:234) highlights that the relationship between increased export growth and improved productivity growth is unclear. Even if it were possible to find a significant link between exports and output growth on one hand and productivity growth on the other, the direction of causality remains ambiguous (Krugman,

[5] The Marshall Lerner condition states that a currency devaluation would only improve the trade balance if the devaluation-induced decline in the terms of trade is more than offset by the devaluation-induced fall in the volume of imports and rise in the volume of exports.

1989:1037). However, Kaldor's technical progress function provides theoretical support for the idea that higher output growth is indeed a stimulus to productivity growth (Dixon and Thirlwall, 1975:209). On the basis of Verdoorn's Law and Kaldor's technical progress function, the proposition that export growth creates a virtuous cycle of growth, due to the link between higher rates of output growth and productivity growth, makes economic sense (Thirlwall and Dixon, 1979:179).

The above model of export-led growth (Equation 2.3.25 and 2.3.26) also indicates that a sustained depreciation of the domestic currency ($e_t > 0$) will raise the equilibrium growth rate consistent with balance of payments equilibrium, if the sum of the two price elasticities exceeds unity in absolute terms (Thirlwall and Dixon, 1979:183). Therefore, a once off devaluation of the domestic currency can only have temporary effects on the economy's export industry and in turn on economic growth. Instead, a continuous depreciation would be required to create the kind of prolonged impact necessary to raise the balance of payments equilibrium growth rate. An example of the deliberate weakening of the domestic currency in the hope of strengthening economic growth is the Plaza Accord of September 22, 1985 that was aimed at improving the competitiveness of the US manufacturing industry in the global market (Arrighi, 2003:16). Indeed, the radical and sustained devaluation of the dollar from 1985 to 1995 lead to a recovery of competitiveness for the US export industry at great cost to Japanese and German manufacturers (Arrighi, 2003:17). Unfortunately, this turnaround for the US export sector was based only on the favourable developments of the domestic currency and not on significant improvements in terms of productive efficiency or innovation. As a result, the revival of the American manufacturing industry, based on the devaluation of its currency, could not be sustained in the long-run. The danger of causing a serious crisis for Japanese and German manufacturers and thereby triggering a downward spiral of world demand, forced the United States to enter into an agreement to reverse the devaluation of the dollar (later called the 'reverse Plaza Accord') (Arrighi, 2003:18). In sum, America's experience shows that the manipulation of the exchange rate in favour of domestic export production proves to be a zero-sum game and is difficult to sustain in the long-run due to its beggar-thy-neighbour mentality. Efforts to restore profitability in the export sector via a fundamental restructuring of the industry could be a more sustainable strategy for raising export competitiveness and economic growth in the long-run (Thirlwall, 2011:128).

The variable $\epsilon(z_t)$ in Equation 2.3.25 and 2.3.26 highlights that much of the appeal of export-led growth within the demand-side view is attributed to the fact that outward-oriented industrialisation is not limited by possible demand constraints of the domestic market (Rangasamy, 2009:604). Although South Africa has a relatively large domestic market, the appeal of access to additional demand in the global market place may nevertheless be a conclusive reason for a stronger pursuit of export-led growth (Jordaan and Eita, 2009:4). In addition, economic policies related to export-led growth such as trade liberalisation and regional integration are likely to "raise the interest of potential foreign investors by increasing the scope of the market" (Bezuidenhout and Naudé, 2010:278). A significant positive relationship has been found between foreign direct investment, an important source of demand for South Africa, and export growth (Felipe *et al.*, 2010:481). On the other hand, the growth performance of an economy pursuing export-oriented production is also dependent on fluctuating world demand, particularly when natural resource products form the majority of the economy's export basket such as in the case of South Africa (Holden, 2005b:165). In view of the extreme volatility of world demand, which is characterised by unpredictable booms and busts, the South African economy is in significant danger of failing to achieve consistently high economic growth rates.

2.3.6 A fundamental law of growth (Thirlwall's Law)

On the basis of the international evidence, Thirlwall and Dixon (1979:174) propound a fundamental law of growth which states that "a country's long-run growth rate will approximate to its rate of growth of exports divided by the income elasticity of demand for imports." Thus, the significance of export-led growth could lie in raising the balance of payments constraint on economic growth and thereby allowing economies to reach their capacity rate of growth.

By assuming that $p_{dt} - p_{ft} - e_t = 0$ or $\eta + \psi = -1$, a simple growth law is determined and the balance of payments equilibrium growth rate reduces to:

$$y_B{}^* = \frac{\epsilon(z_t)}{\pi} \tag{2.3.27}$$

Since Thirlwall and Dixon (1979:174) find that x_t can serve as a proxy for $\epsilon(z_t)$, the equation becomes:

$$y_B{}^{**} = \frac{x_t}{\pi} \tag{2.3.28}$$

where π is the income elasticity of demand for imports ($\pi > 0$).

Therefore, a useful model has been derived that explains why the rate of export growth is usually greater than the rate of income growth. If the income elasticity of import demand exceeds unity, and there is no continuous improvement in price competitiveness, then an equality between the rate of growth of exports and income would generate a higher rate of imports than exports, and income growth would at some point have to be constrained due to balance of payments considerations (Thirlwall and Dixon, 1979:174).

Perraton (2003:6) refers to Equation 2.3.27 as the 'strong' form, and Equation 2.3.28 as the 'weak' form of Thirlwall's Law. He argues that where it is difficult to find robust estimates of the income elasticity of export demand (ϵ) on the basis of Equation 2.3.16, export growth, x_t, must incorporate both the effect of world income growth and the effect of relative price changes, which weakens the argument that the balance of payments equilibrium is always brought about by domestic income changes, y_B. Despite Perraton's (2003:6) caveat and the development of Kaldor's export-led growth model, which incorporates the concept of a virtuous circle driven by exports but curtailed by the balance of payment, Thirlwall and Dixon (1979:188) found that empirical evidence indicates that a simpler model, that is, Equation 2.3.28, will approximate the relationship between exports and growth sufficiently well. This does not disprove the idea of the virtuous circle or the applicability of Verdoorn's Law in this context. Rather, it suggests that relative prices change very little (or have a negligible impact), or the price elasticities of demand for exports and imports (η and ψ) are not sufficiently high, implying that exports of different countries are imperfect substitutes for one another. Indeed, Hussain (2006:37) emphasises that the loss of Africa's market share in world trade over the last few decades (from 6% in 1980 to 2% in 2002) demonstrates that the strategy of raising the export growth rate through improvements in price-competitiveness has largely failed. According to Hussain (2006:37), Africa's price-competitiveness explains only a small fraction of changes in the market share, as Thirlwall's Law suggests.

Thirlwall's growth law further indicates that the income elasticity of demand for imports (π), which is a function of the structure of domestic production and imports, is inversely related to the balance of payments equilibrium growth rate (see Figure 2.2) (Thirlwall, 2011:323).

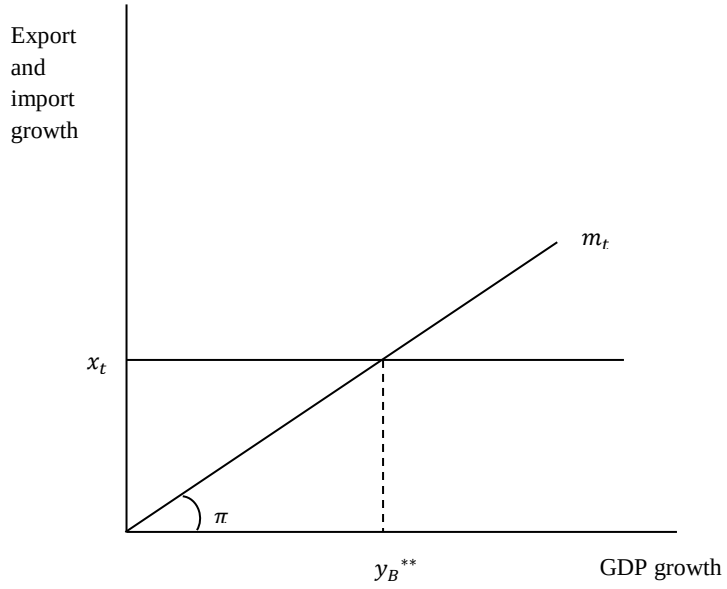

Figure 2.2. Balance of payments constrained growth
Adopted from Thirlwall (2011:323)

Moreover, the strong version of Thirlwall's Law (Equation 2.3.27) shows that an economy's growth rate depends on other economies' growth rates, z_t, while the speed at which an economy grows depends considerably on the income elasticity of demand for exports, ϵ, which, in turn, is a function of the structure and pattern of production and exports (Thirlwall, 2011:323). This proposition finds support in Prebisch's centre-periphery model, which will be discussed in the following section. Hence, the elasticities of both exports and imports depend on the structure and pattern of production, uniting supply and demand aspects within the model (Thirlwall, 1997:383). Thirlwall (1997:383) recommends for balance-of-payments-constrained countries, that supply-side policies be implemented to shift the structure of production both broadly through the allocation of resources between primary and secondary production and between tradable and non-tradable goods, as well as specifically depending on the characteristics of the goods produced. This approach is supported by Gouvea and Lima (2010:170) for example, who have recently integrated in their model of a multisectoral version of Thirlwall's Law the idea that structural adjustments can lead to changes in the income elasticities of imports and exports. The authors have found that these, in turn, significantly affect the extent of the external constraint. As Chapter 4 outlines in more detail, the results of Gouvea and Lima's (2010) study further support Engel's Law, because it was found that, for a sample of Latin American and Asian countries, more technology-intensive sectors exhibited a higher income elasticity of export demand than resource-based sectors (Gouvea and Lima, 2010:183). Similarly, Hussain (1999:128) finds that African countries

tend to have an income elasticity of demand for their exports of less than unity (Engel's Law), leading to a structural problem of ever-increasing external deficits that eventually leads to constrained growth.

2.3.7 Parallels between Thirlwall's Law and other models of economic growth and trade

(i) Harrod's foreign trade multiplier

Harrod's (1933) formulation of a foreign trade multiplier was a static version of Thirlwall's growth law. It stated that the *level* of income would be equal to the *level* of exports divided by the marginal propensity to import. As such, based on the same assumptions as those in Harrod's 1933 derivation, Thirlwall and Dixon (1979) had unknowingly reinvented the wheel, while at the same time pioneering a dynamic trade multiplier that had not been derived in the literature thus far (Thirlwall, 1997:378).

(ii) Prebisch's centre-periphery model

According to Thirlwall (2011:318), Prebisch's 1950 centre-periphery model was one of the first post-war challenges to the orthodoxy of mutual benefits arising out of free trade between developed and developing economies. By focusing on the monetary, that is, balance of payments, perspective on trade, Prebisch (1950) argued that gains from specialisation may be offset by the underutilisation of resources that occurs if foreign exchange poses the dominant constraint on output. Within this model, the less developed countries (LDCs) are shown to specialise in the production of exports (particularly agricultural and other primary products) that face diminishing returns due to a low income elasticity of demand in world markets. Conversely, the developed countries (DCs) tend to specialise in the production of exports that face increasing returns due to a higher income elasticity of demand (manufactured goods) (Thirlwall, 2011:317). As a result, the losers are the LDCs who find themselves in perpetual balance of payments deficit, whereas the gainers are the DCs who experience a perpetual surplus. As Equation 2.3.29 shows, the balance of payments equilibrium growth rate of the LDC requires that the growth of output be constrained, so that imports grow no faster than exports. Thus:

$$g_{LDC} = \frac{x_{LDC}}{\pi_{LDC}} = \frac{g_{DC}\,\epsilon_{LDC}}{\pi_{LDC}} \tag{2.3.29}$$

where g_{LDC} and g_{DC} are the constrained growth rates of a less developed country and developed country respectively, x_{LDC} is the exports growth rate of the LDC, ϵ_{LDC} is the

income elasticity of export demand of the LDC, and π_{LDC} is the income elasticity of import demand of the LDC.

By rearranging the equation, it is possible to obtain the relative growth rate of two countries, which represent a developed and developing country within the model:

$$\frac{g_{LDC}}{g_{DC}} = \frac{\epsilon_{LDC}}{\pi_{LDC}} \tag{2.3.30}$$

The above equation highlights that the LDC would only be able to grow at a fraction of the rate of the DC. According to Thirlwall (2011:318), Equation 2.3.30, which serves as the foundation to Prebisch's centre-periphery model, is also the dynamic equivalent of the static Harrod foreign trade multiplier, and therefore the true forerunner of Thirlwall's growth law. Again, Engel's Law plays a prominent role by explaining that the terms of trade move against countries exporting agricultural products and raw materials as the world's income increases, while at the same time, products embodying higher technology would experience more favourable terms of trade over time (Kaplinsky, 2006:1).

(iii) Krugman's 45-degree rule

In a seminal paper on differences in income elasticities and growth rates among countries, Krugman (1989:1031) discusses an empirical regularity that mirrors closely the results of Thirlwall's model. Krugman (1989:1031) proposes the so-called '45-degree rule', which refers to the tendency of income elasticities of demand for a country's exports and imports to be systematically linked to its long-run rate of growth. Krugman (1989:1032) highlights that fast-growing *(slow-growing)* countries tend to experience a high *(low)* income elasticity of export demand, while having a low *(high)* income elasticity of import demand. Contrary to Thirlwall (1997:379), however, Krugman (1989:1032) argues that this regularity results from a "supply-side element in the apparent differences in demand that countries face". According to Krugman, it is unfathomable that income elasticities determine economic growth. Thus, he dismisses this argument on '*a priori*' grounds and reverses the direction of causation. According to Krugman (1989:1037), it is fast growth, caused by improvements in total factor productivity, that leads to higher export growth and/or low import elasticity. As Krugman (1989:1037) stresses, it is hard to detect which channels link balance of payments problems resulting from unfavourable income elasticities to total factor productivity growth. Yet, as Thirlwall (1997:379) contends, there is a rich literature, such as on Hicks' supermultiplier, that supports the notion that fast output growth leads to fast productivity growth. Particularly,

when including the idea of circular and cumulative causation (Myrdal, 1956), it is clear that through induced investment, embodied technical progress, learning by doing, economies of scale, and so on, fast growth of exports and output will produce rapid productivity growth. This process, captured by Verdoorn's Law, has been found to hold when tested empirically (Thirlwall, 1997:379). While it is clear that output is dependent on factor inputs, Thirlwall (1997:383) stresses that this is only a partial explanation of growth – demand is also important. Nevertheless, supply-side and demand-side theorists can reconcile over the significance of the supply characteristics of goods (Felipe *et al.,* 2010:481). Income elasticities of demand for exports and imports arise out of the non-price characteristics of the goods, or in other words the structure of production (Thirlwall, 1997:383). The more attractive the non-price characteristics of the goods, the higher the income elasticity of demand for exports and the lower the income elasticity of demand for import substitutes will be. This implies that there is a need for supply-side policies that help shape the structure of production in such a way as to foster more favourable income elasticities of demand for exports (ϵ) and imports (π) (Thirlwall, 1997:383).

2.3.8 Extensions of Thirlwall's model

Some important extensions of Thirlwall's model include taking account of capital flows, current account deficit limits and interest payments on debt. Furthermore, a number of studies offer disaggregated versions of Thirlwall's Law, for example by differentiating between different export sectors (Araujo and Lima, 2007 & Gouvea and Lima, 2010) or different trade partners (Nell, 2003). These studies offer logical extensions of Thirlwall's Law that are particularly relevant for empirical investigations. The results of such studies will be discussed in Chapter 4.

(i) Capital flows

An extended model of export-led growth was developed by Thirlwall and Hussain (1982) that reflects, contrary to the 1979 model of export-led growth, that developing economies are indeed often able to run balance of payments deficits, because they have access to a variety of other capital inflows (Thirlwall, 2011:333).

The extended model can be derived by expanding Equation 2.3.19 to include net capital inflows, $\mathrm{C} > 0$:

$$P_{dt}X_t + C = P_{ft}M_tE_t \tag{2.3.31}$$

Integrating the dynamic version of Equation 2.3.31, and using Equations 2.3.18 and 2.3.22 showing export and import growth, the growth rate consistent with the overall balance of payments (y_{ob}) will be:

$$y_{ob} = \frac{(1 + \theta\eta + \psi)(p_{dt} - p_{ft} - e_t) + \theta\epsilon(z_t)\ (1 - \theta)(c_t - p_{dt})}{\pi} \qquad (2.3.32)$$

where θ is the share of export earnings in total earnings going towards financing the import bill, and c is the growth of nominal capital inflows. Therefore $(c_t - p_{dt})$ is the growth in real capital inflows.

To illustrate the workings of the above specification, it is helpful to disaggregate the growth rate shown in Equation 2.3.32 into four components (Thirlwall, 2011:333):
growth resulting from movements in the real terms of trade: $(p_{dt} - p_{ft} - e_t)/\pi$
growth linked to movements in the terms of trade combined with the price elasticities of exports and imports: $(1 + \theta\eta + \psi)(p_{dt} - p_{ft} - e_t)/\pi$
growth linked to exogenous changes in world income: $\theta\epsilon(z_t)/\pi$
growth arising out of real capital flows: $(1 - \theta)(c_t - p_{dt})/\pi$.

As usual, if it is assumed that relative prices measured in a common currency remain somewhat unchanged in the long-run, then Equation 2.3.32 reduces to:

$$y_{ob}{}^{*} = \frac{\theta x_t + (1 - \theta)(c_t - p_{dt})}{\pi} \qquad (2.3.33)$$

Thus, Thirlwall's Law, adjusted for the possibility of consistent disequilibrium of the current account, proposes that the growth rate constrained by the balance of payments growth rate and including an initial current account deficit is the weighted sum of export growth and real capital inflows divided by the income elasticity of import demand (Thirlwall, 2011:334). Without capital flows ($\theta = 1$ and $(c - p_{dt}) = 0$), Equation 2.3.32 would again collapse to the simple rule of Equation 2.3.28, $y = x/\pi$. Thirlwall (2011:334) highlights that empirical tests of the above model (i.e. Equation 2.3.32) for a selection of developing countries from the 1950s to the 1970s revealed that countries which grew faster than predicted by the simple version of Thirlwall's Law (Equation 2.3.28) had experienced significant capital inflows. On the other hand, countries that grew slower than predicted had experienced negative relative price movements, that is, worsening terms of trade. Although the extended model of Equation

2.3.32 performed better than the basic model of Equation 2.3.28, Thirlwall (2011:334) and Hussain (1999:128) argue that the most decisive factor that influences growth performance differences remains the growth of exports.

(ii) Sustainable deficits and interest rate payments on debt

As it stands, Equation 2.3.33 fails to reflect that countries are actually confronted with a limit on the amount of current account deficit that can be financed by capital inflows. In other words, a country's sovereign debt relative to GDP is restricted. To address this issue, it has been suggested to include a fixed deficit/GDP ratio when deriving the constrained growth rate. Moreno-Brid (1998:388) derives the adjusted constrained growth rate by rewriting Equation 2.3.15 as:

$$P_{dt}X_t + FP_{dt} = P_{ft}M_tE_t \tag{2.3.34}$$

where F is the current account deficit in real terms, and FP_{dt} is nominal capital flows (i.e. C) to finance the deficit.

Taking the rates of change of Equation 2.3.34 and setting $f = y$, such that the ratio of the current account deficit to GDP remains unchanged over time, gives:

$$y_D = \frac{\theta\epsilon(z_t) + (\theta\eta + \epsilon + 1)\left(p_{dt} - p_{ft} - e_t\right)}{\pi - (1 - \theta)} \tag{2.3.35}$$

When the terms of trade are assumed to be constant, the constrained growth rate consistent with a fixed current account deficit/GDP ratio simplifies to:

$$y_D{}^* = \frac{\theta_x}{\pi - (1 - \theta)} \tag{2.3.36}$$

In the case that the current account is balanced (i.e. $\theta = 1$), Equation 2.3.36 again collapses to the simple version of Thirlwall's Law (Equation 2.3.32).

To make the model more complete, Moreno-Brid (2003:350), among other economists, extends the balance-of-payments constrained growth model to reflect limits on the sustainable level of current account deficits that arise from interest payments on debt (Thirlwall, 2011:336). Based on the same assumptions as above, substituting x and m, setting $f = y$, as well as including interest payments on capital flows, the new constrained growth rate will come to:

$$y_I = \frac{\theta\epsilon(z_t) - \theta_1 i + (\theta\eta + \epsilon + 1)}{\pi - (1 - \theta - \theta_1)} \quad (2.3.37)$$

where i is the rate of growth of real net interest payments abroad and θ_1 is the share of foreign exchange devoted to interest payments.

Given that the terms of trade are constant, Equation 2.3.37 will simplify to:

$$y_I^* = \frac{\theta_x - \theta_1 i}{\pi - (1 - \theta - \theta_1)} \quad (2.3.38)$$

Clearly, with no interest payments, Equation 2.3.38 will reduce to Equation 2.3.36.

Again, Thirlwall (2011:336) emphasises that export performance, not capital flows or debt service costs, remains the most important determinant of GDP growth. Models including capital flows and interest payments on debt only add small improvements to the accuracy of the regression results. The key factor remains export growth, relative to the income elasticity of import demand. It follows that in the long-run, "no country can grow faster than that rate consistent with balance of payments equilibrium on current account unless it can finance ever-growing deficits which, in general, it cannot" (Hussain, 2006:24).

2.3.9 Thirlwall's Law and its implications for policy formation in the developing economy setting

Thirlwall's teachings are enlightening regarding the question of how to set priorities for economic growth and poverty reduction in emerging market economies. As Hussain (2006:26) argues, when searching for an all-encompassing vision to promote accelerated GDP growth in developing economies, it is Thirlwall's Law which offers a "strong theoretical and empirical justification for making the export sector the focal point in setting such a development vision." While Hussain (2006:27) agrees with supply-side growth theories in that economic growth and the achievement of socio-economic targets will be based on increased investment in physical and human capital, he emphasises that only export expansion can make such growth both possible and sustainable in the long-run. Thirlwall's Law implies that pressure on the current account balance brought about by higher growth rates and subsequent increases in import demand can only be lifted by improved export expansion, otherwise growth will be curtailed (Araujo and Lima, 2007:756). As mentioned earlier, export expansion is the only component of demand that finances the import requirements of growth and thus allows the other components of demand to grow at a faster

rate – a phenomenon that consumption-led growth, investment-led growth or government spending-led growth do not support (Thirlwall, 2011:327). Consequently, any development vision must focus on how investments in physical and human capital will generate higher export earnings, otherwise the balance-of-payments constraint will put an end to such an expansion, leaving domestic resources (particularly human capital) underutilised and the country indebted, as has been the experience of many developing countries in Africa (Hussain, 2006:27).

Thirlwall's model also provides a useful perspective on the financing gap and the issue of sustainability. The continued prevalence of current account deficits in developing countries indicates that borrowed funds, which are used to bridge the financing gap, were not utilised effectively to alter the pattern of trade in such a way that enough foreign exchange earnings were generated allowing for debt repayment and a balanced current account (Hussain, 2006:27). Hussain (2006:36) argues that a country can only reduce its dependence on debt financing and volatile foreign capital flows, if such financing helps shift the economy's production structure and pattern of trade towards the production of goods and services that are more favourable to the long-run development of the economy. On the other hand, if the production pattern remains the same, the economy will fall back to earlier growth rates the moment foreign capital recedes. Thirlwall's model shows that if export performance is improved in relation to the demand for imports, then the financing gap could be lowered over time, which would promote greater sustainability of growth (Hussain, 2001:122). Hence, the effectiveness of economic policy measures should be measured largely in terms of their ability to promote export growth relative to that of imports (Hussain, 2006:36).

As the strong form version of Thirlwall's Law shows (Equation 2.3.27), the economy's export performance depends on a country's income elasticities of demand for exports, $\epsilon(z_t)$, relative to that of imports, π (Perraton, 2003:6). Hussain (2001:95) argues that although the literature and discussions of the leading development institutions emphasise the importance of relative prices in determining an economy's trade performance, the two income elasticities ($\epsilon(z_t)$ and π) are actually much more important in this regard. Export demand is determined by relative prices and global income (Gouvea and Lima, 2010:172). Nevertheless, policy formation continues to disregard the aspect of income-elasticity almost in its entirety and instead focuses its attention on price competition. As a result, initiatives to expand exports in developing countries are mainly limited to improving price competitiveness through currency

devaluations, unfortunately also enforcing current dependencies on primary exports and ignoring the important role of 'non-price competition' that is captured in the income elasticity of export demand $\epsilon(z_t)$ (Hussain, 2001:95).

Non-price competition includes all factors, other than relative prices, that affect a country's trade performance (Araujo and Lima, 2007:756). The first aspect of this concerns the act of selling or marketing and is determined by such factors as infrastructure, packaging, market access, speed of delivery and efficient logistics. The second aspect of non-price competition is related to the characteristics of the product, particularly its level of processing and sophistication. The degree of sophistication of the product gives rise to what Hussain (2006:38) calls the 'income dimension of global competition'. Grounded in the 'inverse of Engel's Law', it implies that the demand for knowledge-intensive goods rises more than proportionally to increases in global income (see Table A1 in the Appendix). For Hussain (2006:38), the most demanding challenge increasingly faced by African countries may be in the domain of the 'income-dimension of global competition'. Policies must be directed at acquiring a competitive advantage in industries where future world demand will be high. Thus, due regard must be given to the income-dimension of global competition, so that developing countries can build vibrant export industries and attain new competitive advantages in products that are more appealing to world demand (Hussain, 2006:40).

Efforts to improve the income elasticity of export demand could also be informed by Cimoli, Porcile and Rovira's (2010:390) discussion on Schumpeterian and Keynesian efficiency in the context of Latin America's growth performance since 1960. Through the lens of the structuralist and evolutionary growth theories, Cimoli *et al.* (2010:389) view Thirlwall's growth ratio for any economy as strongly influenced by the dynamics of innovation and global diffusion of technology, which in turn shape the economy's productive and export structures. Sectors that exhibit higher levels of Schumpeterian and Keynesian efficiency, that is, sectors that tend towards technology-intensive production and whose international demand elasticity improves, give rise to a higher $\epsilon(z_t)/\pi$. In their study, Cimoli *et al.* (2010:404) relate differing growth experiences across countries to structural transformations in favour of sectors that offer higher Schumpeterian and Keynesian efficiency. The former describes sectors that offer larger technological externalities and higher rates of innovation and the latter indicates sectors in which the growth of demand, domestically and internationally, is sufficiently strong to foster the expansion of production and investment at home. Keynesian

efficiency mirrors Hussain's (2006:40) description of the 'income-dimension of global competition'. Cimoli *et al*. (2010:403) conclude that Latin America has failed to converge with the developed world, because its economic structure remained concentrated on sectors with low technological intensity (Schumpeterian efficiency) and a low growth rate of international demand (Keynesian efficiency). Consequently, Cimoli *et al*. (2010:405) suggest that economic policies should be aimed at transforming the structure of the economy in favour of sectors that offer higher Schumpeterian and Keynesian efficiency. This highlights the key role that industrial and technological policies must play in moving the economy on a trajectory of more dynamic growth.

Moreover, changing the pattern of production towards more processed, technology-intensive goods and services also eases pressures on the propensity to import, as domestically produced manufacturing goods can now serve as substitutes (Hussain, 1999:128). The production of goods that are sufficiently 'income-attractive' not only to the international, but also the domestic market, would consequently lower the income elasticity of import demand, which introduces the balance of payments constraint in the first place (Hussain, 1999:128). Moreover, the recognition that a low income elasticity of imports is an important prerequisite for growth in the long-run, could imply some strategic measures to lower income elasticity of imports through targeted import-substituting measures, or at least a slowing down of the pace of trade liberalisation, where such options exist (Pacheco-López and Thirlwall, 2006:60).

2.3.10 Conclusion

Thirlwall's Law offers clear guidance to policy makers who aim to break the vicious cycle of low economic growth and rising poverty. Given that foreign exchange is an important constraint on growth for many developing countries, it follows that better export performance and a reduced income elasticity of demand for imports can help such countries improve their growth performance (Thirlwall, 2011:307). Consequently, the question arises which economic management strategies are needed to improve the income elasticity of exports relative to imports, i.e. the ratio of $\epsilon(z_t)$ to π. As was broadly outlined above, oftentimes, changing the pattern of exports is the key to improving this ratio (Hussain, 2006:40). It follows that a conclusive case can be made for a stronger focus on manufacturing exports on the basis of theoretical analyses such as Engel's Law, Prebisch's centre-periphery model (see Section 2.4), Thirlwall's Law, as well as empirical studies, especially those of Hussain (1999, 2006), which provide evidence supporting a more committed pursuit of exports growth via sectors with a higher income-dimension of global competition.

The discussion on the treatment of the role of exports in the economic growth process within demand-side theories of economic growth brings to the fore also the necessity of bringing together both demand- and supply-side considerations within an encompassing view of economic growth. Not only the supply dimension, such as the level of competitiveness stressed in Section 2.3, influences the success of the export sector and therefore may support economic growth, but so does the demand dimension. The demand-side theory of export-led growth highlights the critical importance of demand factors such as exports and investment in supporting economic growth and stresses the need for exports to alleviate the balance of payments constraint. It is clearly important to take account of demand-side factors when investigating empirically the role that exports play in the overall growth process in South Africa. Particularly, a variable capturing world demand is critical. However, other variables capturing both demand- and supply- dimensions of the economy, such as the real effective exchange rate are equally imperative. The discussion on the question which supply- and demand-side macro-economic variables should be included to help produce a realistic depiction of economic growth in South Africa is extended in Chapter 5. Furthermore, in order to gain more insight into the particular characteristics of economic growth in developing economies, as opposed to developed economies operating close to their PPF, Section 2.4 will offer a discussion of theories of export-led growth within the field of trade theory in Development Economics.

2.4 DEVELOPMENT ECONOMICS AND THE ROLE OF EXPORTS

2.4.1 Introduction

Although Development Economics is a comparably new field in Economics, emerging after World War II, issues of importance to developing economies have been discussed throughout the long history of Economics (Dutt, 2005:100). As Myint (1987:110) highlights, Development Economics has its roots in the classical and neoclassical growth models formalised by Smith (1776) and Solow (1956), among others. Smith's (1776) dynamic trade and vent for surplus theory, or Solow's (1956) growth model serve as important precursors to the further advancement of Development Economics and specifically the discussion of the role of exports in the growth process of developing economies (Dutt, 2005:100 & Ros, 2005:92). The specific role that exports play in the overall growth process of an economy continues to be widely discussed in theories of economic development (Nissanke and Thorbecke, 2006:1341).

Myint (1958:336) argues in a seminal paper on classical trade theory and underdeveloped countries that Smith's dynamic theory of trade (or productivity theory), alongside his vent for surplus theory, constitute crucial, yet often neglected, contributions to trade theory. In the productivity theory, Smith (1776:413) argues that trade permits countries to extend their markets, increasing division of labour and irreversibly lifting productivity over time. This effect is further enhanced by the vent for surplus idea that in the case of a lack of domestic demand for a product, a country able to export will utilise previously unemployed resources specific to these products (Dutt, 2005:101). Thus exports assist the developing economy in moving towards its PPF, overcoming the deficient development of the domestic organisational structures (Myint, 1987:120). Crucially, from the perspective of the developing economy "the direct gains from using the previously underutilised resources will be many times greater than the conventional gains from a more efficient reallocation of given resources" (Myint, 1987:121).

Progressively, however, the discussion on growth economics and particularly development theories of growth has distanced itself from the neoclassical models of the economy, often citing the lack of applicability of its assumptions to developing economies, where market distortions and disequilibrium states are more prevalent than in developed economies (Nissanke and Thorbecke, 2006:1339). In particular, notions of imperfect competition, increasing returns and labour surpluses render the neoclassical growth model largely unusable (Ros, 2005:81). Endogenous growth theory offers a strategy to address some of the theoretical and empirical objections raised by critics of Solow's growth model (Ros, 2005:84). Firstly, Solow's growth model leaves the explanation of growth to factors that are determined exogenously – thereby depriving the theory of much desired explanatory power. Furthermore, the outcomes predicted by this model, such as convergence[6], do not coincide with the actual growth experiences of developing countries (Nissanke and Thorbecke, 2006:1343). It is clear that the disparities between industrialised and developing countries have tended to persist over time and in many cases, such gaps have widened (Culpeper, 2005:9). By endogenising technical progress through the development and incorporation of Kaldor's technical progress function and Arrows' model of learning by doing, endogenous

[6] A critical implication of the neoclassical solovian growth model, termed as convergence, is the idea that poorer countries can achieve higher economic growth rates than richer ones (for example due to lower diminishing return effects), hence catching up with richer countries over time (Di Liberto, 2007:291).

growth theory pioneered by Romer (1986) and Lucas (1988) has helped address the shortcomings of neoclassical growth theory (Ros, 2005:88).

The discussion on the role of trade theory in Development Economics and the role of exports will be structured as follows. First, early Development Economics theories and the role of international trade will be reviewed with a particular emphasis on the role that exports played in these theories. In Section 2.4.3 structuralism and the role of international trade will be discussed. Section 2.4.4 and 2.4.5 will review the Chenery-Strout or two gaps model, which is extended to include elements of Thirlwall's Law. The discussion on Development Economics and the role of exports will conclude with a review of the literature on the 'Openness-Poverty Nexus' and the implications of these insights for South Africa.

2.4.2 Early Development Economics and the role of international trade

Extensions of the neoclassical growth model, or even departures from it, are not new. In this regard, the early development theory of the 1950s is of particular relevance, as it offers new perspectives on the growth experience of developing economies, sparked by the need to explain the lack of convergence of income levels across countries (Ros, 2005:89). As Nissanke and Thorbecke (2006:1354) highlight, there was a need for economic theory to explain the tentativeness of economic progress and the continued presence of poverty in developing economies. Early development concepts of growth such as Rosenstein-Rodan's theory of the big push, Rostow's take off into sustained growth, Nurkse's theory of balanced growth and Hirschman's theory of unbalanced growth via linkage effects are critical to growth theory today, and as Ros (2005:88) argues, present a more promising path beyond the neoclassical growth model. Furthermore, such theories introduced a new, more nuanced perspective on the role of exports within the growth process of underdeveloped economies, thereby offering practical guidance to policy makers within such economies.

Rosenstein-Rodan (1943), who put forward the idea of balanced growth through a 'big push' in developing economies, viewed successful industrialisation as the outcome of the simultaneous expansion of several sectors, generating incomes and markets for each other, and thus in turn, making the initial investment push profitable (Dutt, 2005:103). In this regard, Rosenstein-Rodan stressed the importance of horizontal demand linkages and linkage effects involving input supplies to other sectors in the economy. A strong emphasis was placed on technological externalities and economies of scale in modern industrial production, which implied increasing returns to scale – a clear departure from the assumptions of the

neoclassical growth model (Thorbecke, 2007:5). Rosenstein-Rodan (1943:203) explicitly argued for the inclusion of developing economies in world markets to help them supplement domestic savings through foreign exchange earnings, which would finance the required investments. Moreover, he believed that it would be beneficial for developing economies to profit from the international division of labour, allowing for imports of capital goods that would otherwise be produced at very high costs at home (Dutt, 2005:103).

Nurkse's (1953) 'balanced growth' theory is closely linked to the idea of the big push in investment (Dutt, 2005:103). Again, the role of capital formation is emphasised, with the idea that the 'vicious cycle of poverty' could be ended, if economic development focused on the expansion of both investment and savings capacity. Referring to the role of exports, Nurkse (1953:21) highlights that export growth could provide the investment incentives necessary to break the vicious cycle on the investment side. For developing countries with low productivity, facing small domestic markets for processed goods, which in turn, implies deficient investments keeping productivity low, the possibility of exports opens up new avenues for incentivising investments. In fact, Nurkse argues that balanced growth is no longer necessary if exports provide a large enough incentive to invest, ending the low productivity trap (Dutt, 2005:104). In other words, export growth is potentially perceived as capable of triggering a 'big push' effect. However, it was seen as problematic for developing economies that an expansion of exports along comparative advantage lines would entail the export of primary products that faced worsening terms of trade in the world market. Hence, Nurkse (1952) suggested that poor countries should develop their comparative advantage in a wide range of manufacturing goods through an expansion of production for the domestic market first, thus emphasising the need for investments in these lines. Both Rosenstein-Rodan and Nurkse, therefore, rejected the idea of autarky for developing countries, while at the same time suggesting caution regarding the choice of the country's specific development path and resulting pattern of specialisation over time.

The 'take-off' principle proposed by Rostow (1960) was based on the simple Harrod-Domar identity, which states that for the growth rate of income to exceed that of the population, a minimum threshold investment to GNP ratio must be reached, based on the prevailing capital-output ratio (Cypher and Dietz, 2004:149). Furthermore, for take-off into sustained growth to be possible, Rostow (1960:192) envisaged a reallocation of resources towards building capacity in the non-industrial sectors that would eventually serve as a base for

building up industrial growth. In this regard, Rostow (1960:193) views the effective exploitation of natural resources, a crucial source of foreign exchange earnings, as one of the key focus areas for successful industrialisation. In addition, there is a need for developing economies to find areas where modernisation supports higher growth rates, thereby allowing for a substantial plow-back of profits (Rostow, 1960:193). This implies a progressively more manufacturing-centred export base that faces favourable developments in the income elasticity of demand and improved terms of trade, as structuralists such as Prebisch (1952:3) cogently argue.

In the treatment of trade theory in Development Economics, it is occasionally argued that international integration and increased trade flows worsen the problem of low domestic savings in developing economies, due to higher demand for imported consumer goods (Dutt, 2005:104). Such changes in demand are influenced by the demonstration effect that emanates from consumption patterns in industrialised economies, as summarised by Duesenberry's theory of consumption[7] (Cypher and Dietz, 2004:134). Although increases in imports of consumer goods for purposes of conspicuous consumption, for example, have a negative impact on the foreign exchange position of developing economies and concurrently diminish their ability to import much needed capital goods, the solution according to Nurkse (1953:63), Myrdal (1956:278), Hirschman (1958:124), or Myint (1987:115) does not lie in the restriction of such imports.

Nurkse (1953:63) argues that import restrictions on non-essential luxury goods could induce an expansion of the domestic production of the same goods, leading to no improvement in the savings rate at all. This is problematic, since savings are seen as an essential element of breaking the vicious cycle of poverty (Dutt, 2005:105). In a low savings scenario, low productivity translates into low incomes and hence a diminished propensity to save implying insufficient capital formation. As a result of low capital stock, the economy would be caught in a low productivity trap (Dutt, 2005:103). Nurkse (1953:63) suggested that overcoming the vicious cycle of poverty on the savings side would have to entail direct measures to increase savings in tandem with an effort to reduce overall luxury consumption. He hypothesised that this would produce more tangible results than mere import restriction.

[7] Any consumer will experience more frequent contact with luxury goods, when the consumption expenditure of other consumers within his realm rises. In this situation, impulses to increase consumption expenditure will intensify, resulting in an increase in such expenditure to the detriment of saving (Duesenberry, 1959:27).

Similarly, Myrdal (1956:278) recognises that successful development and the bridging of bottlenecks requires poorer economies to import capital goods that can be devoted to development purposes - but to finance such imports, they require access to foreign exchange. While developing economies may overcome incipient shortfalls in foreign exchange reserves by limiting imports of other non-essential consumption goods, Myrdal (1956:278) stresses that promoting exports may be a more effective strategy for a number of reasons. One argument is that export promotion can have a stimulating effect on otherwise sluggish industrial development. The expansion of "industrial exports is generally apt to instil more of a dynamic spirit of enterprise and competition into a stagnant economy" (Myrdal, 1956:257). Myrdal therefore stresses that export expansion can assist export producers to take advantage of external economies of scale, which include technological spill-overs, rising labour productivity and an enhanced climate of entrepreneurship (Dutt, 2005:111).

In contrast to Rosenstein-Rodan and Nurkse, Hirschman (1958:124) argued that balanced growth is not a requirement for successful development, since 'unbalanced growth' involving directed growth impulses in selected sectors of the economy induces surpluses and shortages that speed up the development process. By identifying and supporting key industries, Hirschman (1958:29) suggested that backward and forward linkages and externalities could be activated, thereby promoting higher economic growth. Regarding the role of international trade, Hirschman (1958:124) argues that when developing countries "restricted imports too severely, they have been shutting out the awakening and inducing effects which imports have on industrialisation". In other words, the growth of imports plays the role of developing preferences and demonstrating to domestic entrepreneurs that markets for such goods exist, encouraging them to enter global markets (Dutt, 2005:107).

Myint's (1987:114) support for a hesitant use of import controls is founded on the concept of effective rate of protection, which provides a useful way for measuring the distortions in incentives against the export sector within a general equilibrium framework. As Thorbecke (2007:9) highlights, the concept of effective protection, put forward in the late 1960s, is an important contribution to the debate on the optimal trade policy for developing countries. Rooted in intersectoral analysis, this theory allowed for the approximation of static efficiency costs associated with import substitution measures (Thorbecke, 2007:9). As Myint (1987:115) argues, the theory of the effective rate of protection brings to the fore that a restriction on imports by means of tariffs and quotas implies difficulties in expanding exports.

In other words, a tax on imports leads to changes in resource allocation equivalent to a tax on exports (Myint, 1987:115). Where export production involves imported inputs, a tariff on such inputs inhibits export expansion, because export producers forfeit competitiveness that foreign rivals achieve by obtaining the required inputs at lower prices. This concept, also referred to as the export bias, will be discussed further in Chapter 3.

What the abovementioned theories of development have in common is that they understand growth in developing economies as a discontinuous process that is based on a large, once-off injection of investment (Thorbecke, 2007:5). Moreover, a common theme in the early development theories is the view that exports serve as an important source of financing for investment spending, since domestic saving is notoriously scarce in these economies. Some theories, such as Rosenstein-Rodan's big push theory and Nurkse's view of balanced growth highlight that exports can also serve as a trigger helping to set off a cumulative process that leads to higher productivity, through improved investment spending or cheaper imports serving as important inputs to the industrialisation drive.

2.4.3 Structuralism and the role of exports

Development Economics in the structuralist tradition strives for a systemic approach towards the detection of rigidities, lags, or other factors that could impact on the processes of economic development (García-Molina and Ruíz-Tavera, 2009:271). Furthermore, structuralists argue, contrary to neoclassical economic theory, that markets do not function effectively in the periphery[8] due to structural (non-market) factors (Saad-Filho, 2005:133). Prebisch's (1950, 1952) perspectives on North-South trade and so-called 'gap models', developed by Chenery and Strout (1966), belong in the structuralist category (Saad-Filho, 2005:133 & García-Molina and Ruíz-Tavera, 2009:271). Apart from the two gaps model proposed by Chenery and Strout (1966), which will be discussed in the next section, structuralist development economics is often associated with a sense of export pessimism (Saad-Filho, 2005:134). This sense of cautiousness related to trade liberalisation and export expansion was influenced by the idea that developing countries faced unfavourable developments regarding the price and income elasticities of their exports over time. The concept of the deterioration of the periphery's terms of trade (the Prebisch-Singer hypothesis) is a central feature of structuralist growth theory (Saad-Filho, 2005:133).

[8] The periphery nations are the less developed economies of Latin America, Asia, and Africa. The so-called 'centre' refers to already developed nations such as the European economies or the United States (Cypher and Dietz, 2004:160).

Deterioration of the periphery's terms of trade can be approached from the supply and demand side. Starting from the supply side, due to the large pool of unemployed workers in the periphery, manufacturing and export sector wages are prevented from rising (Cypher and Dietz, 2004:161). With an improvement in productivity in these sectors, unit costs fall and output prices tend to fall. A large proportion of the benefits of higher productivity in the periphery is transferred to the consumers in the centre – little of the benefit accrues to the workers in the periphery, as they lack the required bargaining power to enforce higher wages in line with productivity increases (Saad-Filho, 2005:134). On the other hand, in the centre, unemployment is low and workers are unionised. In this situation, productivity growth lowers unit costs, but prices do not fall since workers are effectively able to resist nominal wage cuts (Saad-Filho, 2005:134). The benefits of productivity growth in the centre accrue to the workers and employers through increased wages and profits. Thus, given that primary export prices tend to decline for the periphery and prices of manufacturing exports stay fixed, the periphery will face declining terms of trade over time (Cypher and Dietz, 2004:161).

From the demand side, the decline in terms of trade for the periphery is further exacerbated. Since the income elasticity of demand for imports of manufactures exceeds that of food and other primary products, demand for primary goods grows more slowly than demand for manufactures as world income increases (Gouvea and Lima, 2010:183). Since the periphery exports mostly primary goods and imports manufactures, an increase in income in the periphery suggests that the proportion of its imports to consumption also rises (Cypher and Dietz, 2004:161). The result is excess demand for imports, higher prices for manufacturing goods and worsening trade deficits in the periphery (Hussain, 1999:128). On the other hand, as incomes rise in the centre, its ratio of imports to consumption tends to fall, implying that primary product prices fall and the centre's trade balance improves (Saad-Filho, 2005:134). Overall, Prebisch (1950) concludes that all the benefits of trade thus accrue to the centre and none to the periphery (Cypher and Dietz, 2004:162).

Hence, the question arises how developing countries in the periphery could escape this vicious cycle and to what extent trade is desirable for such countries. Latin American Structuralism (associated with Prebisch and Singer for example) envisaged industrialisation as the preferred escape route (Saad-Filho, 2005:134). The idea was either to turn away from exports, structuring the economy towards serving the domestic market, or to embark on a new export path that would focus on manufacturing and the production of goods further along the

value chain, as opposed to focusing on primary exports. Both strategies (turning away from exports or de-emphasising primary exports) were seen as diametrically opposed to the recommendations of the orthodoxy, which viewed primary exports, in which developing countries have a comparative advantage, as key to economic growth and development in such economies (Szentes, 2005:147). Thus, import substitution industrialisation (ISI) was often seen as a strategy for adjusting the structure of export production in order to allow peripheral economies to become more like the centre with respect to their productive and export structure (Todaro and Smith, 2006:627). However, ISI was not the imperative implication of the Prebisch-Singer hypothesis, but rather a suggested means to an end. In any case, a path of structural change allowing for greater industrialisation and manufacturing expansion was required to escape the impact of declining terms of trade. Manufacturing expansion, according to the structuralists, permits periphery countries to profit from participation in international trade, as they would increasingly face rising terms of trade. It follows that maintaining a favourable balance of payments position and diversifying exports could propel the developing economy in the direction of accelerated economic growth and thus poverty alleviation. Therefore, the emphasis lay on optimising the nature of exports and the economic structure that characterises the developing economy in question (Cypher and Dietz, 2004:169). To achieve such a restructuring of the economy, the Latin American Structuralists had a fundamentally different view of the kind of economic policy that was needed, in comparison to early development economists. Whereas the early developmentalists believed that a sudden increase in investment would be sufficient to propel the economy towards sustained growth, the structuralists argued that such a once-off impulse would be inadequate in the context of underdeveloped economic structures and institutions. In fact, the result of a once-off surge in investment could even entrench existing backward socio-economic frameworks, further consolidating the trap of low growth and high poverty (Cypher and Dietz, 2004:158). In general, a fundamental and far-reaching role was envisaged for domestic policy. Thus, the structuralists argued that capitalist development is possible in the peripheral countries through industrialisation and sweeping social reforms (Saad-Filho, 2005:128).

2.4.4 Introduction to the Chenery-Strout model

As has been noted above, Chenery and Strout's (1966) two gaps model is also rooted in the structuralist approach, yet its conclusion regarding the role of exports within the development process of emerging economies is less subdued, lacking the explicit caveat relating to the potential need to distinguish between primary and manufacturing exports. Nevertheless, the

two gaps model offers highly valuable insights by showing that developing economies face consecutive constraints on growth depending on their respective stage of development. Such constraints on growth arise out of structural rigidities, with the external restriction (i.e. deficient exports) being one of them (García-Molina and Ruíz-Tavera, 2009:287). Chenery and Strout (1966:680) firstly highlight that general agreement exists on the principal levers of change that allow stagnant economies to be transformed into economies that achieve consistently high levels of economic growth: an increase in human capital, a higher level of investment and savings, innovations of productive capacity, a more favourable composition of output, the advancement of social and economic institutions, and so on. A long-term transformation of the economy towards a higher growth rate requires all these changes that must be financed from an economy's own resources (i.e. via sufficient domestic savings), or from imports paid by export earnings (Chenery and Strout, 1966:680). The attempt to raise economic growth can be thwarted by a few bottlenecks that prevent access to the required resources for higher economic growth.

(i) The basic Chenery-Strout model

The Chenery-Strout model provides a useful tool for analysing the role that resource shortfalls play in constraining economic growth and offers suggestions for lifting the limits imposed by these bottlenecks. Specifically, the model emphasises that economies face two sequential limitations on accelerated growth (Cochrane, 1972:385). The first constraint occurs in the early stages of development where investment is limited by the supply of domestic savings, in the absence of sufficient capital inflows (Maizels, 1968:53). In later stages of economic development, the achievement of the target growth rate can be frustrated by a limit set on the economy's ability to import due to a lack of sufficient export earnings. Thus, for any target growth rate, two *ex ante* financing gaps occur: the savings gap is attributed to the difference between domestic savings and investment, while the trade gap occurs as a result of the relationship between the growth of income and the growth of the 'minimum' level of imports consistent with that level of income growth (Maizels, 1968:53). The 'minimum' level of imports indicates the value of essential foreign goods necessary for economic development, which could be supplies of machinery and equipment and raw materials, for example (Chenery and Strout, 1966:682). In other words, a trade gap is generated when the structure of the economy is such that the level of imports required for economic expansion could only be obtained by running a consistent balance of trade deficit (Cochrane, 1972:385). The critical GDP growth rate is achieved when "investment resources

(domestic and foreign) and imported commodities are freely available at constant prices" (Maizels, 1968:53). Based on a set of basic national accounting identities shown below, the savings and trade gaps can be identified. Since Equations 2.4.1 and 2.4.2 can both be defined as equalling foreign capital inflows, F, Equation 2.4.3 can be derived, which indicates that *ex post* the savings gap (S-I) is equal to the trade gap (X-M) (Same, 2007:5). Specifically:

$$I \equiv S + F \tag{2.4.1}$$

$$X + F \equiv M \tag{2.4.2}$$

$$S - I \equiv X - M \tag{2.4.3}$$

Foreign capital inflows therefore play the dual role of filling the gap between minimum imports and export earnings, and simultaneously supplement domestic savings to finance the desired level of investment (Maizels, 1968:52).

(ii) The role of exports within the basic Chenery-Strout model

Similarly to Thirlwall and Dixon's (1979) model of export-led growth, Maizels (1968:45) reaches the conclusion that exports are likely to contribute to economic growth, because they finance imports. He adds that other credit elements in the balance of payments schedule such as long-term capital inflows must also be accounted for as encouraging growth via the capacity to import.

In more concrete terms, the two gaps model works in such a way that the target growth rate, which is linked to a required level of net capital inflows, can be raised if exports growth can be lifted. In other words, as the anticipated rate of growth of exports rises, the same amount of net capital inflows would be consistent with progressively higher rates of economic growth, until the savings-constrained phase is reached (Maizels, 1968:57). When the savings-constrained phase is reached the economy no longer has the required domestic resources to encourage higher rates of economic growth in combination with imports (Maizels, 1968:56). Nonetheless, up to that point exports have a direct, positive impact on economic growth.

(iii) The extended Chenery-Strout model

The basic Chenery-Strout model assumes that changes in exports have no impact on either domestic savings or investment, which implies that changes in the rate of growth of exports have no bearing on the *ex ante* savings gap (Chenery and Strout, 1966:685). Contrary to this simplified assumption, Maizels (1968:56) argues that it is misleading to view the two *ex ante* gaps as independent of each another. There are grounds to believe that variations in exports impact domestic savings if the propensity to save in the export sector exceeds that of other

sectors of the economy, or if government savings depend largely on taxes derived from international trade (Wilbur and Haque, 1991:136). Furthermore, in the long-run sustained expansion of the export sector could lead to increases in the marginal propensity to save in other sectors too (Maizels, 1968:58). Thus, the basic Chenery-Strout model is extended to afford exports growth a more significant role in overcoming the two financing gaps that curtail economic growth prospects. It is proposed that a rise in the anticipated rate of growth of exports would thus reduce not only the *ex ante* trade gap as before, but would also lead to a reduction in the *ex ante* savings gap, which depends on the increase in the income of the export sector and that sector's marginal propensity to save. This means that the basic model would "overstate the *ex ante* savings gap for countries having a significant savings response to export changes" (Maizels, 1968:58). Furthermore, empirical evidence exists that supports the hypothesis that higher exports induce higher domestic savings rates (Wilbur and Haque, 1991:144). Thus the importance of raising the rate of growth of exports according to the extended Chenery-Strout model, lies in overcoming both the limit on the ability to invest and the limit on accessing the required supply of complementary inputs (via imports) to achieve the desired growth rate. At the same time, export-led growth could enable countries to reduce their dependence on foreign aid or large capital inflows to finance the resources for continual development (Wilbur and Haque, 1991:135). If it is the case that the export-led growth hypothesis as outlined by the extended Chenery-Strout model holds empirically, then the challenge of ensuring financial sovereignty in current economic conditions warrants efforts such as export promotion, since these could help reduce South Africa's dependence on volatile capital inflows that can be pulled out of the country within seconds and thereby place the economy in jeopardy. As Gill Marcus, Governor of the South African Reserve Bank, emphasised in a recent speech, the tapering off of Quantitative Easing in the United States in combination with other factors has contributed to an outflow of capital from emerging market economies such as South Africa (Marcus, 2013:1). She postulates that the weak exchange rates of emerging economies and capital outflows could "mark the start of a new mutation of the on-going global crisis". Hence, the South African economy needs to position itself in the most favourable way to adapt to these developments. The optimal strategy in this regard may well include a concerted effort to raise exports, through developing brands and technologies that can be exported (Marcus, 2013:1). In that way it may be possible also to alleviate current sources of South Africa's vulnerability that include a high current account deficit and relatively low foreign exchange reserves.

2.4.5 An extension: the unified two gaps model

García-Molina and Ruíz-Tavera (2009) propose an ingenious approach for combining the insights of both Thirlwall's 'balance of payments constrained growth model', as well as Chenery and Strout's 'two gaps model'. Although the authors highlight that these models differ in their approach, with the former founded on the Keynesian tradition and the latter based on the structuralist approach, these models remain fundamentally compatible, as both view the external sector as a crucial constraint on economic growth. Where Thirlwall's law expresses growth in dynamic terms, not taking into account the level of development in the economy, the two gaps model works in level terms, but can explicitly address the particular development stage faced by the country. In combination, García-Molina and Ruíz-Tavera (2009:270) anticipate an encompassing model that is able to describe the dynamics of growth in developing countries.

For a semi-industrialised, middle income, developing economy, García-Molina and Ruíz-Tavera (2009:273) derive a unified 'two-gap dynamic' model. A nuanced understanding of the role of exports in the overall growth process can be obtained by analysing the impact of a change in exports within the framework presented by the authors. Initially, capacity is underutilised until the export growth rate rises to an equilibrium growth rate of x^*. As a result, the rise in exports can be added to aggregate demand, enabling the economy to reach a stronger equilibrium output growth rate of y^* (García-Molina and Ruíz-Tavera, 2009:283). A higher export growth rate than x^* implies that output growth would again be limited. The economy is now faced with the savings constraint, which occurs when an increase in exports and a low elasticity of output to capital combine to generate excess demand (García-Molina and Ruíz-Tavera, 2009:284). A reduction in investment (crowding-out) or consumption (compulsory savings) follows, which reduces output growth.

A remarkable outcome of this view of economic growth and exports is that in an economy characterised by a small enough elasticity of output to capital, there exists a unique export growth rate that maximises the output growth rate (García-Molina and Ruíz-Tavera, 2009:284). A rate of export growth above, or below x^*, yields an output growth rate that is inferior to the maximum rate of y^*. Therefore a non-linear, inverted U-shaped relationship exists between exports and economic growth. García-Molina and Ruíz-Tavera (2009:284) conclude that a developing economy should pursue an export-led growth strategy only so long as the economy faces a foreign exchange constraint, and only until the optimal rate is reached, before the savings constraint is activated.

Depending on the specific characterisation of the economy in question, changes in the variables within the two dynamic gaps lead to different outcomes with respect to the growth of output. As has been outlined above, a higher export growth rate does not unequivocally cause an increase in the output growth rate. As such the unified dynamic gap model developed by García-Molina and Ruíz-Tavera (2009) limits the generality of Thirlwall's Law. A clear implication of the outcome of their analysis is that export-led growth should not be pursued blindly, in the hope that it would always lead to higher economic growth. The developing country in question needs to be analysed carefully to diagnose whether it currently faces a foreign exchange or savings constraint and all further policy actions should be tailored accordingly. Furthermore, the impact of capital inflows or a change in the income elasticity of import demand can easily be accounted for, similarly to any other factor included in the unified model proposed by García-Molina and Ruíz-Tavera (2009).

2.4.6 The openness-poverty nexus

Nissanke and Thorbecke (2006) provide an exploration of the structural factors and policies that affect the transmission of impulses through various channels in developing countries as a result of openness to trade. Concerns have been raised, particularly in the field of Development Economics, that the globalisation process has thus far actually exacerbated adverse poverty and income distributions in developing economies (Culpeper, 2005:9). In this regard, Nissanke and Thorbecke (2006:1340) emphasise that the globalisation-poverty nexus, above all, is complex and heterogeneous. As a result of multi-faceted channels and threshold effects, it is likely that the globalisation-poverty link is nonlinear. In fact, each subset of links within the *globalisation/openness–growth – income distribution – poverty nexus* is fiercely debated by economists (Nissanke and Thorbecke, 2006:1340). Apart from the effects of growth on poverty, arising out of openness to trade, globalisation is known to generate winners and losers, impacting both vertical and horizontal inequality (Ferreira and Ravallion, 2008:14). Notably, Nissanke and Thorbecke (2006:1340) argue that due to the dynamic interaction of multifaceted channels over space and time, the overall impact of globalisation and openness on the poor can only be determined on the basis of highly context-specific empirical studies. Furthermore, only a detail-oriented case study could trace the influence of path dependence of various factors, such as resource abundance, export and production structures, policies, and institutions (Nissanke and Thorbecke, 2006:1340).

The openness-growth link is neither "automatically guaranteed nor universally observable" (Nissanke and Thorbecke, 2006:1340). Thus, an economic strategy that involves more

openness and integration is likely to exacerbate as much as alleviate the gaps between developed and developing nations (Kozul-Wright and Rayment, 2004:4). Whether openness to global market forces launches a virtuous cycle or vicious cycle of growth (due to processes of cumulative and circular causation) will hinge on the initial conditions at the time that the developing economy is exposed, as well as the effectiveness of design and implementation of policy to guide the process of integration (Kozul-Wright and Rayment, 2004:4). This implies that successful integration with global markets for developing countries largely depends on the nature of integration and specialisation. In particular, it is argued that developing countries ought to reach a certain threshold, through the transformation of their trade and production structures, before they can successfully integrate with world markets (Jurajda and Mitchell, 2003:137 & World Bank, 2002:2). Thus, developing countries first need to reach a 'take-off point', before they can benefit from the potential growth effects of openness and globalisation (Nissanke and Thorbecke, 2006:1351). In contrast to the Heckscher-Ohlin trade model, which treats two sectors symmetrically regarding their ability to contribute to the realisation of gains from trade, Nissanke and Thorbecke (2006:1351), for example, argue that patterns of specialisation do matter for the welfare effects of an export-induced growth trajectory. In other words, the impact of international trade on growth is crucially affected by the pattern of specialisation and integration (Nissanke and Thorbecke, 2006:1351).

As opposed to the perspective of the Heckscher-Ohlin model, the two sectors (generally assumed to be either capital or labour abundant) are likely to display differing dynamic scale economies, that is, dynamic externalities via technological spill-over effects and the accumulation of human capital. Applying this idea to the trade model suggests that an economy specialising in a sector with a larger positive externality would grow faster over time, compared with a trading partner that specialises in a sector with a lower externality (Nissanke and Thorbecke, 2006:1351). Consequently, the two countries' trade-induced growth rate could diverge considerably, subject to their respective patterns of specialisation. Nissanke and Thorbecke (2006:1351) conclude that openness on its own is not enough to guarantee that development takes place. To a significant extent, the internal growth configuration and forms of integration determine whether developing countries can reap the potential benefits of openness-induced growth.

In addition, Nissanke and Thorbecke (2006:1352) highlight the importance of a strategic design of national development policies that takes account of the skewed nature of global

integration. In particular, the asymmetries in market power and access to resources (such as information and technology) between Transnational Corporations (TNCs) on one hand and local farmers and entrepreneurs in developing economies on the other hand, continue to bring about a highly skewed distribution of gains from international trade (Kaplinsky, 2002:33). This is possible, as trade is largely mediated through the intra-firm exchanges carried out by TNCs, commanding a massive proportion of international production and marketing networks.

In light of the observed trends towards inequality, both across countries and within many countries (Ferreira and Ravallion, 2008:25), it is necessary for developing nations to take an active role in pursuing domestic development policies that allow them to reap the potential benefits of openness to international trade. In the words of Nissanke and Thorbecke (2006:1355), "passive liberalisation may lead to marginalisation". Alternatively, an active pursuit of favourable domestic development policies requires that such policies are effectively geared towards a long-term vision of promoting comparative advantages in value-added activities further along the technology ladder (Kaplinsky, 2002:33). Strongly associated with the perspectives of Latin American Structuralism, Nissanke and Thorbecke (2006:1355) predict that only those countries that generate patterns of comparative advantage in high-skill and high-productive sectors will gain from global integration and openness to trade.

2.4.7 Implications for South Africa

The theories and insights outlined above also have implications for policy formation in South Africa. The recognition of the importance of proactive domestic policies that protect the South African economy may imply a move towards a developmental state. Such a developmental approach could help suitably guide the principal levers of change towards higher economic growth through the promotion of high-value manufacturing export production, where markets on their own have failed to achieve the desired transformations. As defined by Jahed and Kimathi (2008:97), a developmental state is one that has a developmental orientation and consequently takes on developmental functions. For example, the literature suggests that internationally, the form of economic development will soon be affected by shifts in energy uses that result from resource and environmental capacity constraints (Watson, Boudreau and Chen, 2010:17). In this regard, Freund and Witt (2010:63) argue that there is now growing awareness of the high cost of different sources of energy that are associated with the current economic trajectory in South Africa, which is still heavily

dependent on old comparative advantages related to the MEC. Perhaps the export sector could benefit most from a move towards a developmental state, due to the high potential for "dynamic restructuring of productive structures" and the expansion of value-add manufacturing in this sector (Mohamed and Roberts, 2008:93). This could help build new comparative advantages that are not tied to escalating resource constraints, or the decline in terms of trade that is associated with the continued dependence on primary goods exports.

2.4.8 Conclusion

In conclusion, the treatment of the relationship between trade and economic growth in Development Economics reveals that economic growth is an extremely complex, multifaceted and path dependent process. As Section 2.4.6 showed, a number of macro- and micro-economic variables may interact in different ways at different stages to shape economic growth in an economy – a notion also supported by recent empirical evidence (see Chapter 4). Moreover, access to the required resources for accelerated economic growth is a dominant theme in development theories of export-led growth and improved export performance is often viewed as the preferred path towards ensuring such resources are available to the developing economy. While Thirlwall's Law outlined in Section 2.3 is fundamentally compatible with Chenery and Strout's two gaps model discussed in Section 2.4.4, the former emphasises income-induced increases in imports as an inevitable but problematic outcome, while the latter highlights the critical importance of access to sufficient imports to enable faster economic growth. Yet, both models agree that exports should be viewed as the key to overcoming the constraints imposed on growth when demand for imports rises. Moreover, an element that Development Economics introduces to the discussion of export-led growth is the explicit inclusion of the development stage of an economy as a modifier shaping the role exports play within the economic growth process of an economy (see Sections 2.4.4 and 2.4.5). The discussion of exports as playing an important role in enabling the achievement of the desired investment rates (through allowing for higher savings as well as higher imports) highlights the interconnectedness of these macro-economic variables within the growth process of an economy and implies that an investigation into the exports-growth link of an economy requires the construction of a multivariate model that includes these variables, among others. The discussion on the optimal selection of variables to specify such a multivariate model is extended in Chapters 4 and 5.

2.5 CONCLUSION

As Chapter 2 showed, all three theoretical approaches to the analysis of the export-growth relationship are important to gain a more in-depth understanding of the role exports play in the economic growth process in South Africa. Furthermore, the discussion on the theoretical literature provides a suitable background that helps to contextualise the study's own empirical findings that will be presented in Section 5.5.

Preceding the discussion on the existing empirical evidence on the export-growth relationship, which will follow in Chapter 4, Chapter 3 will first delineate key developments in South African trade policy since 1925. The aim is to gain a better understanding of the specific trade and trade policy path South Africa has taken, which would further facilitate the interpretation of the study's empirical results, which will be discussed in Chapters 5 and 6.

Chapter 3

THE EVOLUTION OF TRADE POLICY IN SOUTH AFRICA

3.1 INTRODUCTION

Similarly to several other emerging market economies and well-documented in studies of economic development such as Holden (1990), Todaro and Smith (2006), or Yaghmaian and Ghorashi (1995), South African industrialisation has occurred via a process of import substitution industrialisation that was followed by export-oriented industrialisation in more recent times. Hence, South Africa has in the past employed trade strategies that afford different incentives to import-substituting production relative to production for the export market (Holden, 1990:261). Bhagwati (1988:32-35) provides a clarification of the definitions of export-promoting versus import-substituting trade strategies.

The import-substituting trade strategy entails an incentive structure that results in an effective exchange rate for exports (EERx) that is less than that for imports (EERm). EERx includes not only any rands earned from a one dollar unit of South African exports at parity, but also any export subsidy, tax credit or any other support for the export industry that is not afforded to industries producing solely for the domestic market (Bhagwati, 1988:32). Similarly, EERm includes the number of rands paid per one dollar international transaction, plus any import tariffs, import premiums and surcharges. If the incentive structure is such that EERx<EERm, then a 'bias against exports' can be detected. However, if the bias against exports is eliminated and the incentive structure is such that EERx=EERm, the trade regime can be described as export-promoting (Holden, 1990:262). Thus, a move from an import-substituting trade regime to a trade neutral strategy, which removes the anti-export bias and facilitates better export performance, can be illustrated by a movement along the production possibilities frontier XM, from point A to point B in Figure 3.1. When a country produces at A for example, tariff protection or overvalued exchange rates create an incentive to produce predominantly for the domestic market rather than world markets. So-called 'ultra-export promoting' economies, which produce at point C on the other hand, pursue a pro-export bias strategy that gives rise to an incentive structure where EERx>EERm. The successful Far Eastern economies have pursued a trade strategy that approximates most closely the export-promoting strategy where EERx and EERm approach neutrality (point B), rather than pursuing a trade strategy that amounts to a significant positive bias in favour of export producers (point C) (Bhagwati, 1988:32).

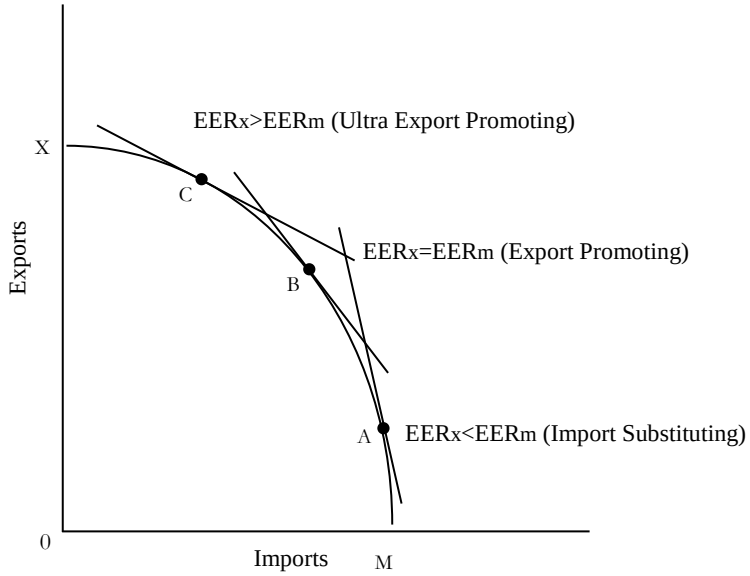

Figure 3.1. Trade strategies and the structure of incentives
Adapted from Bhagwati (1988:49)

It is also important to note that the pursuit of either the export promoting or ultra export promoting trade strategy does not prohibit the use of import-substituting trade measures in selected sectors. The above definitions refer to the overall structure of incentives on an aggregate level, which implies that even within an export-promoting strategy, some sectors may operate within an import-substituting policy environment and vice versa. As Bhagwati (1988:33) highlights, most successful developing economies in the Far East have pursued a broadly export-promoting strategy, while simultaneously pursuing import substitution for selected activities. As such, a distinction between the degree and pattern of import-substitution must be taken into consideration when examining the experience of successful export-promoting or ultra-export promoting countries.

Several emerging economies, such as South Africa, have pursued import-substitution as a strategy for achieving industrialisation in the past. Import substitution industrialisation (ISI) is defined by Bell (1993:81) as "… domestic production of previously imported manufactured goods, mainly for the domestic market." Such import-substituting production is encouraged by all measures that shift the incentive structure to the effect that the effective exchange rate of imports (EERm) is raised above the effective exchange rate for exports (EERx). Since 1972, South Africa has increasingly moved towards an export-oriented growth path, which entails the deliberate promotion of export expansion. This strategy includes trade liberalisation to remove the anti-export bias, as well as several initiatives to encourage the

expansion of South African export industries via export incentive schemes. Efforts to shift the economy towards a more neutral trade strategy are reflected by a movement from A to B in Figure 3.1. As such, South Africa has been striving to achieve further industrialisation through the encouragement of its export industries – a strategy that is referred to as export-oriented industrialisation (EOI).

In order to facilitate a discussion on the optimal trade strategy for South Africa in the future, the following section outlines South Africa's trade policy path since 1925, as well as some influential theoretical developments in the field of trade theory that have shaped policy formation in those years.

3.2 IMPORT SUBSTITUTION INDUSTRIALISATION FROM 1925

From 1925 onwards, South Africa adopted the path of ISI as a means of fostering industrialisation, reducing its dependence on exports of agricultural goods and gold, as well as promoting greater independence from Britain (Lemon and Gibb, 2002:292). By pursuing import-substitution as a vehicle for industrialisation, South Africa's trade strategy was similar to that of several other developing economies in the past (Holden, 1990:260). Especially during the 1950s and 1960s, ISI was the prevailing approach to trade strategy. The general sense of pessimism surrounding the possibility of export-oriented industrialisation for developing countries was informed by two significant pioneers of Development Economics: Raul Prebisch and Ragnar Nurkse. Prebisch (1952:3) argued that countries dependent on exports of primary goods would be disadvantaged, as they faced diminishing terms of trade. Due to differing income elasticities related to primary goods vis à vis manufactured goods, countries relying on exports of primary products would find that international prices for such goods tended to rise more slowly than prices of manufactured goods, which they largely import (Prebisch, 1952:3). The decline in the terms of trade of developing countries implies that gains from trade may be reduced in the short-run and future growth potential may be capped, due to the country's inability to finance the imports required to facilitate higher growth rates (Myrdal, 1956:278).

Nurkse (1952:571) viewed the limits of export-oriented growth for developing countries as stemming from the idea that foreign markets do not have the capacity to absorb imports on the scale required to accommodate developing countries as their development accelerates. In other words, even if a country promoted a higher proportion of manufacturing exports within its export basket and thereby avoided the issue of declining terms of trade, "elasticity"

pessimism remained a strong deterrent to the pursuit of outward-oriented growth in developing economies during the post-World War II period (Bhagwati, 1988:28 & Kattel, Kregel and Reinert, 2011:423). In this regard, Bhagwati (1988:30) poses the question whether the success of the Four Asian Tigers (Hong Kong, Singapore, Republic of Korea, and Taiwan) in the 1950s and 1960s could be reliably used as evidence to support the pursuit of export promotion in general, or whether this would be a "fallacy of composition". Consequently, the question at issue is whether the East Asian trade strategy can be exported to all developing countries, or whether the success of a few was founded on the failure of many others. In addition, Bhagwati (1988:30) describes another source of concern that views the opening up of new markets as restricted, since exporters would soon encounter protectionist measures that would put an end to successful export-oriented industrialisation. Critics of the export-promoting strategy anticipate that importing economies would likely be provoked by import penetration and perceived market disruption (Ariff and Hill, 2011:94).

Since the possibilities for export-oriented growth in developing economies were seen as limited in the post-World War II period, support for import substitution was more prevalent among development economists (Todaro and Smith, 2006:626). Theoretically, import substitution was based on the argument that the establishment of import-substituting industries would eventually allow the economy to reap the benefits of producing on a large scale (infant industry argument for tariff protection), or that the balance of payments would improve as fewer goods had to be imported (Todaro and Smith, 2006:627). Where the first stage of import substitution (often referred to as the 'easy stage' of ISI) constitutes the substitution of domestic production of previously imported consumption goods, the second stage of ISI involves the process of substitution through the domestic production of a gradually more diverse set of more downstream manufactured products – all made possible by a barrier of protectionist measures, such as high import tariffs and quantitative restrictions (Todaro and Smith, 2006:621).

As Jenkins (2001:11) and Bell and Madula (2001:5) argue, South Africa has benefitted greatly from the pursuit of ISI in the areas of employment, industrial development and diversification – most notably during the 'easy stage' of ISI from 1925 to 1972. According to Bell, Farrell and Cassim (1999:26) and Bell and Madula (2001:25), a significant reason for South Africa's success in pursuing ISI is founded on the relationship between economic growth and the current account deficit. Developing economies need to foster their 'macro-competitiveness', that is, their ability to grow without running into balance of payments

difficulties. Particularly in view of limited increases in the levels of sovereign debt and increasingly volatile and unreliable foreign capital inflows, the balance of payments, in the long-run, will have to balance mainly through the current account (Thirlwall, 2011:334). While the demand-side growth theories discussed earlier conclude that export encouragement is the preferred policy choice (often via conventional export-promoting measures), advocates of ISI view the reduction in import demand within ISI as the solution to maintaining the economy's macro-competitiveness. Bell and Madula (2001:25) illustrate that the move from ISI to EOI in South Africa has increased the economy's income elasticity of import demand, which has re-introduced a foreign exchange constraint and is likely to have dampened growth potential.

In earlier decades, when South Africa pursued import substitution, higher export growth and the consequent increases in national income would only lead to a limited rise in import growth due to swift import replacement. Since the early 1980s, however, a stronger outward orientation of the South African economy meant that higher national income no longer induces such "rapid import replacement" and instead a high income elasticity of imports consistently undoes the positive impact of exports growth on the availability of foreign exchange (Bell and Madula, 2001:25). The tendency towards import de-substitution, as illustrated by rising import penetration ratios[9] (see Figure 3.2), has been brought about, at least partially, by South Africa's trade liberalisation efforts (Bell *et al.*, 1999:27).

[9] The import penetration ratio (MPEN) is defined as follows: $MPEN = \frac{imports}{GDP - exports + imports} \times 100$. A value close to 100 suggests that domestic demand is mostly met by imports, whereas a value close to 0 suggests that a country is self-sufficient and domestic demand is mainly met by domestic production.

Figure 3.2. Manufacturing employment and import penetration
Source: Rodrik (2008:785)

An increase in the income elasticity of demand for imports may also have arisen as a result of a decline in the overall output/capital (Y/K) ratio of the economy (Bell *et al.,* 1999:27). As Figure 3.3 shows, compared to 1961-63, the ratio of GDP output to fixed capital was considerably higher than in 2008-11, which suggests (given the complementarity of capital and imported capital goods) that a significantly higher level of capital imports as a fraction of GDP is required in the latter period to support a one percentage point increase in potential output. Thus, an improvement in output capacity today, requires a more substantial increase in capital imports, which would negatively impact the current account balance and the economy's macro-competitiveness.

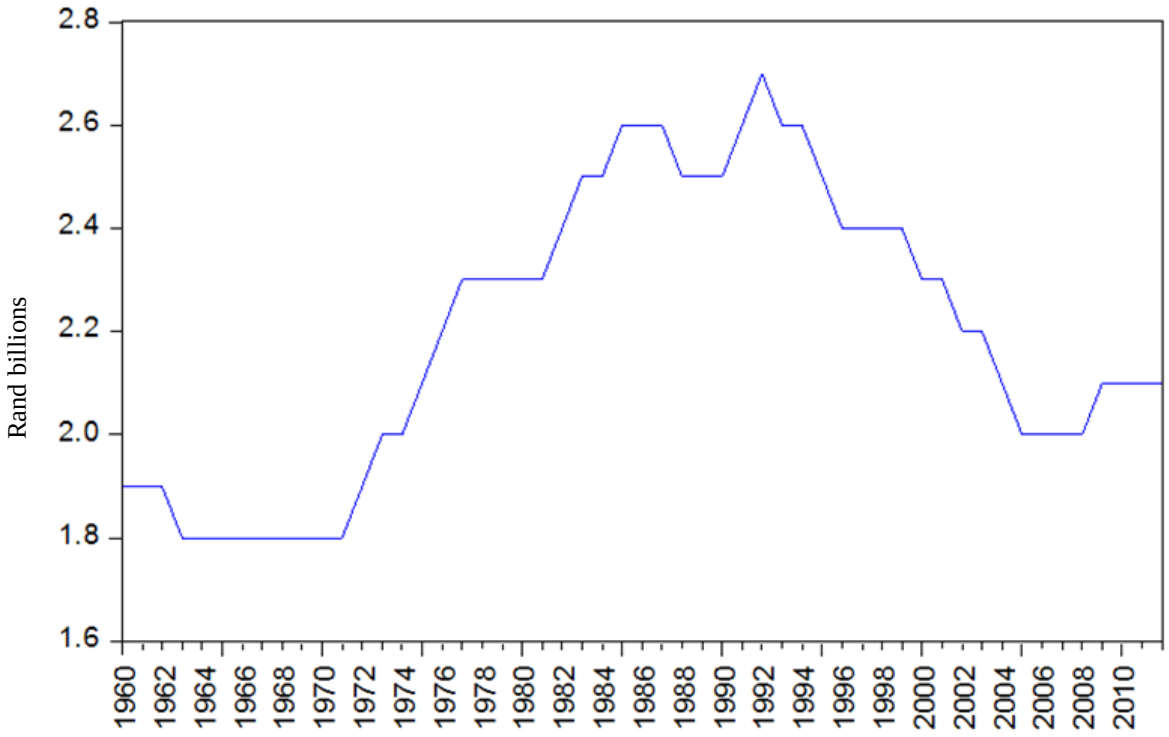

Figure 3.3. Output/capital ratio (rand billions), 1960q1-2011q2
Data source: Thomson Reuters DataStream

Apart from changes in the income elasticity of import demand, assuring a sufficient balance of payments growth rate for South Africa may also have been complicated by a comparatively low income elasticity of demand for South Africa's exports. Due to diverging income elasticities of demand for different export product categories (particularly primary versus manufacturing exports), developing countries dependent on natural resource exports struggle more to manage balance of payments crises than countries largely dependent on manufacturing exports (Spraos, 1991:352). According to Bell *et al*. (1999:26), the sectoral pattern of South Africa's exports, thus, was probably a significant obstacle to an improvement in macro-competitiveness. This argument strongly correlates with the sense of export-pessimism that arose from the Prebisch-Singer Hypothesis (diminishing terms of trade for primary goods exporters), but is extended to show that dependence on primary exports also negatively affects a country's ability to maintain its macro-competitiveness in response to external shocks (Spraos, 1991:362).

Thus, the struggle to sustain robust export growth, exacerbated by unfavourable developments in (i) the income elasticity of import demand and (ii) the income elasticity of demand for South African exports, is a major reason for the decline in the macro-competitiveness of the South African economy since its pursuit of liberalised trade, or the

rising constraint posed by a slowing balance of payments equilibrium growth rate (Bell *et al.*, 1999:27; Blecker, 2013 & Thirlwall, 2011). As such, 'elasticity pessimism' is an important reason for continued support for the pursuit of ISI, or selected import-substituting measures, as a vehicle for industrialisation in South Africa.

3.3 TRADE LIBERALISATION IN SOUTH AFRICA

When trade liberalisation is defined as "any act that would make a trade regime more neutral, in the sense that it reduces the bias towards production for the domestic market and against exports" (Bell, 1993:82), then South Africa has experienced at least two periods of liberalisation: the first one a relatively subtle effort to liberalise trade between 1972 and 1977, and the second one constituting a more concerted effort from 1983-1991.

The process of trade liberalisation ordinarily entails a shift towards neutrality through tariff reductions and the progressive removal of quantitative restrictions (QRs) (Bell, 1993:82). As noted earlier, this can be reflected by a movement from point A to point B in Figure 1, where the effective exchange rate for imports (EERm), after the removal of trade protection, equals the effective exchange rate for exports (EERx) at point B (Holden, 1990:261). Oftentimes, trade liberalisation also involves not only the removal of barriers to imports, but also the promotion of exports that results in a relatively higher incentive given to the production of goods and services for the export market than the domestic market. If such export-promoting efforts are successful, then this is reflected by a movement from point B to C, where the degree of incentive given to produce for the export market exceeds the incentive given to produce for the domestic market.

Although South Africa underwent a notable period of trade liberalisation in the 1980s, several authors suggest that South Africa experienced a third period of trade liberalisation in the 1990s that was more significant and sustained than all previous episodes of liberalisation (Cassim *et al.,* 2004:7 & Jenkins, 2001:13).

3.4 THE FIRST PERIOD OF LIBERALISATION (1972-1977)

Despite initial successes in using import substitution as a vehicle for industrialisation, by the 1970s, South Africa had reached the end of the so-called 'easy stage' of ISI (Holden, 1990:262 & Alves and Edwards, 2009:87). While South Africa had initially focused on import substitution in the consumer goods sectors, the focus progressively shifted to import substitution in upstream industries, especially in strategically important chemical and basic metals industries. However, import substitution by this stage failed to support earlier growth

rates. Since levels of import protection were high, leading to a considerable anti-export bias, export growth and diversification were limited, which further exacerbated South Africa's dependence on gold (Alves and Edwards, 2009:87).

The transition from import-substitution to export-oriented industrialisation in South Africa was heralded by the 1972 Commission of Inquiry into the Export Trade of the Republic of South Africa (the Reynders Report). Within the report, concern was voiced that imports were rising precipitously leading to a widening of the trade deficit that had to be funded by foreign capital and increasingly unstable foreign exchange earnings from gold exports (Jenkins, 2001:11). As a solution, the Reynders Commission emphasised the importance of reducing South Africa's reliance on gold exports for meeting its long-term foreign exchange needs. In addition, it was suggested that South Africa diversify its exports into non-gold exports such as manufactured exports. It was hoped that this could be achieved by introducing export incentives that counter the impact of distance from world markets and the inflow of subsidised exports from other countries (Cassim *et al.*, 2004:7).

Although no specific export subsidies were proposed by the Reynders Report, South Africa implemented the Export Development Assistance Scheme in 1972, with the aim of easing the anti-export bias that resulted from comparatively high levels of import protection. The scheme, which involved tax allowances for marketing costs related to exporting, was later seen as relatively modest, but nevertheless represented one of the first concrete steps towards trade liberalisation in South Africa (Bell, 1993:84). On the import side, the authorities began to dismantle QRs in order to replace them with equivalent tariffs and duties (Cassim *et al.*, 2004:6). Under pressure from GATT and the IMF, South Africa abandoned the practice of using import controls to help manage its balance of payments and negotiated a gradual lifting of QRs in 1972. As proposed by the Reynders Report, over the period 1972-1976, an accelerated attempt to abandon the use of QRs on imports lead to a reduced level of net protection. This was due to the replacement of the QRs by tariffs lower than those implicit in the QRs (Bell, 1993:85).

A significant influence on the effectiveness and sustainability of trade liberalisation efforts were movements in the real effective exchange, precipitated by changes in the gold price. A notable real appreciation of the rand, as a result of increasing gold prices in 1973-1974, triggered the implementation of emergency import duties to protect the manufacturing sector and the textiles sector in particular (Bell, 1993:85). Apart from a once-off 21.8% nominal

devaluation of the rand against the dollar in 1975 in response to a falling gold price, the rest of the decade was marked by an appreciation of the real exchange rate that severely affected the competitiveness of the manufacturing sector and gave rise to pressure from manufacturers for more extensive protective measures (Cassim *et al.*, 2004:7).

While the implementation of some incentives to support export expansion in the 1970s is likely to have reduced the anti-export bias of import substitution, the net degree of import protection declined only marginally. Furthermore, Bell (1993:85) argues that the real appreciation of the rand following the precipitous increases in the gold price, especially from 1979-1980, probably amounted to a reversal of any benefits that may have arisen from efforts to reduce the anti-export bias earlier that decade. Thus, it is possible to conclude that the effective exchange rate for imports probably still exceeded that for exports (Holden, 1990:266). As a result, the structure of incentives in place in South Africa, even after the first period of trade liberalisation from 1972-1977, still reflected that of import-substitution, as defined by Bhagwati (1988:32).

3.5 THE SECOND PERIOD OF LIBERALISATION (1983-1991)

The World Bank defines trade liberalisation as the erosion of protection for import-competing activities, usually with the objective of opening the economy to a greater influx of imports, via import liberalisation and currency devaluation (Michaely, Papageorgiou and Choksi, 1990:17). Furthermore, a central element within the process of trade liberalisation is direct export promoting measures that can help offset possible anti-export biases arising from remaining import protection measures and can therefore effectively swing the balance towards an export-promoting trade strategy (Michaely *et al.*, 1990:20). In light of this view of trade liberalisation, the period of 1983-1991 in South Africa displays all components of comprehensive trade liberalisation: import liberalisation, currency depreciation and export promotion.

3.5.1 Import liberalisation

On the recommendation of the Department of Trade and Industry in 1982, South Africa resumed the elimination of QRs in 1983, which lead to a decline in the proportion of the value of imports covered by QRs from 77% in 1983 to 23% in 1985 (Bell, 1993:89). Although manufacturers could apply for tariff increases to countervail the effect of the dismantling of QRs, the raised tariffs were effectively lower than the tariff rates implicit in the QRs, again, as in the period 1972-1976, leading to a net decline in the level of import

protection (Bell, 1993:89). However, the view that effective import protection declined in that period is contested by Jenkins (2001:12) and Alves and Edwards (2009:92) for example, who argue that effective protection actually rose in the 1980s as a result of the introduction of import surcharges in 1985 in response to escalating economic sanctions. Bell (1993:91) agrees that emergency protectionist measures during the economic downturn of 1984-1986 have led to a partial erosion of the degree of import liberalisation achieved thus far. Nevertheless, he argues that by the end of the second liberalisation period in 1991, the degree of effective import protection was significantly lower than at the start of the period. By the end of 1991, the proportion of imports subject to QRs had fallen further to 10% compared to 23% in 1985 (Bell, 1993:90). In combination with a less sympathetic stance towards private sector calls for protection towards the end of the 1980s, South Africa's progress regarding trade liberalisation was further cemented. While the Board on Tariffs and Trade (BTT), which succeeded the Board of Trade and Industry (BTI), still supported 65% of requests for protection in 1987, in 1989 only 20% of such requests were successful (Cassim *et al.*, 2004:8).

Although developments in the level of effective rates of protection in this period are difficult to ascertain, the authorities' commitment to trade liberalisation was affirmed in 1985, when the publication of a positive list that identified items that could be imported without approval was replaced by the publication of a negative list that specified only items that needed approval before being imported (Cassim *et al.*, 2004:8).

Moreover, several analysts detect a sudden, albeit involuntary shift to EOI, in response to the economic crisis of 1984-1986 (Hirsch, 2005:24 & Jenkins, 2001:12). The debt crisis of 1985 and severe balance of payments problems increased the urgency with which exports growth had to be promoted. In other words, EOI became an imperative (Alves and Edwards, 2009:92). Incentives to exporters were implemented to turn the historical current account deficit into a surplus, and thus to enable the servicing of foreign debt. Despite trade sanctions, non-gold exports increased on average by 7.7% a year between 1984 and 1990 (Jenkins, 2001:12).

3.5.2 Currency depreciation

As Holden (1990:269) highlights, movements in the real exchange rate[10] in the 1970s and 1980s show that the incentive to produce for the export market declined from 1975 to 1984, suggesting that South African manufactured exports were experiencing a fall in competitiveness. Indeed, Bell and Madula (2001:7) provide evidence to show that the change in relative prices that arose due to a massive appreciation of the rand especially between 1976 and 1983, had a significant impact on the manufacturing industry, leading to a fall in the rate of growth of exports of downstream durable goods from approximately 8.0% a year in 1960-70, to only 2.1% in 1970-80. Furthermore, the proportion of the downstream durable goods group within total manufactured exports declined from 15.7% in 1970 to 9.1% in 1980 (Bell and Madula, 2001:7). Only with the severe nominal and real depreciation of the rand, which began in late 1983, did the competitiveness of the export sector experience a turnaround (Holden, 1990:269). The share of exports in total domestic production increased for sectors such as clothing and footwear, paper and paper products, leather and leather products, machinery and miscellaneous products (Holden, 1990:268).

Furthermore, Holden and Gouws (1997:15) show by way of estimating the anti-export bias in South Africa for the period 1974-87, as well as for 1993, 1996 and 1999, that the inclusion of the price of gold in the price of exports leads to a shift in protection from importables to exportables in the form of an implicit tax. When gold is excluded, however, only about a third of such protection is shifted onto manufacturing exportables. Hence, it is not surprising that manufacturing exports experienced a recovery after the real depreciation of the rand in 1984-85 that resulted from the decline in the gold price (Holden and Gouws, 1997:15). The relationship between changes in the gold price and the real effective exchange rate is shown in Figure 3.5, which trace the developments in both variables from 1983 to 1991 – the second period of trade liberalisation in South Africa.

Although the depreciation of the rand, which was intensified by the debt crisis in 1985, was not deliberately caused by policy makers at the time, it nevertheless contributed to an improvement in the 'trade liberalisation index' in terms of the World Bank's criteria (Bell, 1993:90).

[10] To determine the competitiveness of the manufacturing sector, Holden (1990:169) defines the real effective exchange rate as the price of manufacturing exports divided by the price of other goods and services in the economy (e.g. the CPI).

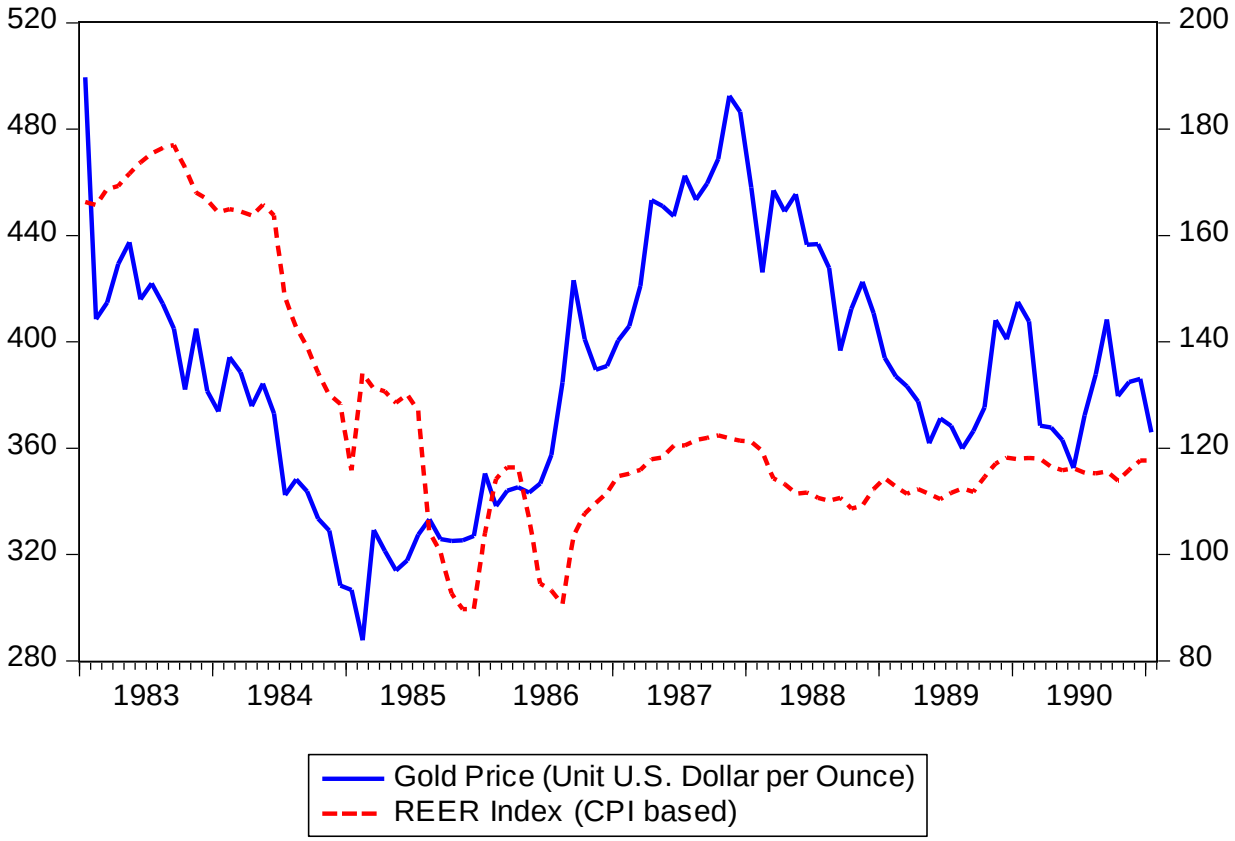

Figure 3.4. Gold price and the real effective exchange rate, monthly: 1983-1991
Source: Thomson Reuters DataStream

3.5.3 Export-promoting measures

Following the appointment of the Van Huysteen Committee in 1977, which was mandated to review the country's structure of export incentives, a new system of export incentives was implemented in 1980. The new system of export incentives intended to help improve the level of competitiveness of South African exports by countervailing comparatively high costs of production and distribution faced by South African exporters. Unfortunately, its introduction coincided with a significant real appreciation of the rand, a decline in world demand triggered by the global debt crisis, and hence a collapse in South African export growth (Cassim *et al.*, 2004:8).

A more effective move towards trade liberalisation in South Africa was achieved from 1983 onwards, when additional export-subsidies, aimed at reducing the anti-export bias flowing from sustained import protection, were introduced, which were accompanied by a temporary suspension of the dual exchange rate (Holden, 1990:265).

The sectoral "structural adjustment programmes" of 1989 that impacted the automotive and textiles industries in particular, further enhanced efforts to promote export-oriented production in South Africa (Bell, 1993:91). These programmes were borne out of the view that specifically designed incentive schemes could help develop existing and potential comparative advantage in targeted industrial sectors (Hirsch, 2005:118). However, such programmes were seen as too complex and hence vulnerable to capture by different interest groups, causing considerable conflict between the BTI that had put forward such structural adjustment programmes and the DTI (Cassim *et al.*, 2004:8).

In 1990, the export incentives scheme of 1980 was replaced by the General Export Incentive Scheme (GEIS), which constituted a broader and more powerful system to support export expansion (Bell, 1993:91). Within GEIS, exporters qualify for assistance that depends on the degree of processing and the fraction of local content used in production (Holden and Gouws, 1997:12). Roughly a third of all export trade (by value) qualifies for assistance under GEIS (Holden and Gouws, 1997:12). Since the majority of the metals and minerals products are not covered by GEIS, most of the benefits of the scheme are directed at supporting the manufacturing industry. Holden and Gouws (1997:17) show that GEIS was responsible for partially counterbalancing the anti-export bias that arose from remaining import tariffs in 1993.

Hence, export-incentive schemes such as GEIS, in tandem with structural adjustment programmes, further reductions in import controls such as QRs, and currency depreciations, made a significant contribution towards trade liberalisation during the period 1985-1991 (Bell, 1993:91). While a wave of import tariff hikes was imposed after 1985 to help deal with balance of payments problems, these were again reduced significantly in March 1990, such that by 1991, the overall balance tips in favour of trade liberalisation and an increasingly export-oriented growth path.

3.6 A THIRD LIBERALISATION EPISODE (1994→)

Despite having a considerable impact on reducing the anti-export bias, GEIS would be phased out by 1997. The general consensus, at the time, was that a scheme such as GEIS was not sustainable in the long-run, since it did not sufficiently encourage investment in the expansion of capacity within the export industry that could be maintained when funding stopped (Holden and Gouws, 1997:14). Furthermore, Hirsch (2005:131) highlights that the administration of GEIS was fraught with fraud, faced severe budgetary problems, and

contrary to the aims of the scheme, large capital-intensive manufacturers of intermediate products benefitted the most. According to Hirsch (2005:131-2), South Africa's agreement to honour the requirements of the 1994 GATT agreement came as a blessing for government, as it helped dismantle a costly, but largely ineffectual export-incentive scheme without losing credibility.

While Bell (1993) identifies two periods of trade liberalisation in South Africa that signify a progressive shift towards EOI, Cassim *et al*. (2004:9) emphasise that it is really the 1990s that saw the most far-reaching period of liberalisation in South Africa. In this regard, the involvement of the WTO is crucial for understanding South Africa's commitment to a comparatively drastic tariff reduction and rationalisation schedule.

When South Africa re-entered the global market in 1994, a general sense of export-optimism prevailed and export-led growth was seen as a significant opportunity, but also a necessity. Pressure from the WTO, IMF, World Bank and foreign investors imposes high opportunity costs on efforts to maintain an import substitution trade strategy, and turning back after significant action had been taken to promote export-oriented growth was not an option for the new government (Jenkins, 2001:11 & Todaro and Smith, 2006:62). Both the Industrial Strategy Project of 1993, commissioned by COSATU and the framework for macroeconomic policy MERG (1993), commissioned by the ANC, recognised the importance for South Africa to produce internationally competitive exports, through the promotion of an export-promoting trade regime (Jenkins, 2001:13).

Following the suggestions of policy frameworks at the time, South Africa's offer at the Uruguay Round in 1994 included the complete removal of export subsidies, as well as a 33% reduction in industrial import tariffs, a 36% reduction in agricultural import tariffs and a 21% reduction in agricultural subsidies within a five to six year period (Hirsch, 2005:130). The provisions of the Uruguay Round also included binding approximately 98% of all tariff lines at the Harmonised System (HS) eight-digit level as compared to 18% before, along with the rationalisation of over 12 000 tariff lines, which would be abolished and replaced by six tariff categories (0%, 5%, 10%, 15%, 20%, and 30%) (Alves and Edwards, 2009:93). In order to reduce the abundance of tariff lines, all industrial products subject to tariffs below 3% would be zero-rated, spikes in absolute tariff levels would be capped, where protection was not essential, tariffs would be cut to 0%, and all remaining import surcharges were lifted on 1 October 1995 (Cassim *et al*., 2004:11). Furthermore, South Africa's offer to GATT during

the Uruguay Round included the tarrification of QRs on agricultural produce that was later followed by a simplification of the system of *ad valorem* tariffs applicable to the agricultural sector (Alves and Edwards, 2009:94). In sum, the most important effect for South Africa of the 1994 GATT agreement was therefore the end of GEIS and considerable tariff reform.

Although not all commitments of the 1994 GATT offer were realised (particularly within the area of tariff simplification), there appears to be agreement (see Alves and Edwards, 2009:96; Cassim *et al*., 2004:12; Edwards, 2005:754 & Jenkins, 2001:13) that substantial progress was achieved during the 1990s regarding South Africa's objective of liberalising trade and promoting a more neutral export-promoting trade strategy, as defined by Bhagwati (1988:32). Table 3.1 supports the view that considerable progress was made in the 1990s regarding the simplification of the tariff structure. While the number of tariff lines was still 12 500 in 1990, by 1999, this number had declined by 61% to 7 743. Edwards and Lawrence (2006:33) find that the import-weighted effective rate of protection declined from 35.6% in 1989 to 14% in 2000.

Table 3.1. Tariff changes, 1990-1999

	All rates 1990	**All rates 1996**	**All rates 1999**	**Positive rates 1999**
Number of tariff lines	12 500	8 250	7 743	2 463
Number of different rates (bands)	200	49	47	45
Minimum rate	0%	0%	0%	1%
Maximum rate	1 389%	61%	55%	55%
Unweighted mean rate	27.5%	9.5%	7.1%	16.5%

Notes: 'Positive rates' contains only non-zero tariff rates; 'all rates' contains positive rates, zero rates and non-available entries

Source: Lewis (2001:3)

Moreover, Table 3.2 shows a disaggregated view of the decline in weighted import tariffs for a number of industries between 1996 and 2004. In total, weighted tariffs for all industries declined from 11% in 1996 to 7.7% in 2004, constituting a 3.2 percentage point decline in weighted tariffs (Gonzalez-Nuñez, 2010:32).

Table 3.2. Import tariffs (in constant prices) for South Africa, 1996 – 2004

		Weighted tariff 1996	Weighted tariff 2004	% point change in tariff 1996-2004	Effective rate of protection 2004
1	Clothing	61.4%	35.8%	-25.5%	103.4%
2	Beverages	22.1%	4.1%	-18.0%	12.1%
3	Motor vehicles and parts	44.7%	29.9%	-14.7%	116.5%
4	Tobacco	39.3%	25.6%	-13.7%	12.1%
5	Footwear	39.6%	29.4%	-10.2%	78.3%
6	Textiles	26.6%	17.2%	-9.4%	68.3%
7	Printing and publishing	9.8%	1.0%	-8.7%	-1.2%
8	Non-metallic mineral products	10.6%	3.6%	-7.0%	10.9%
9	Other industries	11.6%	5.1%	-6.5%	3.4%
10	Gold mining	6.0%	0.0%	-6.0%	-1.5%
11	Petroleum and petr. products	5.8%	0.4%	-5.4%	-0.5%
12	Plastic products	19.0%	13.8%	-5.1%	25.8%
13	Metal products	10.8%	5.7%	-5.1%	9.8%
14	Paper and paper products	8.5%	5.4%	-3.1%	18.9%
15	Basic iron and steel products	5.7%	2.7%	-3.0%	6.8%
16	Electrical machinery	8.2%	5.3%	-2.9%	11.1%
17	Agriculture	4.7%	2.4%	-2.3%	-0.1%
18	Glass and glass products	9.7%	7.7%	-2.0%	18.2%
19	Other chemical products	4.6%	2.7%	-1.9%	14.7%
20	Basic non-ferrous metal products	3.2%	1.5%	-1.8%	2.9%
21	Rubber products	16.6%	14.9%	-1.7%	41.2%
22	Basic chemicals	3.5%	2.1%	-1.4%	5.7%
23	Furniture	19.9%	18.6%	-1.3%	61.4%
24	Other transport equipment	0.9%	0.2%	-0.7%	-3.4%
25	Machinery	2.4%	1.8%	-0.6%	0.1%
26	Scientific equipment	0.7%	0.3%	-0.5%	-4.1%
27	Other mining	0.2%	0.0%	-0.1%	-1.1%
28	Wood and wood products	4.0%	3.8%	-0.1%	5.2%
29	Food	9.4%	11.7%	2.3%	61.8%
30	Coal mining	0.0%	0.0%	0.0%	-2.0%
31	TV and communications eq.	2.0%	2.2%	0.2%	1.3%
32	Leather products	16.3%	17.2%	0.8%	28.6%
33	Primary	1.0%	0.3%	-0.7%	-1.0%
34	Manufacturing	12.4%	9.3%	-3.1%	19.25%
35	Services	-	-	-	-1.4%
36	**Total**	**11.0%**	**7.7%**	**-3.2%**	**-**

Source: Gonzalez-Nuñez (2010:32)

It is interesting to note that the reduction in import tariffs and the rationalisation of the system of tariffs in combination with the progressive phasing out of GEIS in the 1990s, amounted to an increase in the anti-export bias coefficient[11], which is illustrated in Table 3.3 below. Holden and Gouws' (1997:17) calculations show that the anti-export coefficient for the total economy increased to 1.32 in 1996 and 1999, from an earlier value of 1.19 in 1993. The

[11] Generally associated with Bhagwati (1978), the anti-export bias coefficient measures the bias in the incentive structure against the export sector relative to the import-substituting sector. It is defined as the ratio of the effective exchange rate for exports (EERx) to the effective exchange rate for imports (EERm) (Athukorala, 2006:162).

coefficient for total manufacturing first rose notably from 1.27 in 1993 to 1.45 in 1996, and then marginally fell to 1.44 in 1999 (Table 3.3).

Table 3.3. Anti-export bias (including export incentives), 1993, 1996 and 1999

	1993	**1996**	**1999**
Total Economy	1.19	1.32	1.32
Total Manufacturing	1.27	1.45	1.44

Source: Holden and Gouws (1997:17)

When it became clear that GEIS would be phased out, policymakers in South Africa were looking for an improved, more cost-effective way to support the export sector. What followed was the implementation of a credit guarantee programme for small exporting firms, on top of an existing government initiative that provides export credits (Jenkins, 2001:14). According to Hirsch (2005:132), this programme was one of the most effective initiatives that have been introduced in South Africa to support smaller firms and their endeavours to penetrate world markets, particularly markets in fast-growing developing countries.

The World Player Scheme, run by the Industrial Development Corporation (IDC), was implemented to assist those firms that were most severely affected by the tariff phase-down arranged in Marrakech in 1994. Firms facing tariff cuts exceeding 15% were offered discounted loans for projects aimed at building up their competitiveness to succeed in the global marketplace (Hirsch, 2005:135).

Another initiative, which formed part of trade policy reform in the 1990s, was the overhaul of the export marketing assistance scheme. To counteract the impact of trade liberalisation on smaller, labour intensive firms, the new Export Marketing and Investment Assistance Scheme was introduced. This scheme offers additional stimuli to develop South African goods and services and to help recruit new foreign direct investment into the country (DTI, 2010a:5).

The government's role in promoting exports entailed not only tariff liberalisation or export incentive schemes, but also "a more forceful approach to market access arrangements […] as well as a commitment to commercial presence in key export markets" (NPC, 2011:107). In other words, a core element of the economic strategy since 1994 has included a widening of the market for South African goods and services through a stronger pursuit of exports to rapidly growing economies. Table 3.4 outlines the main trade agreements South Africa has joined since 1994.

Table 3.4. Important trade arrangements since 1994

Date	**Trade Agreement**
August 1996	Signing of the SADC Free Trade Protocol (implemented in September 2000)
January 2000	Implementation of South Africa-EU Trade, Development and Co-operation Agreement (TDCA)
May 2000	Preferential access to US for some products under the African Growth and Opportunity Act
October 2002	2002 Southern African Customs Unit (SACU) Agreement
December 2004	Preferential trade agreement (PTA) signed between SACU and Mercado Común del Sur (Southern Common Market and Mercosur)
July 2006	Free trade agreement (FTA) signed between SACU and the European Free Trade Area (EFTA) (implemented in 2008)

Source: Adapted from Alves and Edwards (2009:95)

South Africa joined the Southern African Development Community (SADC) in 1994, significantly raising the region's bargaining power on the international stage by multiplying the Community's GDP fourfold (Hirsch, 2005:137 & Jenkins, 2001:15). Through establishing a free trade area (FTA), SADC members aim to further economic development within the region. However, ratification and implementation of the SADC protocol have been rather slow, in part, since member states participate in a broad range of regional trade arrangements that may compete with or undermine SADC objectives. For example, South Africa came under pressure from smaller member countries of SADC before signing the TDCA agreement in 2000, as they were afraid that the exposure to competition from the EU's member countries would depress domestic exports growth (Jenkins, 2001:16). In spite of co-ordination issues within a greatly diverse community of member states, Alves and Edwards (2009:95) note that only the SADC protocol has thus far shown considerable commitment to a simplification of its tariff regime. In 2007, only six *ad valorem* tariff bands remained, with almost no application of non-*ad valorem* rates.

The FTA signed between the Southern African Customs Union (SACU), a subset of SADC, and the European Free Trade Area (EFTA) in 2006, was implemented in 2008. It is the first FTA that EFTA signed with another trading bloc. Through the liberalisation of trade between the two blocs, it is hoped that trade and economic relations between the respective member

states will be fostered, leading to a mutually beneficial expansion of trade and a substantial increase in investment opportunities (EFTA-SACU, 2006:6).

As recent policy documents, such as the NGP and the NDP highlight, market access is crucial for the successful pursuit of export-oriented growth in South Africa. Similarly, the 2013 IPAP stresses the importance of 'locking in' access to export markets with growing demand for South Africa's exports (DTI, 2013:41). In this regard, the inclusion of South Africa in the global partnership of BRICS is a crucial step forward in South Africa's foreign policy interaction that builds on the ongoing economic and trade cooperation efforts of the Department of Trade and Industry (DTI, 2011:9).

Although over time a clear movement towards export-oriented growth can be detected in South Africa, including measures such as trade liberalisation and export-incentive schemes, recent industrial policy documents such as the NIPF and 2012 and 2013 IPAP, indicate that in some circumstances the strategic use of tariffs may be desirable (DTI, 2007:41 & DTI, 2010b:36). In addition, while the need to lower tariffs on intermediate inputs to support manufacturing and other productive sectors continues to be emphasised by South African industrial policy documents, in cases where there is potential for (i) the retention and creation of jobs, or (ii) notable import replacement, or (iii) if it is possible to formalise and strengthen conditionalities regarding tariff increases, then scope for the selective use of tariffs is maintained (DTI, 2010b:36). In general, the 2013 IPAP aims to implement developmental trade policies in the form of selected and strategic trade measures, such as tariffs, enforcement and Standards, Quality Assurance, Accreditation and Metrology (SQAM) measures that are envisioned to assist in shifting the economy towards expanding the productive side of the economy (DTI, 2013:7).

Furthermore, the 2013 Industrial Policy Action Plan: IPAP 2013/14 - 15/16, drawn up within the framework of the NGP and informed by the vision of the NDP, offers clear guidelines as to how the South African economy could be moved into non-traditional tradable goods and services that compete in export markets and against imports (DTI, 2013:8). The 2013 IPAP also highlights that the success of scaled-up industrial policy especially in the area of trade policy depends on an alignment of macro- and micro-economic policies. Specifically, a competitive and stable exchange rate structure is emphasised as a pivotal element of a successful expansion of the tradable sector in South Africa (DTI, 2013:7).

3.7 CONCLUSION

As Helleiner (1992:6) notes, there is a lot more to the analysis of trade policy than the dichotomous characterisations often emphasised in the literature on the topic – often categorising countries in terms of either 'outward' or 'inward' orientation. Moreover, it is clear that the experience of the Four Asian Tigers in the 1950s and 1960s, regarding the pursuit of growth through export expansion, is not easily transferable to the situation of South Africa today. Thus far, South Africa has successfully opened its economy to more international trade, and the manufacturing sector now faces considerable competitive discipline, irrespective of whether firms are import-substituting or export-oriented (Rodrik, 2008:784). Moreover, as noted earlier, trade policy in South Africa has recently become more strategic by aiming to support the diversification of the industrial base and expansion of the manufacturing sector through the pursuit of a number of strategies including lowering tariffs on imported primary goods needed in the production of more processed goods, while at the same time raising tariffs on more processed imported goods – all within the bounds of WTO rules and regulations (DTI, 2010b:36). As the 2012 IPAP outlines, for example, if an in-depth cost-benefit analysis ascertains significant potential gains regarding job creation or import replacement, strategic tariffs and other measures may be justified (DTI, 2010b:36).

Thus, there appears to be an understanding that imports, unless required in production processes targeted towards value-add productive activities, can diminish economic growth and employment in South Africa. It would therefore be interesting to investigate whether the results of this study's empirical tests would suggest that higher imports support economic growth (as suggested for example by development theories of economic growth such as the Chenery-Strout model), or whether imports actually diminish higher growth and employment prospects. Furthermore, the current emphasis on export promotion within public policy plans in South Africa (see for example the NDP or NGP) suggests that public policymakers acknowledge that export growth plays a critical role in supporting economic growth in South Africa. The purpose of this study's empirical analysis of the export-growth connection in South Africa, outlined in Chapter 5, is to analyse *the way* in which exports interact with other macroeconomic variables within the economic growth process in South Africa. This would consequently allow for a broad discussion of the general policy implications flowing from the empirical findings, which will be outlined in Section 6.2.

Chapter 4

EXISTING EMPIRICAL FINDINGS ON EXPORTS AND ECONOMIC GROWTH

4.1 INTRODUCTION

Despite the theoretical appeal of the export-led growth hypothesis and continuous developments within the area of econometric modelling, the empirical evidence is contradictory and no agreement has been reached regarding the validity of the export-led growth strategy (Hussain, 2006:36 & Thirlwall, 2011:319). It has been argued, for example, that empirical investigations of the relationship between exports and economic growth within the neoclassical framework have failed to prove that causality runs from exports to economic growth and instead simply assume that such a relationship exists (Rangasamy, 2009:606 & Yaghmaian and Ghorashi, 1995:39). The persistence of contradictory results within the empirical literature could also be attributed to the fact that the question of the validity of the export-led growth strategy is actually a country-specific issue (Nissanke and Thorbecke, 2006:1340 & Rangasamy, 2009:606). Especially the large number of cross-country studies that make up the majority of the early empirical work may be of limited use given that the growth process is a highly country-specific process (Grindle, 2004:525). In other words, "attempts to universalise a non-universal process" (Yaghmaian and Ghorashi, 1995:38) by comparing countries operating within vastly different contexts cannot lead to reliable conclusions. Maizels (1968:27) argues that export growth cannot have the same impact in economies that differ in terms of size, stage of industrial development, level of output, or the proportion of exports relative to the entire economy. Moreover, given that exports are only one element in the overall growth process, it is possible that there is no universal relationship to explain the link between exports and economic growth (Çetintaş and Barişik, 2009:637 & Maizels, 1968:49). In other words, since the export-growth nexus is complex and heterogeneous, involving multifaceted channels, cross-country analyses of the export-growth relationship are likely to produce contradictory results (Nissanke and Thorbecke, 2006:1340). Rangasamy (2009:606) therefore proposes that time series analysis, examining country-specific trends over time, could best capture possible nonlinearities and threshold effects and hence overcome the weaknesses of cross-sectional analysis.

The aim of many recent empirical studies is thus to test whether export-led growth is viable for the country in question on the basis of a context-specific empirical analysis, and not whether export-led growth is necessarily universally applicable. The importance of

contemporary empirical studies, within a context-specific framework, is also highlighted when considering that the validity of the export-led growth strategy may not only depend on the particular country under consideration, but may also change over time. Evidence from Lim, Chia and Ho (2010) and Lim and Ho (2013) suggests that the relationship between export growth and economic growth may vary from time to time and a particular rate of sensitivity of GDP to export changes cannot be identified. It follows that, due to the nonlinearity of the export-growth relationship, a 'reality-check' is needed from time to time, even if a positive export-growth connection was once established.

The remainder of the chapter offers an overview of existing empirical studies on the exports-growth relationship, by first outlining the results of important cross-country studies (Section 4.2) and thereafter reviewing the evidence from more recent time series studies (Section 4.3). Section 4.4 will take a closer look at other relevant linkage effects through which a rise in exports may indirectly affect economic growth performance. The review will conclude with a summary of the key points that arise out of the discussion of existing empirical studies on exports and economic growth.

4.2 CROSS-COUNTRY EVIDENCE

Despite a move towards time series analysis, the results of many cross-sectional analyses are relevant, as they have had a considerable impact on the discussion regarding the export-led growth hypothesis and have since shaped development policies. The World Bank report of 1987 provides a strong case for export-led growth, particularly for developing economies. By highlighting that countries progressively more 'outward oriented' exhibit productivity increases and higher rates of economic growth, the report aims to buttress its recommendation that export-led growth is the most effective path of development (World Bank, 1987:93). An earlier, widely quoted study by Maizels (1968:27) tests the relationship between exports and economic growth for a group of Sterling Area members for the period 1953-1962. Maizels (1968:28) finds support for the positive link between export growth and economic growth, using both cross-sectional tests and time series regression analysis. Cross-country studies such as Balassa (1978, 1984), Feder (1983), Kavoussi (1984), Moschos (1989), Ram (1985) and Tyler (1981) provide further support for the export-led growth hypothesis. Most of these studies employ multivariate regressions within production function-type models.

A number of recent studies attempt to shed light on the question of the validity of the export-led hypothesis by taking a cross-country approach that incorporates panel causality techniques such as Toda and Yamamoto's (1995) version of the Granger causality test, panel cointegration approaches that are based on Johansen's cointegration methodology or the ARDL bounds testing approach, panel threshold regressions, or directed acyclic graphs. As in earlier studies on export-led growth, the most commonly used framework is a neoclassical production function model, or alternatively the new growth model that is similarly grounded in the supply-side tradition. New growth models aim to improve the applicability of the basic neoclassical model by including a number of endogenous explanatory variables, particularly human capital (Marin, 1992:678). More recent cross-country studies are discussed in more detail in Table 4.1.

Table 4.1. Cross-country studies of export-led growth since 2005

Author(s)	Countries and time frame	Method	Result
Love and Chandra (2005)	India (1950-1998) Nepal (1964-2000) Sri Lanka (1965-1997) Pakistan (1970-2000) Bangladesh (1973-2000) Maldives (1977-2000) Bhutan (1980-1997) Annual data	Granger causality tests, cointegration and ECM modelling	ELG: India, Maldives and Nepal GLE: Bangladesh and Bhutan No causality: Pakistan and Sri Lanka
Shiraz and Manap (2005)	5 South Asian countries Pakistan (1960-2003), India (1960-2002), Bangladesh (1973-2002), Sri Lanka (1960-2002) and Nepal (1975-2003) Annual data	Johansen's cointegration test and MWALD causality tests (Toda and Yamamoto, 1995)	Strong support for a long-run (LR) relationship among exports, imports and GDP growth for all tested economies, except Sri Lanka. The results support the export-led growth hypothesis for Bangladesh, Pakistan, and Nepal, but not for India and Sri Lanka.
Chan and Dang (2010)	1950-2000 for 50 countries, 1960-2000 for 96 countries and 1970-2000 for 98 countries Annual data	Johansen's cointegration methodology, impulse responses, Granger causality tests	Trade is shown to Granger-cause output, thus confirming the ELG hypothesis in the world economy.
Mishra, Sharma and Smyth (2010)	Panel of Pacific island countries (Fiji, Papua New Guinea, Solomon Islands, Tonga and Vanuatu) 1982-2004 Annual data	Panel cointegration and panel causality approach	In the LR bidirectional causality was detected between exports and economic growth, imports and economic growth, and exports and imports.
Gouvea and Lima (2010)	Latin American and Asian countries 1962-2006 Annual data	Johansen's methodology, VEC modelling and OLS	Thirlwall's Law was found to hold in all countries except South Korea. A multi-sectoral version of Thirlwall's law was found to hold for all countries under study.
Lim, Chia and Ho (2010)	Singapore (1966-2008), Hong Kong (1971-2008) and South Korea	Breiting's (2001) rank test procedure and Johansen's	Strong evidence of nonlinear cointegration between GDP growth and exports

	(1954-2008) Annual data	methodology	
Tang and Lai (2011)	Asia's Four Little Dragons (Korea, Taiwan, Hong Kong and Singapore) Up to 2007 (start date depends on availability for each country) Quarterly data	Johansen's cointegration test and MWALD causality tests (Toda and Yamamoto, 1995)	Cointegration results: Exports, GDP and the exchange rate are cointegrated in all four economies. Causality results: Results regarding ELG hypothesis fluctuate widely in the short-run (SR).
Acaravci and Ozturk (2012)	10 European Transition countries: Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic and Slovenia 1994-2008 Quarterly data	ARDL bounds testing and error-correction based on Granger causality tests	Detection of cointegrating relationships and causality between exports, growth and FDI, however, investment was found to be the main engine of growth.
Tekin (2012)	Range of 18 Least Developed Countries including Angola, Benin, Burkina Faso, CAR, Chad, Cambia, Haiti, Liberia, Madagascar, Malawi, Mauritania, Niger, Rwanda, Senegal, Sierra Leone, Togo, Yemen, and Zambia 1970-2009 Annual data	Panel Granger causality tests based on bootstrapped Wald statistic, which is based on SUR systems and Wald tests	The results indicate direct, one-period-ahead, unidirectional causality from exports to GDP in Haiti, Rwanda and Sierra Leone, and from GDP to exports in Angola, Chad and Zambia.
Bajo-Rubio and Diaz-Roldan (2012)	New EU members: Czech Republic, Estonia, Latvia, Lithuania, Hungary, Poland, Slovenia and Slovakia 1996-2009 Quarterly data	Johansen's cointegration test and Granger causality testing	Only support for ELG in the case of Czech Republic, with no significant evidence for causality in the remaining cases
Seabra and Galimberti (2012)	72 countries 1974-2003 Annual data	Panel threshold regressions	Empirical results give support to ELG hypothesis. The estimated thresholds indicate that growth was conditioned by countries initial levels of output and human capital.
Dreger and Herzer (2012)	45 developing countries 1971-2005 Annual data	Panel cointegration techniques	SR: Relationship between exports and non-export GDP is positive. LR: An increase in exports leads to a reduction in non-export GDP in developing countries, on average.
Lim and Ho (2013)	ASEAN-5 countries (Malaysia, Thailand, Phillipines, Indonesia and Singapore) 1953-2008 Annual data	Nonparametric approach to cointegrating relationships and causality tests	Detected nonlinearity affects ELG evidence.

Notes: Export-led growth (ELG)
Growth-led exports (GLE)

In an influential study, Yaghmaian and Ghorashi (1995:41), who employed cross-sectional regression analysis including 30 developing countries, found that the regression results of different versions of the neoclassical model of export-led growth lacked statistical significance. Instead, the authors found support for the notion that both economic growth and exports growth depend on the level of economic development and structural change, which the developing economy was already able to achieve (Yaghmaian and Ghorashi, 1995:41). This outcome was supported by Dodaro (1991:1162) who found, using cross-sectional data of a wide range of less-developed countries that effective economic growth via export expansion depends on the country's stage of development. Similarly, Hussain's (2006) study of export-led growth in African countries throws doubt on the universal applicability of export-led growth for developing economies. He emphasised that the pressures of price-competition arising from greater openness to trade has thus far not contributed to increases in Africa's market share in world trade over the last few decades (Hussain, 2006:37). Instead, the income elasticity of demand for African exports was found to be the most significant indicator of export success that enables higher economic growth. With African countries typically facing an income elasticity of demand for exports of less than unity, they have tended to be constrained by structural problems of ever-growing external deficits (Hussain, 1999:128).

While Wilbur and Haque (1991) also found no significant support for the export-led growth hypothesis on the basis of a cross-sectional analysis of 12 less developed and rapidly developing countries, they did find that exports growth contributes to higher savings growth. Within their model (based on the Chenery-Strout specification), Wilbur and Haque (1991:144) found evidence for "export-led savings". This outcome provides support for the use of the extended, rather than the basic Chenery-Strout model, which reflects the idea that changes in exports growth also impact the *ex ante* savings gap (Chenery and Strout, 1966:685).

Although the production function approach to testing the export-led growth hypothesis predominates in the empirical literature on the topic, a number of notable contributions have been put forward that take a demand-side view, or seek to combine insights from both neoclassical and demand-side growth theory. Cross-country studies following in the Keynesian tradition include Thirlwall and Hussain (1982) for a range of developing countries, Hussain (1999) for a number of African and East Asian Economies, Nell (2003) for South Africa and other SADC countries, Gouvea and Lima (2010) for a range of Latin

American and Asian countries and Cimoli *et al.* (2010) for a number of Latin American countries. In general, such studies found support for the applicability of different versions of Thirlwall's Law across a range of developing economies, and hence provide evidence supporting the validity of the export-led growth strategy.

A recent study by Antunes and Soikiazis (2012) introduced a balance of payments constraint into the neoclassical growth model, and highlighted the importance of links between human capital, foreign trade (particularly via openness) and economic growth. Hence, the idea of knowledge and technology diffusion can be stressed when seeking to explain how human capital and trade interact to stimulate economic growth (Antunes and Soikiazis, 2012:17). Therefore, there is evidence to suggest that not only the aggregate level of development matters for the likelihood of successful export-led growth, but so do specific factors including trade policy orientation, that is, the degree of liberalisation or openness (Antunes and Soukiazis, 2012 & Paul and Das, 2012), the extent of the regulatory burden on business, the degree of labour market flexibility (Dreger and Herzer, 2012) and human capital (Antunes and Soukiazis, 2012 & Seabra and Galimberti, 2012). The idea that a number of conditioning factors influence the likelihood of successful export-oriented growth is discussed in endogenous growth theory developed by Romer (1986) and Lucas (1988).

4.3 TIME SERIES RESULTS FOR INDIVIDUAL COUNTRIES

More recent tests of the export-led growth hypothesis tend to be based on time series data (Rangasamy, 2009:606). Grindle (2004:525) highlights that any successful development strategy must be based on a nuanced view of the specific conditions of that country, and time series analysis is seen as more appropriate for capturing the underlying economic relationships that define an individual economy's growth process. In these studies, in contrast to cross-sectional studies, it is possible to test for example whether causality runs from exports growth to economic growth, instead of simply assuming that causation exists. Several studies found support for export-led growth by employing Granger causality testing, cointegration procedures, error correction modelling (ECM), and vector autoregressive (VAR) modelling. These include Abual-Foul (2004) for Jordan, Al Mamun and Nath (2005) and Hossain and Karunaratne (2004) for Bangladesh, Dash (2009), Nain and Ahmad (2010), Paul and Das (2012), Ray and Ray (2012) and Tabrizy and Trofimenko (2010) for India, Chang, Simo-Kengne and Gupta (2013), Herrerias and Orts (2010) for China, and others. Table 4.2 summarises recent empirical studies on export-led growth.

Table 4.2. Empirical findings of time series based export-led growth studies since 2004

Author(s)	Country and time frame	Method	Result
Abual-Foul (2004)	Jordan 1976-1997 Annual data	VAR modelling, ECM, Hsiao's version of the Granger causality test	Unidirectional causality from exports to output was detected.
Hossain and Karunaratne (2004)	Bangladesh 1974–1999 Quarterly data	Vector error correction modelling (VECM)	Both total exports and manufacturing exports have a positive and statistically significant impact on economic growth both in the long-run and the short-run.
Al Mamun and Nath (2005)	Bangladesh 1973-2003 Quarterly data	Error correction modelling and SR Granger causality tests	SR: no evidence of a causal relationship between industrial production and exports. LR: ECM suggests unidirectional causality from exports to growth.
Dash (2009)	India 1992-2007 Quarterly data	Johansen's cointegration procedure and Granger causality tests	Support for ELG: Unidirectional causality flows from exports to growth in the LR.
Nain and Ahmad (2010)	India 1996-2009 Quarterly data	Granger causality test (Toda and Yamamoto, 1995) and forecast error variance decomposition (within VAR framework)	Support for GLE, not ELG.
Tabrizy and Trofimenko (2010)	India 1998-2008 Various frequencies	Firm-level analysis of 1822 firms from seven manufacturing sectors	Learning-by-exporting effects are non-existent. LR gains from export expansion may be lower than anticipated.
Ray and Ray (2012)	India 1979-2009 Annual data	Johansen's cointegration approach, ECM and augmented Granger causality test	LR relationship between export performance and productivity growth is detected.
Paul and Das (2012)	India 1960-2009 Quarterly data	Johansen's cointegration approach, impulse responses and causality tests	Evidence of ELG during the liberalisation era in India (1991-2009).
Herrerias and Orts (2010)	China 1964-2004 Annual data	Johansen's methodology, ECM	Both an ELG effect and an investment-led growth effect are relevant in the Chinese economy. Exports exogenously drive output and productivity in the LR.
Siliverstovs and Herzer (2006)	Chile 1960-2001 Annual data	VAR modelling, Granger causality (Toda and Yamamoto, 1995)	Unidirectional causality running from manufactured exports to economic growth. Failure of primary exports to Granger cause output.

Narayan, Narayan, Prasad and Prasad (2007)	Papua New Guinea (1961-1999) and Fiji (1960-2001) Annual data	Bounds test for cointegration and Granger causality	SR: Evidence of bidirectional causality for Papua New Guinea. LR: Evidence of ELG in Fiji – exports and imports Granger cause GDP.
Awokuse (2006)	Japan 1960-1991 Quarterly data	Toda and Yamamoto 1995 methodology to test for Granger non-causality Directed acyclic graphs (DAG)	Bidirectional causality between export and GDP growth.
Tang and Ravin (2013)	Cambodia 1972-2008 Annual data	Engle-Granger cointegration procedure and VAR modelling	Bidirectional causality between exports and economic growth.
Hye and Siddiqui (2011)	Pakistan 1985-2008 Quarterly data	ARDL approach and rolling window regression method	Cointegration exists when real GDP and real exports are the dependent variables. Results support ELG in Pakistan, because throughout the sample, exports positively determine real GDP.
Chigusiwa, Bindu, Mudavanhu, Muchabaiwa and Mazambani (2011)	Zimbabwe 1977-2006 Annual data	ARDL approach	Strong evidence in support of ELG in the SR and LR.
Araujo and Soares (2011)	Brazil 1991-2010 Quarterly data	Granger causality	Evidence supports both ELG and GLE hypothesis.
Hamdi (2013)	Tunisia and Morocco 1961-2011 Annual data	Granger causality test developed by Toda and Yamamoto (1995) and employs MWALD test for restrictions	Export-led growth in Tunisia. Growth-led exports in Morocco.

The use of a production function-type specification to model economic growth as a function of labour, capital, exports and a variety of other relevant variables, was widespread in earlier studies (Balassa, 1978; Tyler, 1981 & Ram 1985) and continues to be popular in more recent studies (Awokuse, 2003; Siliverstovs and Herzer, 2006 & Narayan *et al.*, 2007). Furthermore, several studies on the export-led growth hypothesis now employ techniques such as cointegration, error correction modelling and vector autoregression (VAR) (Abual-Foul, 2004; Dash, 2009; Chan and Dang, 2010; Herrerias and Orts, 2010; Rangasamy, 2009; Hossain and Karunaratne, 2004; Al Mamun and Nath, 2005 & Love and Chandra, 2005). As Sims (1980:33) argues, VAR models are particularly useful for the depiction of the dynamic behaviour of economic time series, often providing superior forecasts to those of univariate time series models and involved simultaneous equation models. Thus, it comes as no surprise

that there has been a notable shift towards the use of cointegration techniques to discover the long-run relationship between exports and economic growth (Thirlwall, 2011:340). Johansen's cointegration procedure has been and continues to be employed in a number of empirical studies on export-led growth to reflect potential causal effects of specified variables and to allow for the derivation and evaluation of impulse responses that indicate the amount of information each variable contributes to other variables in the autoregression (Lütkepohl, 2011:13).

In addition, several economists stress that it is important not to assess simply the positive relationship between exports and economic growth that results from the national accounting identity which states that exports form part of GDP (Siliverstovs and Herzer, 2006:320). To gain a clearer understanding of the export-led growth process, Rangasamy (2009:607) proposes "to net out exports from GDP" when analysing the link between exports and economic growth.

Another relevant development within the field of export-led growth studies is the increased interest in firm-level analyses. Following a renewed awareness that not countries, but firms trade, empirical studies in the field of the 'new' new trade theory, now emphasise the role of the firm in international trade and hence stress the trade-productivity nexus (Ciuriak *et al.*, 2011:2). A number of empirical studies have increasingly turned their attention to micro-level activity when analysing the validity of the export-led growth strategy. One of the central models to new new trade theory, developed by Melitz (2003), showed that a country that opens up to trade will find that only the productive firms stay in the market, whereas the least productive firms are forced to exit (Melitz, 2003:1695). The paper also showed that through trade-induced productivity growth following from such reallocations, trade can add to the welfare gain (Melitz, 2003:1718). Empirical studies have found evidence suggesting that the most productive firms are selected into exporting, leading to a significant correlation between productivity levels and export status (see for example: Delgado *et al.*, 2002). However, particularly in the context of developed economies, these firms do not necessarily exhibit improvements in productivity over time (Pavcnik, 2002:264). Tabrizy and Trofimenko (2010), who traced firm-level productivity paths of 1822 firms from seven manufacturing sectors for India between 1998-2008, found evidence suggesting that self-selection of more productive firms into exporting exists, leading to a productivity differential between exporters and non-exporters. However, learning-by-exporting is virtually non-existent, hence

productivity must be achieved prior to firms seeking to open up new markets internationally (Tabrizy and Trofimenko, 2010:18). Overall, this implies that the gains from trade, particularly from the perspective of productivity enhancements derived from learning by doing through exporting, may be less pronounced than previously anticipated (Tabrizy and Trofimenko, 2010:19).

An influential caveat regarding the export-led growth hypothesis, commonly associated with Rodrik (1994:5), is the idea that causality may actually run in the opposite direction, in other words economic growth may cause export growth (growth-led exports) (Jurajda and Mitchell, 2003:137). Indeed, while Love and Chandra (2005) find evidence of exports Granger causing economic growth in the cases of India, Maldives and Nepal, they also find evidence of growth-led exports for Bangladesh and Bhutan and a lack of causality for Pakistan and Sri Lanka. Love and Chandra (2005:143) found the result of unidirectional Granger causality running from exports to economic growth in the case of India particularly encouraging, since export-led growth is possible despite India's large domestic market. This result also has implications for South Africa. Although South Africa has a fairly large domestic market with significant growth potential (Jordaan and Eita, 2009:4), in light of India's success regarding export-led growth, the possibility of export-led growth remains viable. In addition, a bidirectional causality relationship is discovered by Shan and Sun (1998) for China and by Awokuse (2006) for Japan. For Chile between 1960 and 2001, Siliverstovs and Herzer (2006:323) find that unidirectional Granger causality runs from manufacturing exports to net-of-exports GDP, but no such causality runs from primary exports to output. This reinforces the idea that the composition of exports can affect economic growth, and more advanced causality tests should differentiate between the various types of exports in order to discover the most desirable path of economic development that a country should pursue (Siliverstovs and Herzer, 2006:323).

In addition to several time series studies based on a supply-side production function approach, a number of time series studies now exist, which take a demand-side approach to testing the export-led growth hypothesis. Ibarra (2010), for example, employs an identity for output defined as a function of aggregate demand. It serves as a foundation to an empirical investigation of the export-growth relationship in Mexico for the free-trade period 1988-2006. Applying Johansen's methodology, he finds that industrial production correlates positively with non-maquila (non-assembled goods) manufactured exports and investment

and that investment depends positively on industrial production, the real exchange rate, and non-maquila manufactured exports (Ibarra, 2010:439). Conversely, maquila exports (assembly goods), which display low spillover gains, have a negative impact on investment, hence implying the need to shift the composition of exports towards non-maquila manufactured exports (Ibarra, 2010:457).

Ozturk and Acaravci (2010:265) applied Autoregressive Distributed Lag (ARDL) Bounds Testing to investigate the relevance of Thirlwall's law to the South African economy during the period 1984 to 2006. The empirical results indicate that South Africa's economy is indeed constrained mainly by a balance of payments constraint, hence providing support for Thirlwall's hypothesis in the case of South Africa. Similarly to Ozturk and Acaravci (2010), Alonso (1999) detects in an earlier study on growth and the external constraint in Spain, that the balance of payments position was a conditioning factor in the growth process of Spain's economy.

As discussed earlier, several extensions of Thirlwall's growth model have been developed to render the simple model more realistic. Moreno-Brid (2003:350), for example, extends the balance-of-payments constrained growth model to reflect limits on the sustainable level of current account deficits that arise from interest payments on debt (Thirlwall, 2011:336). To assess the applicability of such extensions, Moreno-Brid (2003:363) tested the model for the case of Mexico and found that the balance of payments constraint (adjusted to include foreign interest payments) was indeed binding to Mexico's long-run economic growth in the period 1967-1999. Hence, higher export growth would have had the potential to lift the constraint to enable higher long-run economic growth. Similarly to Moreno-Brid's (2003) study, a study by Britto and McCombie (2009) testing the applicability of Thirlwall's Law to Brazil, applied Johansen's cointegration procedure to model several endogenous variables in a VAR framework. The regression results provided support for the contention that Brazil's growth rate has been constrained by the balance of payments – similarly to the case of Mexico (Britto and McCombie, 2009:15). Furthermore, the tests of the hypothesis refuted the original version of Thirlwall's Law and accepted Moreno-Brid's (2003) extended specification (see Equation 2.3.38) due to its ability to capture existing limits on growth posed by the need to maintain sustainable levels of current account deficits.

4.3.1 Existing empirical evidence of export-led growth in South Africa

Empirical evidence regarding the export-led growth theory for the case of South Africa mostly supports the theory that higher export growth causes higher economic growth in South Africa. Table 4.3 summarises the findings of five important studies on export-led growth for South Africa.

Table 4.3. Existing empirical findings regarding the export-led growth hypothesis in South Africa

Author(s)	Time frame	Method	Result
Rangasamy (2009)	1975-2007 Quarterly data	Johansen's cointegration approach and Granger causality tests	Unidirectional causality from exports (primary and non-primary) to economic growth in the SR and LR.
Ziramba (2011)	1960-2008 Quarterly data	ARDL (autoregressive distributed lag) approach and rolling window regression method	Real merchandise exports support the ELG hypothesis.
Chang, Simo-Kengne and Gupta (2013)	South Africa 1995-2011 Annual data	Provincial analysis using bootstrap panel causality analysis, accounting for cross-section dependency and heterogeneity across regions	Unidirectional causality runs from economic growth to exports for Mpumalanga. Bidirectional causality between exports and economic growth was detected for Gauteng. No causality was found for the rest of the provinces.
Cipamba and Cipamba (2013)	1970-2012 Quarterly data	Granger causality tests within multivariate framework	Bidirectional causality between exports and economic growth in the SR and LR.
Ajmi, Aye, Balcilar and Gupta (2013)	1911-2011 Annual data	Linear and non-linear Granger causality tests	No evidence of ELG on the basis of linear Granger causality tests. Non-linear Granger causality tests suggested either GLE or bidirectional causality between exports and growth.

Ziramba (2011), for example, analysed whether causality exists between the components of exports and real GDP for South Africa from 1960q1 to 2008q3. Evidence of export-led growth was detected in the case of merchandise exports, whereas no evidence of Granger causality in either direction was found for the case of net gold exports. Rangasamy's (2009) findings suggested unidirectional Granger causality running from exports to economic growth in South Africa for the period 1975q1 to 2007q3. Notably, non-primary exports were found to support economic growth more strongly than primary exports (Rangasamy, 2009:613). Furthermore, definite support for the export-led growth strategy in South Africa was derived from Cipamba and Cipamba's (2013) Granger causality tests in a multivariate VAR framework. The authors established clear bidirectional causality between exports and

economic growth for the period 1970q1 to 2012q4. Chang, Simo-Kengne and Gupta (2013) conducted a provincial investigation of export-led growth in South Africa for the period 1995-2011 and detected evidence of export-led growth and bidirectional causality in the case of Mpumalanga and Gauteng respectively. No such causality could be detected in the remaining provinces. Ajmi, Aye, Balcilar and Gupta (2013) found no evidence of linear causality between exports and GDP for the period 1911 to 2011. Only when applying nonlinear methods, Ajmi *et al*. (2013) detected evidence of unidirectional causality running from GDP to exports for the test based on Hiemstra and Jones (1994) and bidirectional causality based on the test proposed by Diks and Panchenko (2005). Overall, their results suggest that there is a risk of misleading conclusions when empirical tests are based on standard linear Granger causality tests that do not account for likely structural breaks or nonlinearities. Clearly, the relationship between exports and GDP in South Africa is dynamic and changes with time.

4.4 OTHER RELEVANT EXPORT LINKAGES WITHIN THE GROWTH PROCESS OF THE ECONOMY

In several cases, export growth was found to affect macroeconomic variables, such as savings, investment (foreign or domestic), and imports, hence contributing to the idea that multifaceted channels play a role in modifying the export-growth relationship (Nissanke and Thorbecke, 2006:1340). Particularly interesting are cases where export growth was not found to share a significant relationship with economic growth, but exhibited cointegrating relationships or causality with other factors known to impact the economic growth rate.

As discussed in Section 2.4.4, one relevant study that proposes a way in which export growth is connected within the macroeconomy, is Wilbur and Haque (1991). On the basis of a cross-sectional study of 12 less developed countries the authors find significant support for export-led savings, hence highlighting the superiority of export-oriented growth to ISI (Wilbur and Haque, 1991:144). Regarding possible reasons why savings depends of exports, Wilbur and Haque (1991:136) suggest that the propensity to save might be higher in the export sector than in other sectors, and higher exports can cause significant movements in government revenues (with taxes on foreign trade yielding large sums). In turn, these factors influence the level of government investment, and hence growth.

Several studies have discovered a strong link between exports and investment, in particular FDI. For example, Acaravci and Ozturk (2012) detect a positive long-run relationship

between FDI, exports and economic growth for 10 European Transition countries. Ibarra (2010) similarly emphasised the importance of 'export-led investment'. In a study on the relationships between exports, FDI and GDP growth for a number of developing economies, Tekin (2012) describes that during an analysis of the export-FDI nexus, it was found that causality runs from FDI to real exports in Benin, Chad, Haiti, Mauritania, Niger, Togo and Yemen, and from real exports to FDI in Haiti, Madagascar, Mauritania, Malawi, Rwanda, Senegal and Zambia. Hence, investment, FDI in particular, and export growth tend to be cointegrated and often share a long-run relationship. This implies that where exports were found to be important for investment and hence capital formation, the link between exports and economic growth is clear, although it may be indirect. Some empirical studies have found fixed investment to be a vital factor in fostering higher long-run economic growth (see for example: Kwan *et al.,* 1999:67 & Gutiérrez, 2005:5). Therefore, any factor supporting capital formation indirectly helps drive higher long-run economic growth.

Another recurring link is the import-export connection that is prevalent in a number of empirical studies. For example, Shiraz and Manap (2005:472) presented evidence that strongly supports a long-run cointegrating relationship among output, exports and imports for all 5 South Asian countries under study, except for Sri Lanka. In the case of India, economic growth and export growth were both found to Granger cause imports and strong feedback causality was detected between imports and exports for both Bangladesh and Nepal. In another study, Mishra *et al.* (2010) detected a number of feedback causal relationships in a panel study of Pacific island countries. It was found that exports and imports, exports and economic growth, and imports and economic growth share a long-run relationship (Mishra *et al.,* 2010:60). Hamdi (2013:684) also found a complex chain of causal relationships for Tunisia and Morocco, with causality flowing from imports to exports, and from exports to economic growth in the case of Tunisia (export-led growth). The study also found evidence of bidirectional causality between imports and economic growth and unidirectional causality flowing from growth to exports in the case of Morocco (growth-led exports). Similarly, for Cambodia, Tang and Ravin (2013:660) detected import-led export growth, in addition to feedback causality between exports and economic growth.

Overall, the above examples of cointegrating relationships and causality links highlight that an analysis of the exports-growth connection should take into consideration, or address explicitly, the multitude of simultaneous and lagged responses of different variables in the macroeconomy as a result of changes in exports (Nissanke and Thorbecke, 2006:1340).

4.5 CONCLUSION

To conclude, the results of the above studies differ widely. Nevertheless, a few key findings appear recurrently in older and more recent studies. Export composition matters and in general, manufacturing exports are more likely to enable a country to achieve export-led growth than primary exports can (Dodaro, 1991; Dreger and Herzer, 2012; Ghatek, Milner and Utkulu, 1997; Greenaway, Morgan and Wright, 1999; Hossain and Karunaratne, 2004; Ibarra, 2010; Siliverstovs and Herzer, 2006 & Tyler, 1981).[12] This supports several theories discussing the export-growth nexus in the field of Development Economics.

Countries that have reached a certain level of development are generally more capable of successfully competing in the global export market, hence achieving higher export and economic growth (Dodaro, 1991; Yaghmaian and Ghorashi, 1995 & Seabra and Galimberti, 2012). Firm level evidence suggests that self-selection of more productive firms into exporting exists and learning-by-exporting is virtually non-existent. Hence, productivity must be achieved prior to firms seeking to open up new markets (Tabrizy and Trofimenko, 2010:18).

Not only the aggregate level of development matters for the likelihood of successful export-led growth, but so do specific factors including trade policy orientation, that is, the degree of liberalisation or openness (Antunes and Soukiazis, 2012 & Paul and Das, 2012), the extent of the regulatory burden on business, the degree of labour market flexibility (Dreger and Herzer, 2012) and human capital (Antunes and Soukiazis, 2012 & Seabra and Galimberti, 2012).

Export growth is intricately linked to other macroeconomic variables, such as investment (FDI and domestic), imports, or savings, hence often exhibiting cointegrating relationships or causality (Wilbur and Haque, 1991; Shiraz and Manap, 2005; Mishra *et al.,* 2010; Acaravci and Ozturk, 2012; Tekin, 2012; Hamdi, 2013 & Tang and Ravin, 2013). Where export growth is not directly linked to economic growth, export growth may still indirectly support economic growth through these channels operating within the macroeconomy. The picture is thus likely to be complex due to the simultaneous operation of multiple transmission mechanisms (Nissanke and Thorbecke, 2006:1340).

[12] An important point in this regard is the desired time horizon. It is possible that empirical studies find a positive link between primary export growth and economic growth. However, to optimise the long-run economic development of the country, efforts to diversify into manufacturing export activities would be required. Hence, for example empirical evidence provided by Chigusiwa, Bindu, Mudavanhu, Muchabaiwa and Mazambani (2010), who find that primary goods have a significant positive effect on economic growth in Zimbabwe (more so than manufacturing exports), may need to be viewed from the perspective of short- to medium- term growth versus long-run development prospects.

The validity of the export-led growth strategy varies not only from country to country, as the wide range of empirical results indicates, but also changes on an intra-country basis over time (Lim *et al.*, 2010 & Lim and Ho, 2013). Nonlinearity has been detected regarding the sensitivity of economic growth to export growth for the ASEAN-5 countries (i.e. Malaysia, Thailand, Philippines, Indonesia and Singapore). Hence, a 'reality check' is required from time to time. This is the case even if a positive export-growth relationship has been established once before.

Chapter 5

EMPIRICAL ANALYSIS OF EXPORTS AND ECONOMIC GROWTH IN SOUTH AFRICA

5.1 INTRODUCTION

Both in theories of export-led growth, or in existing empirical studies on the export-growth nexus that were discussed in Chapters 2 and 4 respectively, exports are frequently accorded a special role in supporting accelerated economic growth. In South Africa, there is a particular sense of urgency regarding the need to raise economic growth rates in order to reduce high levels of unemployment, poverty and inequality. As outlined in Chapter 3, since 1994 in particular, trade policy has shifted from an inward oriented industrialisation path towards an economic development path that in more recent times emphasises the importance of a sustainable and strategic expansion of the South African export sector. Particular emphasis now lays on driving export production towards future growth areas in value-add manufacturing and knowledge-intensive goods production (DTI, 2013:8).

In light of these developments, it is therefore critical to investigate empirically the role exports play in the overall economic growth process in South Africa. An empirical analysis of quarterly time series data to investigate the link between exports and economic activity for the case of South Africa will follow below. Chapter 5 is structured as follows. First, Section 5.2 will outline the data used for all empirical tests, including a short graphical analysis of the main variables of interest. Section 5.3 outlines the theoretical and empirical justifications for the particular model specifications of economic activity and exports applied in the study. The econometric methodology, including Johansen's cointegration procedure, will be outlined in Section 5.4 and the results of the estimation of the long-run cointegrating relationships, as well as short-run VECM analysis, impulse response functions, variance decompositions and Granger causality tests will be reported in Section 5.5. Chapter 5 concludes with Section 5.6, which discusses some implications of the results with respect to theories of export-led growth and existing empirical findings.

5.2 DATA AND PRELIMINARY OBSERVATIONS

Quarterly and annual time series data has been drawn from the South African Reserve Bank and Thomson Reuters DataStream for the period 1975q1 to 2012q4. Data for the real

effective exchange rate was available from 1975q1, determining the start date for the study's empirical analyses. All time series used in the study were available at constant prices with 2005 as the base year. It is important, moreover, to ensure that the correct variable is used to proxy capital (K). Since the other variables to be employed, namely economic output, labour exports, imports and the real effective exchange rate are all included in the specification in level terms, it is critical, that the same is done for capital too. It is clear from a theoretical and empirical standpoint that capital must also be in level terms like the other inputs to production. Hence, capital, that is K, will be specified as Total Fixed Capital Stock. While the use of Total Fixed Capital Stock is most appropriate in this situation, this time series is only available in annual intervals. From a statistical perspective, the estimation of regressions with a mix of quarterly and annual time series is not optimal. A method of intrapolation can be used to transform the variable into a quarterly time series, making the available time series usable nonetheless. In light of the importance of ensuring that a) the correct 'level' capital stock variable is used and b) the possibility of using intrapolation, it has been decided to proceed with the estimation in this manner nonetheless.

Another relevant point to note is that the use of a production function type model, which is applied largely for reasons of practicality, presupposes that the inputs to production such as labour and capital are at full capacity (Boianovsky and Hoover, 2009:3 & Dutt, 1990:41). In light of the questionability of this assumption, particularly in the emerging market context, labour input will be proxied by total employment as in similar studies of economic growth (Siliverstovs and Herzer, 2006; Shan and Sun, 1998 & Yaghmaian and Ghorashi, 1995). Using employment rather than labour force data takes account of the fact that only the employed section contributes to productive activities and growth (Yaghmaian and Ghorashi, 1995:40).

For all empirical tests, Gross Domestic Expenditure (GDE) has been used as a proxy for economic activity. The exclusion of exports and imports from this accounting identity allows for an assessment of the exports-output link beyond merely the analysis of a national accounting identity in which exports form part of GDP (Rangasamy, 2009:607). Furthermore, both Lin and Li (2003) and Bell and Madula (2001:25) indicate that the use of GDP as an indicator of economic activity would fail to reflect the impact of exports on economic performance, since the income induced growth in imports nullifies much of the positive shock to economic growth that could result from higher exports. This calls for a different specification that is based on GDE growth as one of the main variables of interest. By

excluding the tradable sector from the variable reflecting economic activity in South Africa, it is possible to test whether higher exports stimulates domestic spending, driving economic expansion. Figure 5.1, showing the annual rate of growth of GDE and exports, reflects that there appears to be a positive correlation between these variables, that is, however, not consistent over time. While both fell notably following the global recession of 2008 and share a common trend thereafter, other periods, such as 2000 to 2006, show an inverse relationship between exports and growth. From the graphical analysis it is not possible to determine whether the reasons for the inverse relationship prior to 2007 are a negative connection between the two variables, or the operation of a lag effect. Hence, it is important to employ econometric techniques to investigate this link further.

It is anticipated that capital plays a prominent role by supporting economic growth, particularly in the long-run (Gutiérrez, 2005:5; Knight, Loayza and Villanueva, 1993:515 & Kwan, Yangru and Zhang, 1999:67). This may be the case both because investment is an important source of aggregate demand and because it expands productive capacity and encourages the integration of new technology (Ibarra, 2010:457). A graphical analysis of Figure 5.2, which shows the annual rate of growth of GDE and capital formation, suggests that a positive relationship seems to exist between both variables. However, between 1983 and 1987 the annual rate of growth of GDE and capital formation seem to move conversely, suggesting that further empirical tests are required. The annual rate of growth of exports and capital formation shown in Figure 5.3 suggest, moreover, that both variables are positively linked. Furthermore, exports, it seems, functions as a leading operator. If the empirical investigation of the data shows a significant positive relationship between exports growth and capital formation, this would suggest that exports plays a central role in promoting growth through its role in encouraging capital formation. Nonetheless, exports growth is highly volatile which makes the relationship between exports and capital formation hard to determine from the graphical analysis of Figure 5.3, necessitating the application of more rigorous empirical tests.

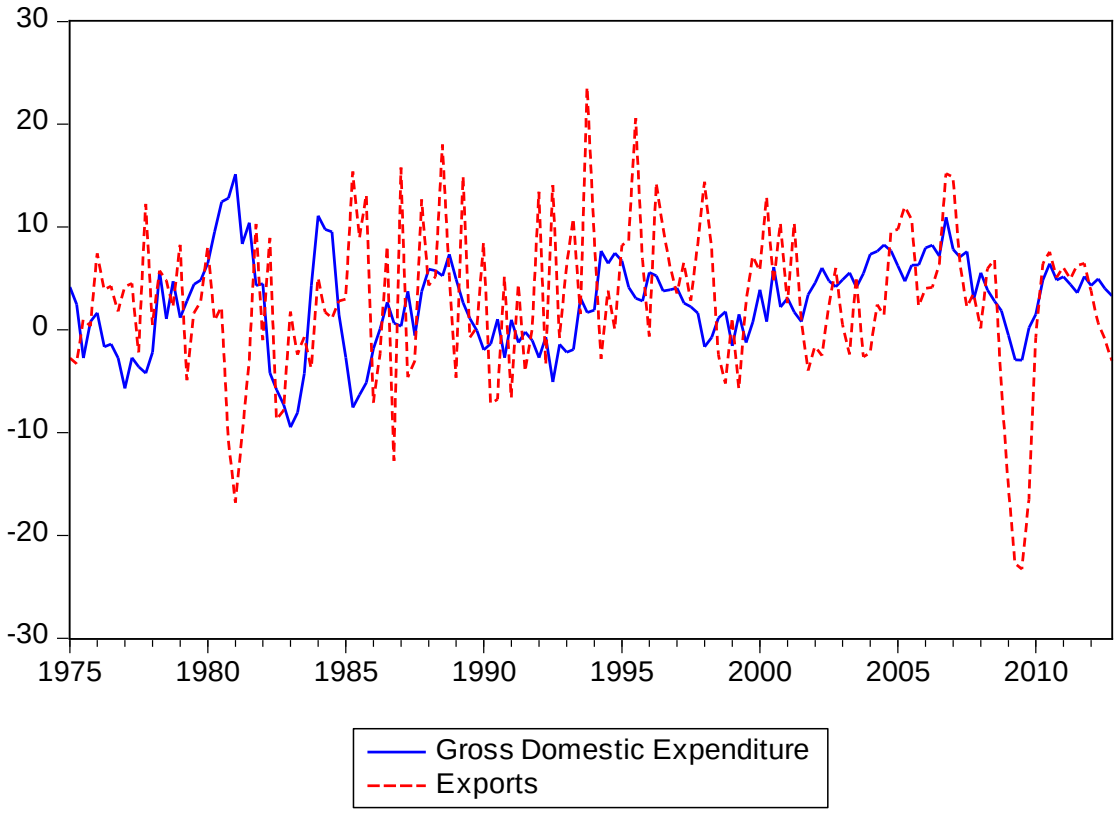

Figure 5.1. Gross domestic expenditure and exports in South Africa, percentage change per annum
Data source: Thomson Reuters DataStream

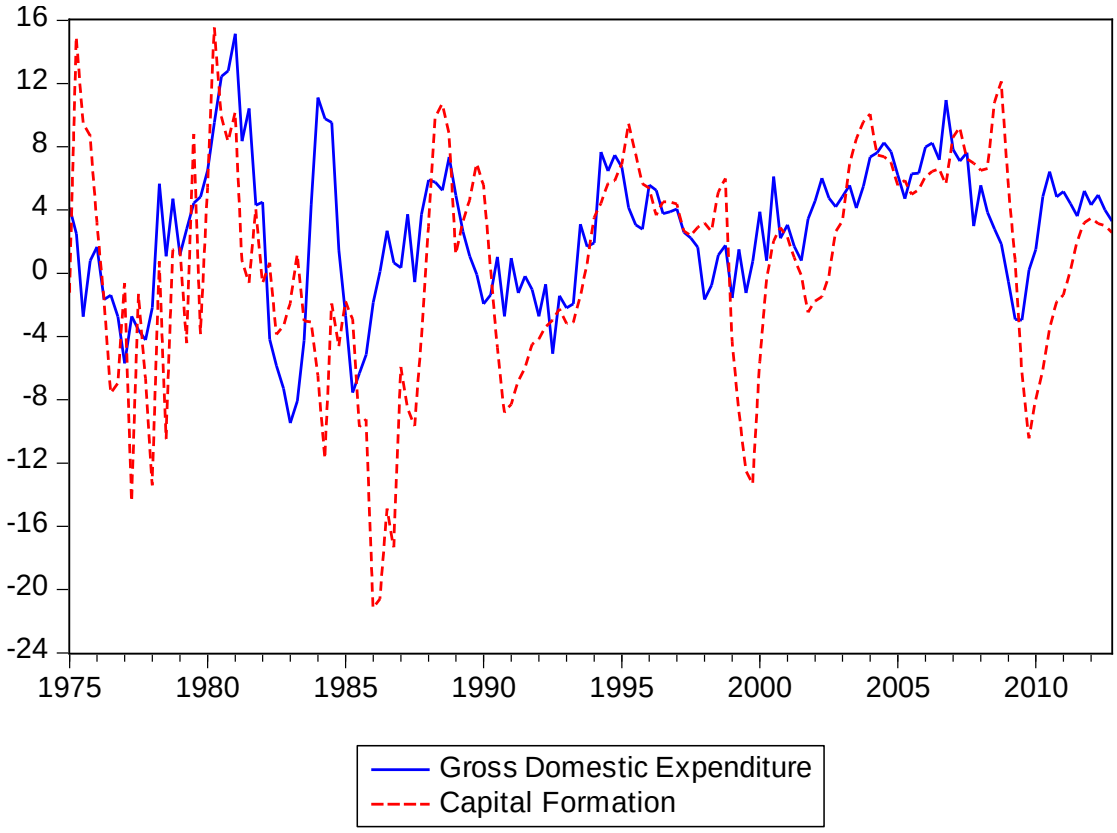

Figure 5.2. Gross domestic expenditure and capital formation in South Africa, percentage change per annum
Data source: Thomson Reuters DataStream

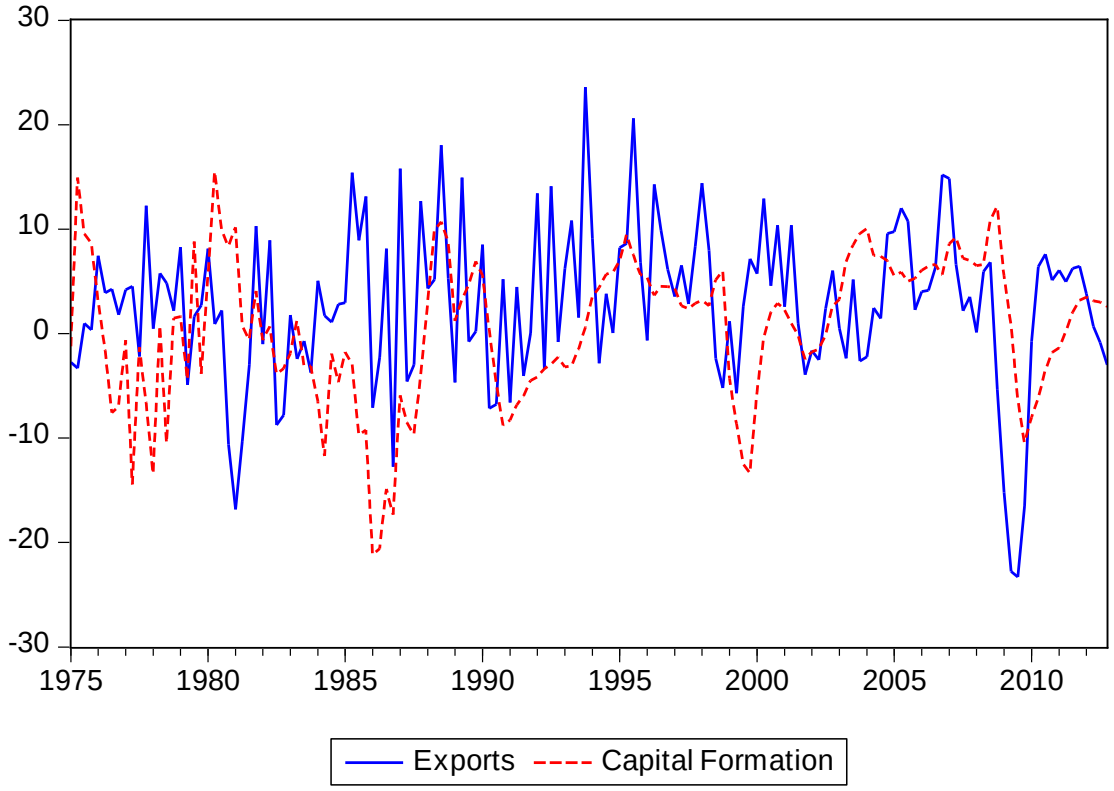

Figure 5.3. Exports and capital formation in South Africa, percentage change per annum
Data source: Thomson Reuters DataStream

5.3 MODEL SPECIFICATION

Preliminary empirical investigation showed that there appear to be two cointegrating relationships within the data. A multivariate model normalised on economic activity and exports was modelled through an application of Johansen's cointegration methodology. The following two sub-sections provide a discussion of the theoretical and empirical reasoning behind the specifications used to model each of the cointegrating relationships.

5.3.1 Economic performance

As noted in Section 2.2.4, the basic neoclassical production function-type model, employed in studies such as Ram (1985) and Yaghmaian and Ghorashi (1995) for example, models growth as a function of capital formation, growth in employment and export growth. Thus:

$$\dot{Y} = \beta_0 + \beta_1 \dot{I/Y} + \beta_2 \dot{L} + \beta_3 \dot{X} \tag{5.1}$$

This basic model has been extended in several studies to avoid the omitted variable bias arising from excluding other relevant inputs to economic growth, hence aiming to reflect the realities of economic growth more realistically. For example, imports (M) are often included in studies of export-led growth (see, for example: Hamdi, 2013; Narayan *et al.*, 2007; Mishra *et al.*, 2010; Paul and Das, 2012; Shan and Sun, 1998 & Shiraz and Manap, 2005), as they are generally needed to support the expansion of productive structures and hence economic growth. The importance of imports is also widely discussed in theories of Development Economics, as noted earlier in Section 2.4 (see, for example: Hirschman, 1958; Myrdal, 1956; Maizels, 1968 & Dutt, 2005). Dash (2009:310), testing export-led growth in the case of India, argued that since India imports a substantial amount of capital inputs for domestic production and also for the tradable sector, imports should be included as a key variable in the growth equation. It is likely that this experience will be similar in South Africa, supporting the inclusion of imports as an additional variable in the model. Conversely, the exclusion of imports could lead to biased or spurious results, particularly in the context of emerging market economies (Dash, 2009:310).

Due to the importance that is generally ascribed to both exports and imports in supporting productivity gains, Cipamba and Cipamba's (2013) approach to modelling export-led growth will be partially adopted as a basis to the study's empirical analysis. This model, shown in Equations 5.2 and 5.3, Cipamba and Cipamba (2013:6) drew from Herzer *et al.* (2006).

First, the simple neoclassical production function is defined as:

$$Y = Af(L, K) \tag{5.2}$$

where A represents TFP, Y is output (GDP), L is labour and K is capital stock as discussed in Section 5.2.

As was discussed in detail in Section 2.2.4, substituting the specification for TFP (Equation 2.2.4) into Equation 2.2.3, replacing Y with NY and taking the logarithms of the variables produces the following familiar specification:

$$logNY_t = \alpha + \beta logK_t + \gamma logL_t + \delta logX_t + \theta logM_t + \epsilon_t \tag{5.3}$$

where NY is output net of exports $(Y - X)$, α is a constant, the coefficients β, γ, δ and θ are elasticities of production with respect to K, L, X and M, and ϵ_t is the stochastic error term that captures the impact of all other factors influencing economic growth that are not explicitly included in the model.

Similarly to Tang and Ravin (2013:5), who include two dummy variables accounting for differences in trade policy orientations in Cambodia between 1972 and 2008, this study will take account of a number of key developments, either domestically or internationally, which are expected to have had a substantial impact on South Africa's economic growth path. In the period between 1985 and 1994, South Africa was forced to maintain a surplus on its current account, which represented a major macroeconomic policy challenge at the time. The foreign debt crisis, which occurred in mid-1985, lead to a continued outflow of foreign capital and consequently required sustained current account surpluses. Due to the important implications of the restrictions experienced on South Africa's balance of payments, the study will include a dummy variable, D_{CA}, to take account of these circumstances. The dummy variable D_{CA} takes the value of 1 for the period 1985q3 to 1994q1, and 0 otherwise. The study will also take account of the inclusion of South Africa in the world community that followed with the transition to democracy and which was consolidated with the first democratic elections held in April 1994. The dummy variable D_{1994} will take the value of 0 prior to and including 1994q1 and will take the value of 1 thereafter. Another dummy (D_{CRISIS}) will be included to control for the impact of the global financial crisis of 2008, as well as the dampening effect on South African growth resulting from the European sovereign debt crisis – merely an altered manifestation of the global economic crisis (Marcus, 2012:1). As Figure 5.1 shows, the global financial crisis, triggered by the collapse of Lehman Brothers in September 2008 leading to a worldwide downward spiral, severely negatively affected South Africa's economic growth performance. The dummy D_{CRISIS} will take a value of 0 prior to 2008q3 and a value of 1 thereafter. Furthermore, the dummy variables D_{CA}, D_{1994} and D_{CRISIS} will be included in the model as exogenous factors, since they are both determined outside the multivariate model.

It is clear that global conditions have a secular impact on South Africa's growth performance (Marcus, 2012:2). World income, in particular, is expected to influence economic growth for a number of reasons including the availability of credit and demand for export goods and services (Gern, Jannsen, Sander, Scheide and van Roye, 2008:14). Accelerated growth in world income is closely associated with improved investor confidence and an increased willingness to lend. As a result of increased world income and higher liquidity in money markets, investment spending is expected to rise, especially in countries dependent on large capital inflows to support domestic investment spending (Gern *et al*., 2008:9). Moreover, as discussed in Section 5.3.2, export demand is also a function of world income. During a global

economic downturn, investors view declining export earnings projections as a warning signal leading to dampened investor confidence and hence investment spending, particularly in tandem with scarcer credit availability (Gern *et al*., 2008:16). Room for investment spending may also fall due to the likely worsening of the current account when exports fall, especially when savings are limited. World income (WY), which will be proxied by US GDP due to data availability considerations, is clearly a critical factor to include within the model. Importantly, US GDP growth is considered a weakly exogenous variable, since it is determined outside the multivariate system, as established by Herrerias and Orts (2010:42). Therefore, in this study, the variable WY will be included in the model as an exogenous factor.

In contrast to Rangasamy's (2009) study on export-led growth in South Africa, which included the variables economic growth (net of exports), exports (both manufacturing and non-manufacturing) and terms of trade, or Cipamba and Cipamba's (2013) study on the role of exports in South Africa, which included the variables economic growth, capital, labour, exports and imports, this study aims to model economic growth by including the following variables:

$$Y = f(K, L, X, M, WY, D_{CA}, D_{1994}, D_{CRISIS}) \tag{5.4}$$

where Y is real GDE, K is total fixed capital stock, L is employment, X is real exports of goods and services, M is imports of goods and services, WY indicates world income proxied by US GDP growth, D_{CA} is the dummy capturing the forced sustained current account surplus from 1985 to 1994, D_{1994} is a dummy variable capturing the transition to democracy in 1994 and D_{CRISIS} is a dummy variable capturing the global economic downturn following the economic crisis of 2008. In log-linear form, Equation 5.4 becomes:

$$\begin{aligned} lnY_t = {} & \beta_0 + \beta_1 lnK_t + \beta_2 lnL_t + \beta_3 lnX_t + \beta_4 lnM_t + \beta_5 lnWY_t \\ & + \beta_6 D_{CA} + \beta_7 D_{1994\,t} + \beta_8 D_{CRISIS_t} + \varepsilon_t \end{aligned} \tag{5.5}$$

As noted earlier, a production function-type specification is used, where GDE is used as a proxy of economic output. All coefficients are elasticities, hence β_1, β_2, β_3, β_4, and β_5 show the elasticity of economic output to capital input, labour input, exports, imports and world income respectively. Finally, β_0 is a constant and ε_t is a stochastic error term.

5.3.2 Exports

Exports are modelled by four endogenous variables, namely economic activity, capital, imports and the real effective exchange rate, as well as four weakly exogenous variables, namely world income and the dummy variables D_{CA}, D_{1994} and D_{CRISIS}.

A relevant factor to consider while modelling exports is economic activity. Similarly to Dodaro (1991:1159), the exports specification will include economic output (GDE) as a domestic demand factor that is generally expected to have a negative impact on exports (X). Increases in domestic demand divert exports towards domestic consumption resulting in a fall in exports (Sharma, 2003:442).

Capital (K) is estimated by total fixed capital stock and is included in the exports specification, since theory predicts that fixed investment would support the tradable sector in South Africa by encouraging higher levels of productivity and hence competitiveness (Islam, 1998:416). A positive connection between export growth and capital formation seems to exist as shown by Figure 5.3, but still requires further investigation.

As noted in Section 2.2.3, the export sector may benefit from imported goods that embody new technology (Harrison and Rodríguez-Clare, 2009:58). By importing capital and intermediate products, an economy's export sector can benefit from technological progress achieved by other countries (Eaton and Kortum, 2001:754). Hence, imports function as a vehicle for 'international R&D spill-overs'. Empirically, it has been found that increased access to intermediate inputs is linked to large productivity gains, also benefitting the export sector (see, for example: Halpern *et al.,* 2005). Similarly to the productivity improvements that supply-side theorists envision from importing capital and intermediate products, the role of imports in supporting industrialisation is also emphasised in the treatment of export-led growth in Development Economics, which was covered in Section 2.4. As Hirschman (1958:124) argues, when developing countries "restricted imports too severely, they have been shutting out the awakening and inducing effects which imports have on industrialisation". Thus, the imports plays the role of developing preferences and demonstrating to domestic entrepreneurs that markets for such goods exist, encouraging them to enter global markets (Dutt, 2005:107). Overall, this will support the expansion of the export sector. Empirically the connection between imports and exports has been detected in several studies, as noted in Section 4.4. Shiraz and Manap (2005) offered strong support for a long-run relationship among exports, imports and GDP growth for all tested economies,

except Sri Lanka. Mishra *et al.* (2010), furthermore, showed evidence of long-run bidirectional causality between exports and economic growth, imports and economic growth, and exports and imports for a panel of five Pacific island countries. It is expected that imports have a notable positive impact on export growth in South Africa, warranting its inclusion in this study's estimation of exports.

In order to increase the predictive power of the model, the real effective exchange rate (REER) is also commonly included in studies on the export-growth nexus (see, for example: Dash, 2009, Herrerias and Orts, 2010 & Tang and Lai, 2011). A variable capturing both demand and supply dimensions of the economy, such as the real effective exchange rate, is imperative in the specification modelling exports. In other words, the inclusion of the real effective exchange rate is important, as it is expected to affect export demand and serves as a proxy variable to capture the economy's competitiveness. An appreciation will generally lower demand for an economy's exports, whereas a depreciation would have the opposite effect (Sharma, 2003:442). Sharma (2000, 2003) and Dash (2009) model a specification for exports that includes the real effective exchange rate due to the anticipated negative link between the real effective exchange rate and export demand. Similarly, Herrerias and Orts (2010:47) contend that a close relationship is likely to exist between the real effective exchange rate, trade and even investment.

While terms of trade and price dimensions are important aspects that determine export performance, in view of the capacity of the real effective exchange rate to capture competitiveness dimensions and in light of the importance of limiting the number of variables in terms of *lex parsimoniae*, it was decided to exclude other variables related to price competitiveness. This is particularly necessary in light of the choice of three lags for the estimation of the VECM in Section 5.5.2, leading to a substantial loss in degrees of freedom. Overall, the exclusion of further variables was based solely on statistical grounds related to the aim of minimising the number of variables in the specification and rests on the belief that the real effective exchange rate will capture to a significant extent the prices and competitiveness elements in the determination of export performance.

Another factor expected to have a notable impact on South African exports is world income (WY). As noted in Section 5.3.1, US GDP growth will be used as a proxy for world income growth for reasons of data availability. Although South African exports exhibit a much more volatile trend than US GDP, as shown in Figure 5.4, exports seem to be positively correlated

with US GDP. This relationship appears to be more pronounced after the global recession, that is, after 2008q3, than before. Herrerias and Orts (2010:46) emphasise the importance of taking into account foreign influences via a variable that captures world income. Global economic conditions are likely to have a secular impact on the exports growth rate of the country in question (Sharma, 2003:442).

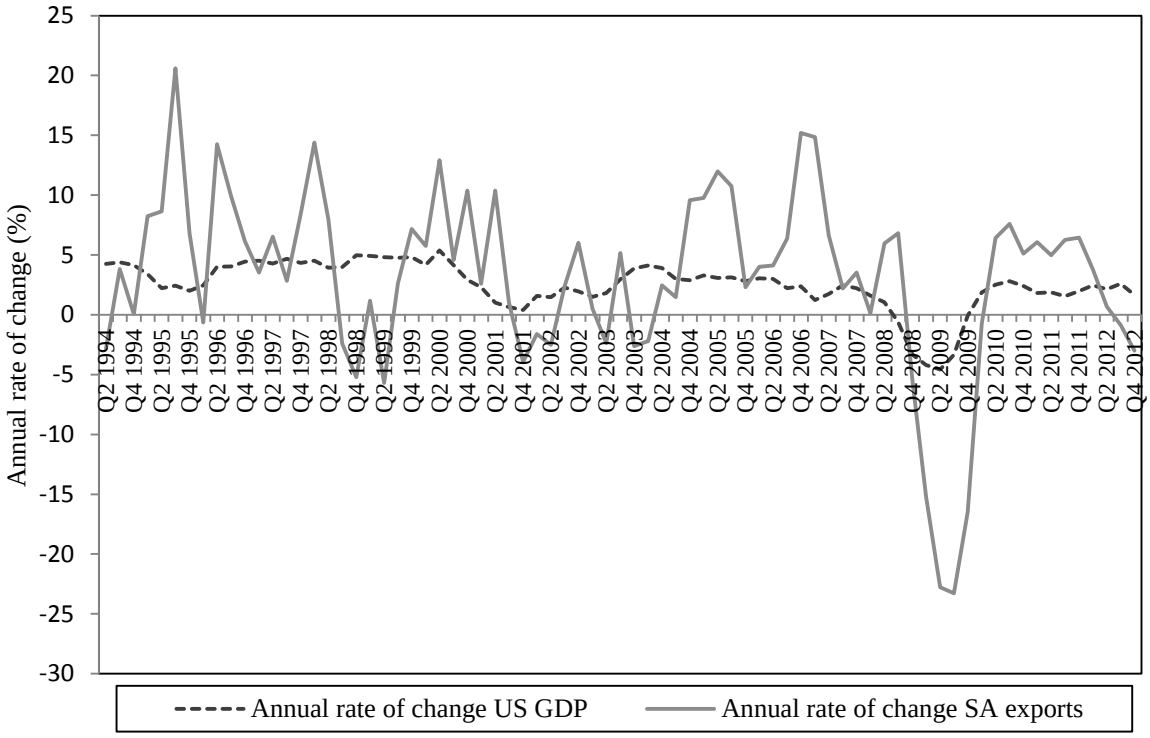

Figure 5.4. US GDP growth and SA export growth from 1994q1 to 2012q4
Data source: Thomson Reuters DataStream

Again, the inclusion of a dummy variable that accounts for the period 1985 to 1994 in which South Africa was required to sustain a current account surplus on its balance of payments is warranted. At the same time as South Africa was experiencing a substantial outflow of foreign capital, exports were also increasingly seeing the impact of international sanctions. Overall, it is important that the study takes account of the economic restrictions experienced on South Africa's balance of payments, hence the export specification will include a dummy variable, D_{CA}, to take account of these circumstances. As noted earlier, the dummy variable D_{CA} takes the value of 1 for the period 1985q3 to 1994q1, and 0 otherwise. Furthermore, as in the case of economic growth, the dummy variable D_{1994} will be included to model export growth. The dummy is expected to take account of the opening up of opportunities for export growth that followed from South Africa's inclusion in the world community after the transition to democracy in 1994. As discussed in Section 3.6, South Africa's re-entry into the

global market in 1994 marked the start of a far-reaching period of trade liberalisation in South Africa coupled with a strong sense of export-optimism (Cassim *et al.*, 2004:9). Hence, the dummy variable D_{1994} captures the promotion of export-oriented growth by the new government from 1994 (Jenkins, 2001:11 & Todaro and Smith, 2006:627). Additionally, as Marcus (2012:2) highlights, South African exports are highly dependent on strong demand from abroad. Both the global financial crisis of 2008 and the European sovereign debt crisis that followed thereafter had a significant negative impact on South African export performance (see Figure 5.4), warranting the inclusion of the dummy variable D_{CRISIS} to capture this effect within the model. Equations 5.6 and 5.7 indicate the export growth specification, the second cointegrating relationship within the VECM model. Thus:

$$X = f(Y, K, REER, M, WY, D_{CA}, D_{1994}, D_{CRISIS}) \tag{5.6}$$

where X is real exports of goods and services, Y is real GDE, K is total fixed capital stock, $REER$ is the real effective exchange rate, M denotes real imports of goods and services, WY indicates world income proxied by US GDP growth, D_{CA} is the dummy variable accounting for the sustained current account surpluses required in South Africa from 1985 to 1994, D_{1994} is a dummy variable capturing the transition to democracy in 1994 and D_{CRISIS} is a dummy variable capturing the economic crisis of 2008 and the impact of the European sovereign debt crisis. In log-linear form:

$$\begin{aligned} lnX_t = {} & \beta_0 + \beta_1 lnY + \beta_2 lnK + \beta_3 lnREER_t + \beta_4 lnM_t + \beta_5 lnWY_t \\ & + \beta_6 D_{CA} + \beta_7 D_{1994\,t} + \beta_8 D_{CRISIS_t} + \varepsilon_t \end{aligned} \tag{5.7}$$

5.4 ECONOMETRIC METHODOLOGY

Recently, there has been a notable shift towards the use of cointegration techniques to discover the long-run relationship between exports and economic performance (Thirlwall, 2011:340). As Rangasamy (2009:607) notes, Granger causality tests may be sensitive to omitted variables and thus a bivariate condition including only exports and non-exports GDP would be inappropriate for testing the export-led growth hypothesis. This implies that if Granger causality testing is used, it must occur within a multivariate framework to produce reliable results. Johansen's cointegration methodology allows for the application of Granger causality tests within a multivariate framework, as well as the use innovation accounting techniques such as impulse response functions and variance decompositions.

Johansen's cointegration procedure is outlined in detail in Johansen (1988, 1991) and Johansen and Juselius (1990, 1992) and has become a well-known and popular approach for estimating the number of co-integrating relations among the variables in a system, as well as analysing the relationships they share with each other (Fedderke and Schaling, 2005:86). Essentially, the Johansen procedure is a multivariate generalisation of the Dickey-Fuller test (Enders, 2004:348). It is often the preferred choice to test for long-run equilibrium relationships, since it overcomes several important defects of the Engle-Granger approach[13] to detecting cointegration (Maddala and Kim, 1998:165). One issue, which Johansen's approach addresses, is that with a limited sample size the test for cointegration is dependent on the choice of the variable selected for normalisation. This problem is exacerbated when three or more variables are included in the model. Furthermore, when three or more variables are included in the tests, there may be more than one cointegrating relationship; however, the Engle-Granger method has no systematic way of separately estimating multiple cointegrating vectors (Enders, 2004:347). Johansen's method overcomes these defects and allows for the presence of multiple cointegrating relationships. In addition, it is possible to test restricted versions of the cointegrating vectors and the speed of adjustment parameters (Enders, 2004:348). If cointegration can be detected, which would imply that although a set of time series may be non-stationary individually, their linear combination is stationary, then this would suggest that they influence each other in the long-run (Juselius, 2006:28). Overall, the application of Johansen's cointegration methodology is expected to help understand the underlying dynamics within the data and to shed light on the question which role export growth plays within the overall growth process in South Africa.

An important point to consider is that Johansen's procedure presupposes that all variables are endogenous, that is, they all depend on one another, producing a closed-form model (Maddala and Kim, 1998:187). However, it is possible to treat certain variables as weakly exogenous when estimating the long-run relationship among other variables. This allows for an estimation of the long-run relationships that is conditional on these weakly exogenous variables. Where it is clear that some variables are weakly exogenous, for example on the basis of *a priori* economic theory, neglecting this information leads to a loss of power. In other words, if a variable is weakly exogenous for the long-run parameters, the variable of interest must not appear in the estimation of the model, that is, the variables must not be error correcting (Maddala and Kim, 1998:188). Hence, the resulting multivariate model must

[13] The Engle-Granger approach to cointegration is outlined in Engle and Granger (1987) for example.

assure that the dependent variables economic growth and exports growth are endogenous, as the detection of weak exogeneity would disqualify the results and make any further tests, such as impulse responses, variance decompositions and Granger causality tests, spurious.

Johansen's cointegration procedure is based on variables that are stationary at first differences. Hence, the Kwiatkowski–Phillips–Schmidt–Shin (KPSS), Augmented Dickey–Fuller (ADF) and Elliott-Rothenberg-Stock (ERS) tests will be used to test whether all variables included in the model are indeed integrated of order one, that is, I(1). The application of three unit root/stationarity tests is warranted, since no single test is uniformly powerful (Brooks, 2008:331). The KPSS test is used to test the null hypothesis that the time series in question are stationary around a deterministic trend. The ADF test is a test for a unit root in a time series; however, it is augmented to allow for larger and more sophisticated time series models. Finally, the use of the ERS test is proposed, as it is able to address the problem that the power of unit root tests falls when linear trends are added to the test regression (Brooks, 2008:330). Similarly to the ADF test, the ERS test is used to test the null hypothesis that the time series in question has a unit root. All unit root/stationarity tests will be estimated with a constant, but no linear trend, as the inclusion of the intercept caters for the possibility of a drift.

In short, Johansen's procedure involves the specification of a VECM estimation framework. The first step is to specify and estimate a VAR(k) model for the vector z_t, where k is the number of variables (Zivot and Wang, 2003:440). There may be a number of cointegrating relationships r, so that $0 \leq r \leq k-1$.

This produces a k-dimensional VAR:

$$z_t = A_1 z_{t-1} + \cdots + A_m z_{t-m} + \mu + \delta_t \tag{5.9}$$

where m denotes the lag length, μ contains deterministic terms and δ is a Gaussian error term.

From Equation 5.9, a VECM specification can be derived:

$$\Delta z_t = \sum_{i=1}^{k-1} \Gamma_i \, z_{t-1} + \Pi z_{t-k+1} + \mu + \delta_t \tag{5.10}$$

where μ and $\Gamma_i, \ldots, \Gamma_k$ are allowed to vary without restrictions, z_t denotes the variables included, and δ_t is a normally distributed error term (Simleit, Keeton and Botha, 2011:11).

The presence of r cointegrating relationships amounts to the hypothesis that:

$$H_1(r): \Pi = \alpha\beta' \tag{5.11}$$

where Π is *p x p*, and α and β are *p x r* matrices of full rank. The rows of β' form the basis for the r cointegrating vectors and the elements of α distribute the impact of the cointegrating vectors to the evolution of Δz_t (Zivot and Wang, 2003:441). By constructing likelihood ratio tests for the rank of Π, the number of cointegrating vectors can be determined. In other words, testing for the rank of the matrix, r, means testing the hypothesis of reduced rank of $\alpha\beta'$. Hence, $H_1(r)$ is the hypothesis of reduced rank of Π (Fedderke and Schaling, 2005:86). Importantly, the factorisation $\Pi = \alpha\beta'$ is not unique and only identifies the space covered by the cointegrating relationships. Obtaining unique values for β' and α requires the introduction of restrictions on the model. This means that when $r > 1$, issues of identification arise that necessitate the imposition of normalisations and identifying restrictions on the cointegrating relationships (Zivot and Wang, 2003:441). Given the normalised cointegrating vectors, it is then possible to estimate a cointegrated VECM by maximum likelihood.

According to Johansen (1995:89), the advantage of the parametrisation shown in Equation 5.12 below is the interpretation of the coefficients - the effect of the levels is isolated in the matrix $\alpha\beta'$ and $\Gamma_i, \ldots, \Gamma_k$ depict the short-run dynamics of the process.

$$\Delta z_t = \alpha\beta' z_{t-k+1} + \sum_{i=1}^{k-1} \Gamma_i \, z_{t-1} + \mu + \delta_t \tag{5.12}$$

Johansen's cointegration procedure applies two likelihood ratio (LR) test statistics to establish the rank of the Π matrix, that is, the number of cointegrating vectors (Enders, 2004:352). The two test statistics generally used to test for the number of characteristic roots are the trace (λ_{trace}) and maximum eigenvalue (λ_{max}) statistics, specified as follows:

$$\lambda_{trace}(r) = -T \sum_{i=r+1}^{n} \ln(1 - \hat{\lambda}_i) \tag{5.13}$$

$$\lambda_{max}(r, r+1) = -T\ln(1 - \hat{\lambda}_{r+1}) \tag{5.14}$$

where $\hat{\lambda}_i$ denotes the estimated values of the characteristic roots derived from the estimated Π matrix and T represents the number of usable observations. While the first test statistic consecutively tests the null hypothesis that the number of cointegrating vectors is less than or equal to r, the second test statistic tests the null hypothesis that there are r cointegrating vectors against an alternative of $r + 1$ cointegrating vectors (Enders, 2004:353).

Exact identification requires the imposition of r^2 restrictions on the cointegrating equations. Hence, for the expectation that the rank is two, *r = 2,* four restrictions are therefore necessary (Johansen, 1995:72). On the basis of the theoretical discussion above, as well as the discovery of two cointegrating relationships in Section 5.5.2 (ii), the VECM shown above will be estimated. Furthermore, WY, D_{CA}, D_{1994} and D_{CRISIS} will be included in the model as weakly exogenous variables (Herrerias and Orts, 2010:42 & Tang and Ravin, 2013:5).

The model specified in Equation 5.15 reflects formally the VECM that will be estimated to model the export-growth relationship in South Africa. Cointegrating relationships in this model are provided by $\varepsilon_i = \beta_{i1}Y_t + \beta_{i2}X_t + \beta_{i3}K_t + \beta_{i4}L_t + \beta_{i5}M_t + \beta_{i6}REER_t$ with α_{ij} providing the error correction terms. The results for the VECM will produce β, which is the matrix containing the long-run relationships, as well as α, denoting the short-run dynamics of the variables (Simleit *et al.*, 2011:11). The VECM is estimated as discussed earlier with a constant only.

$$\Pi z_{t-k+1} = \begin{pmatrix} \alpha_{11} & \alpha_{12} \\ \alpha_{21} & \alpha_{22} \\ \alpha_{31} & \alpha_{32} \\ \alpha_{41} & \alpha_{42} \\ \alpha_{51} & \alpha_{52} \\ \alpha_{61} & \alpha_{62} \end{pmatrix} \begin{pmatrix} 1 & +\beta_{12} & +\beta_{13} & +\beta_{14} & +\beta_{15} & 0 \\ -\beta_{21} & 1 & +\beta_{23} & 0 & +\beta_{25} & -\beta_{26} \end{pmatrix} \begin{pmatrix} Y \\ X \\ K \\ M \\ REER \\ L \end{pmatrix}_{t-k+1} \quad (5.15)$$

Furthermore, the restrictions that will be imposed, as well as the anticipated signs of the coefficients are given in Equation 5.15. For the first cointegrating equation, β_{11} is set to equal one thereby normalising on GDE. In the second cointegration, β_{22} is set to one thereby making exports the second dependent variable. Furthermore, two zero restrictions are imposed with β_{16} and β_{24} set equal to zero leading to the exclusion of the real effective exchange rate in the first cointegrating relationship and labour in the second cointegrating relationship. Given the inclusion of GDE, exports, capital, labour, imports and the real effective exchange rate within the multivariate framework, and the preceding theoretical and empirical analyses of particularly relevant variables to include in both cointegrating relationships, which was given in Section 5.3, it is determined that the real effective exchange rate and labour in the first and second cointegrating relationships respectively are less significant for the determination of the dependent variable and are therefore excluded. It was found that the real effective exchange rate was rarely included as a determinant of economic performance in existing studies on the topic. Similarly, employment could be considered less important for exports, since the other variables within the model were explicitly emphasised in existing studies on the determinants of exports, whereas employment rarely featured in such estimations of export performance.

5.5 ESTIMATION RESULTS

5.5.1 Univariate characteristics of the data

Johansen's cointegration methodology emphasises that all times series need to be I(1), hence all variables are pretested to assess their order of integration (Johansen, 1995:45). Table 5.1 summarises the results of the unit root tests for all variables in log form. For all variables except capital stock, the KPSS, ADF and ERS unit root tests indicate stationarity at first differences. Due to contradictory evidence in the case of capital, where the KPSS tests suggest that the variable is I(1) and the ADF and ERS tests suggest otherwise (see Appendix), it will be assumed that capital is I(1). Predicated on the assumption that all variables are I(1), the following sections will proceed Johansen's method (Enders, 2004:362).

Table 5.1. Summary of unit root test results

Series	**KPSS test statistics**		**ADF test statistics**		**ERS test statistics**	
	Level	1st Difference	Level	1st Difference	Level	1st Difference
Economic output (GDE)	1.363715	0.277875*	1.400046	-6.743237*	263.6970	0.491039*
Capital stock	1.38668	0.274885*	0.120116	-1.980936	201.5626	40.00278
Employment	1.033934	0.166470*	-0.150402	-11.95752*	43.47308	0.341405*
Exports	1.436123	0.037899*	-0.557366	-13.02821*	132.8579	0.322718*
Imports	1.328163	0.238472 *	0.095835	-14.35739*	33.24267	0.358338*
Real effective exchange rate	1.049597	0.032779*	-1.771326	-6.091329*	9.282400	0.621844*
World income	1.482858	0.336362*	-2.004073	-8.187213*	1239.006	0.409911*

Notes: The KPSS (1992) 1% critical value = 0.216, the MacKinnon (1996) 1% critical value for the ADF test = -4.020822 and the ERS (1996) 1% critical value = 4.1508. Hence, * denotes that the time series is I(1) on the basis of the unit root test/stationarity test in question.

5.5.2 Johansen VECM estimation

(i) Lag length selection

The optimal lag length must be determined to estimate the unrestricted VAR and the subsequent VECM. Both the Schwarz Information Criterion (SIC) and Hannan-Quinn

information criterion (HQ) indicated that four lags would be the optimal number of lags and preliminary tests for autocorrelation indicated that only from three lags and higher the degree of autocorrelation fell to desirable levels (see Table A46). Hence, based on the autocorrelation tests and the information criteria shown below, it was decided that four lags would be most appropriate for the unrestricted VAR estimation (refer to Appendix for lag order selection tests and autocorrelation tests).

Table 5.2. Summary of lag order selection information criteria

Lags	AIC	SC	HQ	LR
1	-25.72287	-24.36171	-25.16977	1225.659
2	-25.98281	-23.87919	-25.12802	96.51230
3	-26.04685	-23.20078	-24.89037	68.24898
4	-28.65801	-25.06949*	-27.19984*	357.7833
5	-28.82144*	-24.49047	-27.06158	72.31413*

Notes: AIC: Akaike information criterion, SC: Schwarz information criterion, HQ: Hannan-Quinn information criterion, LR: sequential modified LR test statistic (each test at 5% level)

(ii) Testing for the rank

The trace test and max-eigenvalue test were conducted to determine the number of cointegrating vectors within the data, as discussed in Section 5.4. The results of the rank tests are summarised in Table 5.3. The tests were based on the assumption of an intercept and no trend. The trace statistic indicates that three cointegrating vectors are present, while the max-eigenvalue test suggests that two cointegrating vectors are present at the 1% level of significance. In view of such contradictory evidence, the estimation will proceed on the basis of the assumption that two cointegrating vectors are present in the data.

Table 5.3. Johansen cointegration test (Max-eigenvalue and Trace Statistics)

Null Hypothesis	Trace Statistic (r)	5% Critical Value	P-value	Max-Eigenvalue Statistic $\xi(r)$	5% Critical Value	P-value
$r = 0$	167.3237*	95.75366	0.0000	57.97771*	40.07757	0.0002
$r \leq 1$	109.3460*	69.81889	0.0000	53.45057*	33.87687	0.0001
$r \leq 2$	55.89541*	47.85613	0.0073	26.88299	27.58434	0.0613
$r \leq 3$	29.01241	29.79707	0.0614	18.84013	21.13162	0.1016

Notes: r is the number of cointegrating vectors under the null hypothesis of no cointegration. *indicates the rejection of the null hypothesis of no cointegration at the 5% level of significance

(iii) VECM results

(a) Long-run equilibrium relationships

On the basis of the LM test for autocorrelation, shown in Table A49 in the Appendix, it is possible to conclude that there exists no autocorrelation within the model that would compromise the results of the VECM. Figure A8 in the Appendix depicts the two

cointegrating relations for economic performance and exports. Furthermore, the results shown in Equations 5.16 and 5.17 below provide the long-run relationships for the two cointegrating vectors. The t-statistics are shown in parentheses below the respective variables:

$$lnY = \underset{(-10.4144)}{0.955086lnK} + \underset{(-3.50007)}{0.043057lnL} - \underset{(0.25998)}{0.004850lnX} - \underset{(5.89727)}{0.216233lnM} \quad (5.16)$$

$$lnX = \underset{(37.3399)}{-6.574890lnY} + \underset{(-12.6844)}{6.424398lnK} - \underset{(5.90246)}{0.296326lnREER} - \underset{(4.30607)}{0.871816lnM} \quad (5.17)$$

LM ~ $\chi^2(3)$ = 63.86465 (p-value = 0.0029)

The individual coefficients of the equilibrium relationship for GDE (Equation 5.16) suggest that economic output shares a significant positive long-term relationship with capital and labour. A 1% increase in capital is related to a 0.96% increase in GDE, holding all else constant. Employment and GDE are also positively linked in the long-run, as expected, with a 1% rise in employment being associated with a 0.04% increase in GDE, *ceteris paribus*. Imports on the other hand share a significant negative long-run relationship with GDE. A 1% increase in imports is thus related to a 0.22% decline in GDE, *ceteris paribus*. Furthermore, it is interesting to note that exports are insignificant in explaining economic performance, with the exports coefficient showing a negative sign – contrary to *a priori* expectations. It is likely that, had GDP been used as a dependent variable, exports growth would share a more pronounced positive relationship with economic performance. However, the results show that, at least when GDE is used as the proxy for economic output, which excludes the tradable sector in its calculation, the remaining impact of exports on economic output in the long-run is not significant. At first glance, therefore, it seems that higher exports do not support economic output, at least in the long-run, beyond constituting a positive component within the accounting identity of GDP, when it is used as a measure for economic performance instead. Nonetheless, it is important also to consider the short-term influence of exports within the model as well as to analyse impulse response functions and Granger causality tests for a more complete view of the role of exports within the economic growth process in South Africa.

Equation 5.17 reflects the second cointegrating relationship, where exports growth shares a significant positive long-run relationship with capital only, and a significant negative long-

run relationship with GDE, the real effective exchange rate and imports. Specifically, a 1% rise in GDE means that exports growth falls by substantial 6.57%, holding all else constant. This is expected, as higher domestic output represents a demand factor that has the effect of diverting production output towards domestic consumption and away from the export sector. As already mentioned, a highly significant, positive long-run relationship can be detected between exports and capital. The results show that a 1% increase in fixed capital stock is associated with a 6.42% increase in exports, *ceteris paribus*. Furthermore, the above results show a negative elasticity of exports with respect to the real effective exchange rate, suggesting that the real appreciation of the rand adversely affects South African exports in the long-run. In other words, on average a 1% appreciation of the rand reduces exports by 0.30%, *ceteris paribus*. Furthermore, a 1% increase in imports is associated with a 0.87% decline in exports in the long-run, holding all else constant. These results conform to *a priori* theoretical and empirical expectations.

(b) Short-run dynamics

As the Granger representation theorem states, "for any set of I(1) variables, error correction and cointegration are equivalent representations" (Enders, 2004:333). This implies that when cointegration is detected, the best way of specifying the relationship between the variables is to specify an error correction model (Maddala and Kim, 1998:40). As determined through Johansen's rank tests in Section 5.2.2 ii), two cointegrating relationships were revealed suggesting that the results should also be analysed by employing an error correction model (ECM). Two particular ECMs for economic output and exports are shown below, given that the behaviour of these variables is the focus of the study. The full results of the ECMs are reported in the Appendix in Table A48. The estimates of the short-run dynamics for economic growth and export growth are shown by Equation 5.18 and 5.19 respectively.

The coefficients of the error correction terms (ECT) are the speed of adjustment toward the long-run equilibrium relationship. The coefficients of the other variables capture the short-run dynamics in the model (Jiranyakul, 2010:4). In particular, ECT(1) and ECT(2) reflect the error correction terms of the two cointegrating equations derived from Equations 5.16 and 5.17 respectively. In Equation 5.18 the coefficient of ECT(1) is -1.062, which is significant at the 1% level of significance. Since the coefficient of ECT(1) in Equation 5.18 is negative, any deviations from the long-run equilibrium of Equation 5.18 will be corrected. Hence, it takes only 0.94% of a quarter for long-run equilibrium to be restored, that is, for the discrepancy between short-term and long-term to be corrected. Although it is not optimal that

the ECT term is lower than -1, with a standard error for the ECT(1) of 0.218, the value of -1.062 is not statistically different from -1. This suggests that a deviation from long-run equilibrium is corrected in one quarter and that no overshooting occurs. It is perhaps most important, in cases in which a long-term relationship is to be shown between two variables, that their ECT's are negative and not equal to zero, thereby showing they are indeed endogenous (Enders, 2004:368). This can be shown by Table 5.6, which will follow in Section 5.2.2 vii).

It is particularly noteworthy that a change in exports in the previous quarter has a significant positive impact on GDE, with a 1% increase in exports in the previous quarter leading to a 0.09% increase in GDE in the next quarter at the 5% level of significance. While the long-run relationship between GDE and exports could not be established from Equation 5.16, in the short-run a positive relationship between the two variables can be detected. Moreover, the real effective exchange rate and GDE both share a positive relationship at the 1% levels at two lags. This implies that a strengthening real effective exchange rate is linked with stronger economic performance two quarters later. The fact that improved economic performance in the previous quarter suggests better economic performance in the next quarter suggests that it is at least partially path dependent and sustaining positive momentum can help maintain better economic performance in the following quarter. Furthermore, the exogenous variable D_{CRISIS} is significant at the 1% level. The positive sign of D_{CRISIS} suggests that South Africa's economy has been able to weather the global economic turbulence triggered by the world-wide crisis of 2008 surprisingly well.

$$\Delta Y_t = \underset{(-4.87184)}{-1.062ECT(1)} + \underset{(4.67665)}{0.159ECT(2)} + \underset{(3.03434)}{0.473\Delta Y_{t-1}} + \underset{(0.46428)}{0.081\Delta Y_{t-2}} - \underset{(-0.52330)}{0.089\Delta Y_{t-3}} + \underset{(1.62682)}{0.197\Delta K_{t-1}} + \underset{(0.09467)}{0.011\Delta K_{t-2}}$$

$$\underset{(-0.31042)}{-0.038\Delta K_{t-3}} - \underset{(-0.62852)}{0.025\Delta L_{t-1}} + \underset{(1.28465)}{0.052\Delta L_{t-2}} - \underset{(-0.62296)}{0.025\Delta L_{t-3}} + \underset{(1.91159)}{0.089\Delta X_{t-1}} - \underset{(-0.02137)}{0.001\Delta X_{t-2}} - \underset{(-0.53769)}{0.022\Delta X_{t-3}}$$

$$\underset{(-1.34233)}{-0.059\Delta M_{t-1}} + \underset{(1.05555)}{0.051\Delta M_{t-2}} + \underset{(1.01763)}{0.044\Delta M_{t-3}} - \underset{(-0.81298)}{0.019\Delta REER_{t-1}} + \underset{(2.64568)}{0.060\Delta REER_{t-2}} - \underset{(-1.67938)}{0.041\Delta REER_{t-3}}$$

$$\underset{(1.009969)}{+0.001D_{1994}} + \underset{(2.53886)}{0.014D_{CRISIS}} - \underset{(-0.43383)}{0.003D_{CA}} - \underset{(-1.91112)}{0.044WY} + \underset{(0.402819)}{0.403 + \mu_t} \quad (5.18)$$

Adj. R^2 *= 0.395298*

In Equation 5.19 the coefficient of ECT(2) is -0.497, which is significant at the 1% level. Hence, any deviations from long-run equilibrium of Equation 5.17 will be corrected within

just over two quarters. Stated differently, 50.3% of the discrepancy between long-term and short-term exports will be corrected each quarter. Furthermore, it can be seen that GDE lagged one quarter has a highly positive impact on exports at least in the short-run at a 5% level of significance. The exogenous variable WY is significant at the 1% level and suggests that in the short-run a 1% increase in world income leads to a 0.26% increase in exports, *ceteris paribus*. Thus, a significant positive link between South Africa's export performance and world income can be detected that indicates that higher exports are dependent on buoyant demand from abroad. Furthermore, the results of Equation 5.19 suggest that the impact of the global recession and consequent European sovereign debt crisis had a significant negative impact on South African export performance.

$$\Delta X_t = \underset{(3.88605)}{3.153ECT(1)} \underset{(-3.91294)}{-0.497ECT(2)} + \underset{(2.30830)}{1.340\Delta Y_{t-1}} + \underset{(1.27895)}{0.828\Delta Y_{t-2}} \underset{(-0.07317)}{-0.046\Delta Y_{t-3}} \underset{(-0.16331)}{-0.074\Delta K_{t-1}} + \underset{(1.56757)}{0.730\Delta K_{t-2}}$$

$$+\underset{(1.92035)}{0.886\Delta K_{t-3}} \underset{(-0.13000)}{-0.019\Delta L_{t-1}} \underset{(-0.08541)}{-0.013\Delta L_{t-2}} + \underset{(0.02292)}{0.003\Delta L_{t-3}} \underset{(-0.12699)}{-0.022\Delta X_{t-1}} + \underset{(0.15598)}{0.026\Delta X_{t-2}} \underset{(-0.22503)}{-0.034\Delta X_{t-3}}$$

$$\underset{(-2.14537)}{-0.349\Delta M_{t-1}} \underset{(-0.97084)}{-0.173\Delta M_{t-2}} \underset{(-0.87582)}{-0.141\Delta M_{t-3}} + \underset{(1.42991)}{0.126\Delta REER_{t-1}} + \underset{(0.87549)}{0.074\Delta REER_{t-2}} + \underset{(0.54050)}{0.049\Delta REER_{t-3}}$$

$$\underset{(-1.00366)}{-0.037D_{1994}} \underset{(-2.95857)}{-0.062D_{CRISIS}} \underset{(-0.09887)}{-0.002D_{CA}} + \underset{(2.93469)}{0.256WY} \underset{(-2.98331)}{-2.310} + \mu_t \qquad (5.19)$$

Adj. R^2 *= 0.320630*

(iv) Impulse response functions

A number of impulse response functions merit particular emphasis, since they point towards interconnections and patterns that will be explored further in Section 5.6. Figure 5.5 shows the impulse response functions related to the export-capital-output connection. Figure 5.6 shows several impulse response functions relevant for the discussion on Thirlwall's Law that will follow in Section 5.6. In Figure 5.7, employment is the focal point and its response to economic output and exports is depicted. Lastly, the impact of the real effective exchange rate was found to be particularly noteworthy. The responses of exports and imports to a one standard deviation shock (appreciation) in the real effective exchange rate are shown in Figure 5.8.

Firstly, in Figure 5.5, impulse responses are shown that reflect how GDE and exports respond to positive shocks from each other and from capital. As noted already, the results are particularly useful for understanding the likely links between exports, capital and economic activity in South Africa.

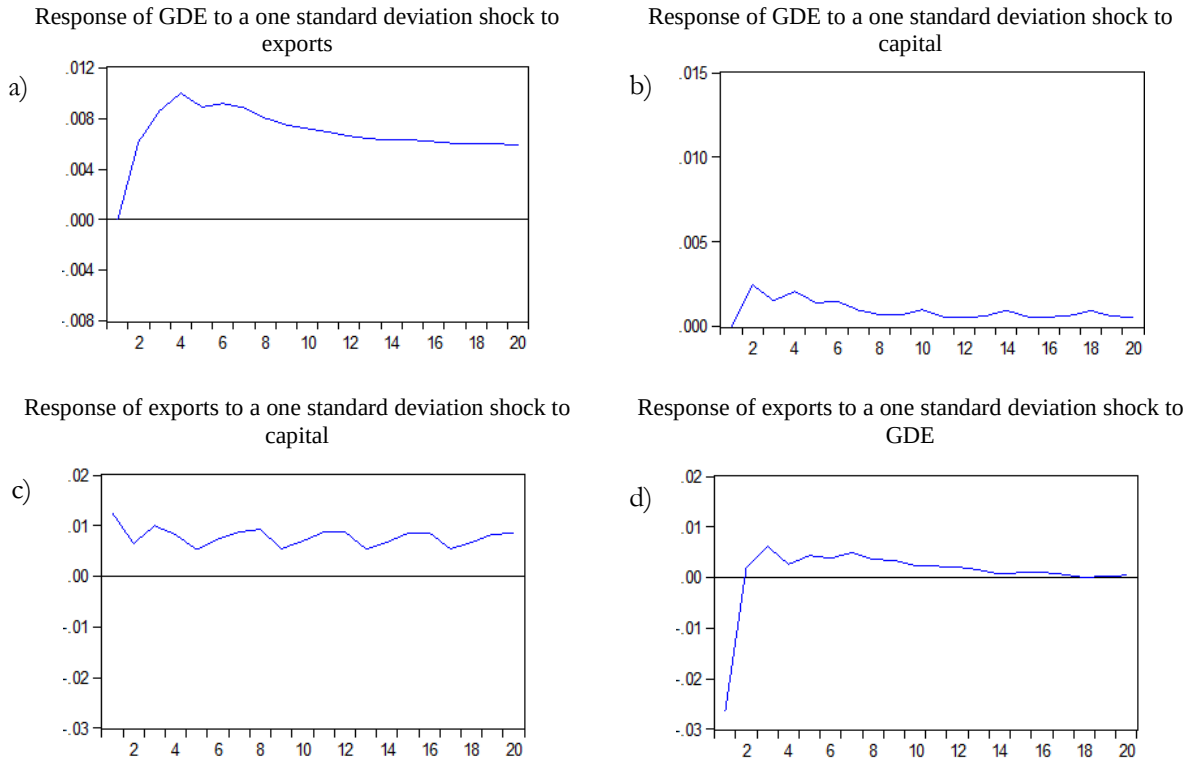

Figure 5.5. Impulse response functions and the export-capital-output connection

Figure 5.5 a) shows that a one standard deviation shock to exports leads to a positive shock in GDE, which first spikes after one year, and then starts to fall, stabilising at a slightly higher level from lag 15 onwards. This implies that while in the long-run the effect of a shock to exports dies out to some extent, in the short-run the positive shock to GDE is notable. Economic output also responds positively to a one standard deviation shock to capital, as Figure 5.5 b) shows. However, this effect is quite subdued and returns towards zero from lag eight onwards.

Figure 5.5 c) and d) reflect how exports responds to shocks in capital and GDE respectively. A one standard deviation shock to capital leads to a positive response in exports that remains at a higher level. On the other hand, a shock to GDE translates into a significant negative spike in exports, which starts to recover from quarter one, with exports then returning to zero by quarter 20.

Overall, the impulse response functions highlight what the short-run VECM analysis already showed to some extent. The direct role of exports in supporting economic output is particularly visible in the short-run. Moreover, although the encouraging role exports may play in supporting economic output is not lasting enough to be captured by the long-run relationship of Equation 5.16, the impulse response functions and short-run coefficients do

suggest that exports are relevant for economic performance in South Africa. This is particularly true when including the impact of capital.

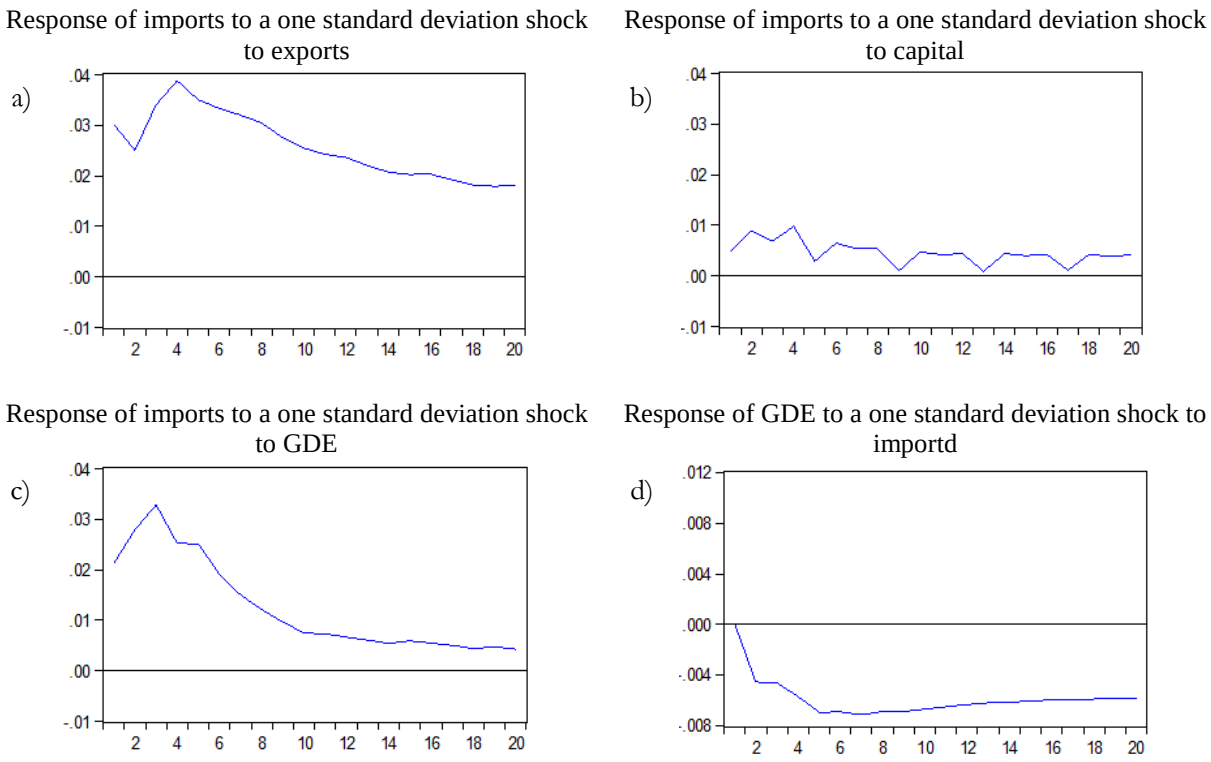

Figure 5.6. Impulse response functions and the link to Thirlwall's Law

The impulse response functions derived from the multivariate model of Equation 5.15 also offer some insights into the question whether exports may play a role in easing possible balance of payments constraints on economic growth in South Africa. As Figure 5.6 a) shows, a positive one standard deviation shock to exports leads to a notable positive response in imports that is particularly strong for the first seven to eight quarters after the initial shock, peaking at quarter five. This response then starts to stabilise at a slightly higher level from quarter 15 onwards. It is likely that export earnings provide funds for higher imports (income-induced import effect).

Figure 5.6 b) shows that a one standard deviation shock to capital leads to a positive response in imports, with imports stabilising at a somewhat higher level in the following quarters. As noted in Section 5.3.1, the positive response of imports to a shock in capital is likely linked to the high proportion of capital goods in the import basket.

Figure 5.6 c) reflects that a positive shock to GDE leads to a significant positive spike in imports peaking at quarter three, declining towards zero between quarter four to twelve

thereafter. From quarter 14 onwards, imports stabilises at a slightly higher level, although it is almost zero. As expected, imports respond positively to an increase in income in the economy, however this impact does dissipate over time.

Finally, Figure 5.6 d) indicates that a positive shock to imports leads to a negative response in GDE, with economic output stabilising at a slightly lower level from quarter 14 onwards. A long-run negative influence of imports on economic performance is also shown by Equation 5.16. Hence, both in the short- and long-run, imports can be seen to have a negative impact on GDE.

From the results shown in Figure 5.6, higher domestic income stimulates higher imports and imports play a role in supressing higher GDE. On the basis of these impulse responses, as well as the connections found in the long- and short-run VECM analyses, a clear connection to the operation of Thirlwall's Law in South Africa can be established, which will be discussed further in Section 5.6.

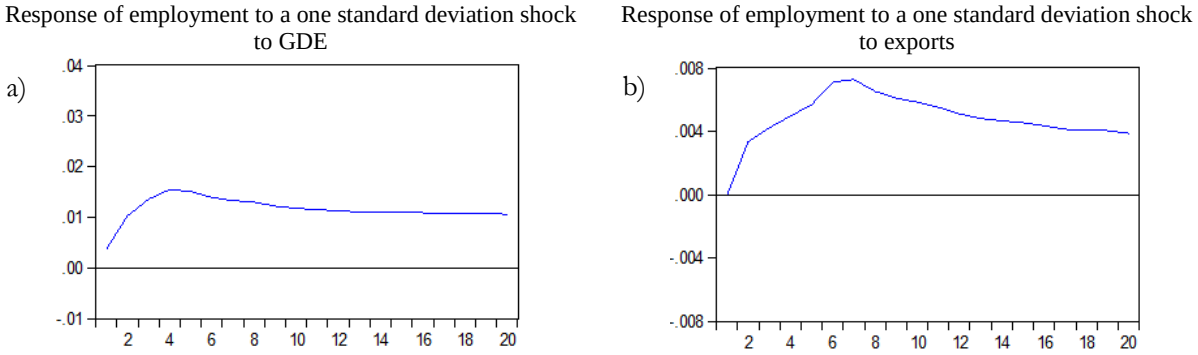

Figure 5.7. Response of employment to shocks to GDE, capital and exports

The impulse response functions shown in Figure 5.7 reflect the response of employment to shocks in GDE and exports respectively. Labour responds positively to a one standard deviation shock to GDE, as shown in Figure 5.7 a). Furthermore, that response is sustained, stabilising at a higher level from quarter eight onwards. Employment also responds positively to a shock to exports, peaking at quarter seven and stabilising at a higher level from quarter 16 onwards (see Figure 5.7 b)). As will be discussed further in Section 5.6, employment therefore responds positively to an upward shock to GDE and exports.

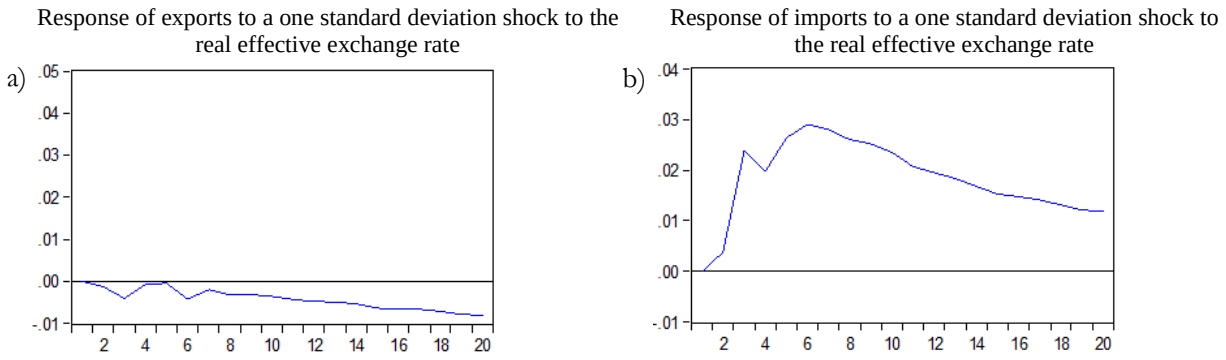

Figure 5.8. Response of exports and imports to a one standard deviation shock in the real effective exchange rate

The impulse response functions shown in Figure 5.8 reflect how exports and imports respond to a shock in the real effective exchange rate. It is interesting to see whether the responses of the variables in Figure 5.8 conform to *a priori* expectations. As expected, exports declines in response to a shock (appreciation) in the real effective exchange rate, with exports remaining at a lower level from quarter twelve onwards. Imports, on the other hand, respond positively to a one standard deviation shock in the real effective exchange rate, spiking after seven quarters and then remaining at a notably higher level. This corresponds to the results of the short-run VECM, where the appreciation of the real effective exchange rate at two lags was found to have a significant positive impact on imports (see Appendix).

(v) Variance decompositions

As noted by Enders (2004:278), variance decompositions are highly useful for uncovering the interrelationships among variables in a VECM. While impulse response functions trace the impact of a shock to an endogenous variable within the VAR to other variables within the system, variance decompositions split the variations in a variable into component shocks in the VAR (Brooks, 2008:299). Thereby it is possible to attain information regarding the relative importance of shocks of each variable in explaining other variables within the VAR framework. In other words, variance decompositions reflect the proportion of the movements in the endogenous variables that are due to their own variations, against those that are from other variables within the VAR system (Brooks, 2008:300). It is anticipated that the series' own innovations explain most of the error variance of the series in a VAR (Brooks, 2008:301).

Table 5.4. Variance decompositions

Variance Decomposition of GDE						
Period	**LNGDE**	**LNK**	**LNL**	**LNX**	**LNM**	**LNREER**
5	50.94870	0.981349	5.213316	19.65940	8.271387	14.92585
10	31.89167	0.606652	11.13275	19.44255	11.21360	25.71277
20	24.34540	0.428926	14.04953	18.35658	13.14640	29.67316
Variance Decomposition of Capital						
Period	**LNGDE**	**LNK**	**LNL**	**LNX**	**LNM**	**LNREER**
5	8.656186	48.63545	2.805644	22.64973	2.590139	14.66286
10	14.85616	14.17878	6.455069	32.07429	5.097874	27.33782
20	13.63701	4.462617	9.703675	31.45335	6.095266	34.64808
Variance Decomposition of Employment						
Period	**LNGDE**	**LNK**	**LNL**	**LNX**	**LNM**	**LNREER**
5	16.72670	0.149356	79.99533	1.871443	0.019012	1.238162
10	18.48122	0.149779	76.98115	3.518053	0.054381	0.815417
20	17.71583	0.111605	77.75651	3.232345	0.036111	1.147599
Variance Decomposition of Exports						
Period	**LNGDE**	**LNK**	**LNL**	**LNX**	**LNM**	**LNREER**
5	14.91352	7.621053	1.875601	74.64075	0.598168	0.350904
10	10.58531	8.714343	3.056812	76.33624	0.405387	0.901914
20	6.686846	10.06993	5.820875	73.32667	0.435959	3.659724
Variance Decomposition of Imports						
Period	**LNGDE**	**LNK**	**LNL**	**LNX**	**LNM**	**LNREER**
5	29.52234	2.106672	2.343079	44.77543	7.444927	13.80755
10	20.17040	1.719812	5.802514	44.78101	4.139385	23.38689
20	15.81597	1.739609	6.641630	46.82414	3.445970	25.53268

As Enders (2004:297) suggests, since a Cholesky decomposition provides a minimal set of assumptions to identify the structural model, it has been used as the identification restriction for this study's variance decompositions. The variance decompositions are reported in Table 5.4 above and full results are reported in the Appendix.

As the variance decomposition of economic growth demonstrates, changes in GDE are mostly due to its own innovations. Nonetheless, exports are the second most important explanatory factor, with exports explaining 19.66% of the movement in GDE in period 5. Furthermore, imports share a notable proportion of the movements in GDE. For example in period 5, 8.27% of movements in GDE are explained by shocks to imports. Nonetheless, in the same period, the impact of imports on GDE is still less than half of that of exports. Overall, this would suggest that exports do play a role in determining the movements of GDE.

The variance decomposition of capital reflects that capital is not only explained by its own innovations, but also by innovations to exports. In period 5, 22.65% of changes in capital are explained by exports. This is an effect that even rises to levels around 31.45% up to period 20.

As the variance decomposition of exports indicates, exports is explained to some extent by innovations to capital. The proportion of change in exports explained by shocks to capital reaches 10.07% in period 20. These results support the idea that exports and capital are closely linked, as already determined in Sections 5.5.2. (iii) and 5.5.2 (iv). Furthermore, it is also noteworthy that the real effective exchange rate explains a large portion of capital, which reaches 34.65% in period 20.

Furthermore, it is interesting to note that the most important factor that impacts employment, apart from its own innovations, are shocks to GDE. In period 10, for example, shocks to GDE explain 18.48% in movements in employment in South Africa.

As the variance decomposition of imports suggests, a notable income-induced import effect can be detected, since at 5 quarters 29.52% of changes in imports are explained by innovations to GDE in South Africa. This would have implications for the economy's ability to maintain balance of payments equilibrium during phases of accelerated economic growth.

Although the largest proportion of movements in the various endogenous variables is due to their own variations as expected, in a number of cases, the shocks from other variables within the model also share a large fraction of these movements. Furthermore, the results of the variance decompositions support the findings of the VECM analysis of Section 5.5.2 (iii) and the impulse response functions of Section 5.5.2 (iv) and are aligned with the findings of the VEC Granger Causality/Block Exogeneity Wald tests, which will be discussed in 5.5.2 (vi).

(vi) Causality tests

The results of VEC Granger Causality/Block Exogeneity Wald tests are summarised in Table 5.5. All variables included in the table were those found to be significant at least at the 10% level of significance. The full results are included in the Appendix.

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Table 5.5. Summary of VEC Granger Causality/Block Exogeneity Wald tests

Dependent variable	**Excluded variable**	**Chi-square**	**p-value**
GDE	Real effective exchange rate	10.10773	0.0177
Total fixed capital stock	GDE	14.46996	0.0023
	Exports	31.98381	0.0000
	Real effective exchange rate	9.847351	0.0199
Exports	GDE	7.478859	0.0581
Employment	Real effective exchange rate	16.59805	0.0009
Imports	GDE	44.91104	0.0000
	Total fixed capital stock	6.701890	0.0820
	Real effective exchange rate	18.05245	0.0004

The results of the Granger causality tests mirror to a large extent the short-run relationships between the variables derived from previous analyses. For example, the results show that GDE, exports and the real effective exchange rate Granger cause growth in capital stock. Furthermore, GDE Granger causes export growth in South Africa, but only at the 10% level of significance. The real effective exchange rate Granger causes employment and GDE in South Africa at the 1% and 5% levels of significance respectively. Finally, GDE, capital and the real effective exchange rate all Granger cause imports.

Figures 5.9 to 5.12 summarise some important findings from the results produced in Sections 5.5.2 (iii) to (vi). The long-run VECM suggested that both exports and economic activity respond significantly positively to an increase in capital (both in the long- and short-run).

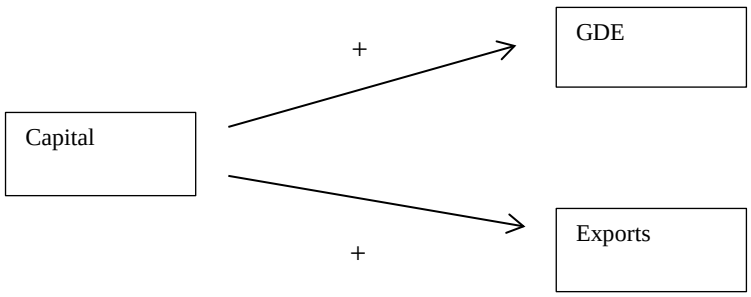

Figure 5.9. Summary of results – the impact of capital

As anticipated, exports respond negatively to higher GDE in the long-run (although a positive relationship is implied by the short-run VECM for one lag). Economic output was found to Granger cause improvements in capital stock at the 1% level of significance. See Figure 5.10 below:

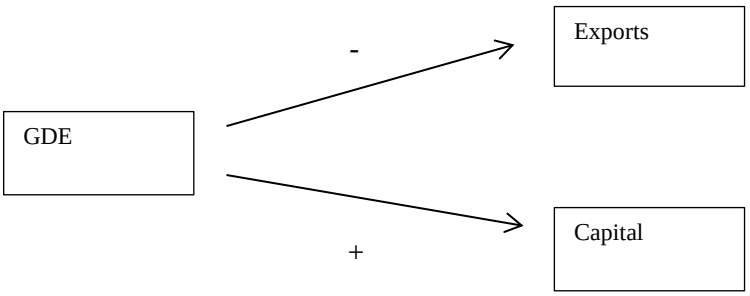

Figure 5.10. Summary of results – the impact of economic activity

In addition, the short-run VECM analysis, Granger causality tests and innovation accounting results suggested that a shock to exports leads to a positive response in capital - a result that is also supported by the Granger causality results of Section 5.5.2 (vi). Lastly, the short-run VECM analysis, impulse response functions and variance decompositions suggested that exports leads to improvements in GDE in the short-run, but do not have the same effect in the long-run. Hence, while the positive response of economic performance to a shock in exports is only visible in the short-run, the positive connection between exports-capital-output is supported by both the long-run cointegrating relationships as well as the short-run coefficient, innovation accounting results and Granger causality findings. The figure below reflects the impact of exports on GDE and capital.

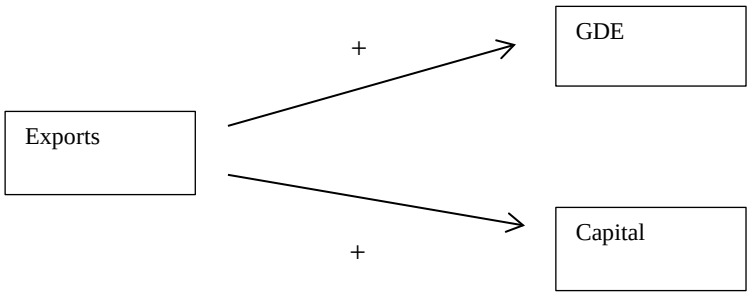

Figure 5.11. Summary of results – the impact of exports

Therefore, as the results and Figure 5.12 suggest, when exports work through the intermediary, namely capital, higher exports is likely to have a significant positive impact on

economic performance. When assessed on its own, the insignificant long-run coefficient for exports in Equation 5.16 could yield misleading conclusions. It is important to emphasise the role of capital within the model of export-led growth in South Africa to gain a more differentiated understanding of the inter-connections and transmissions that are active in the South African economy.

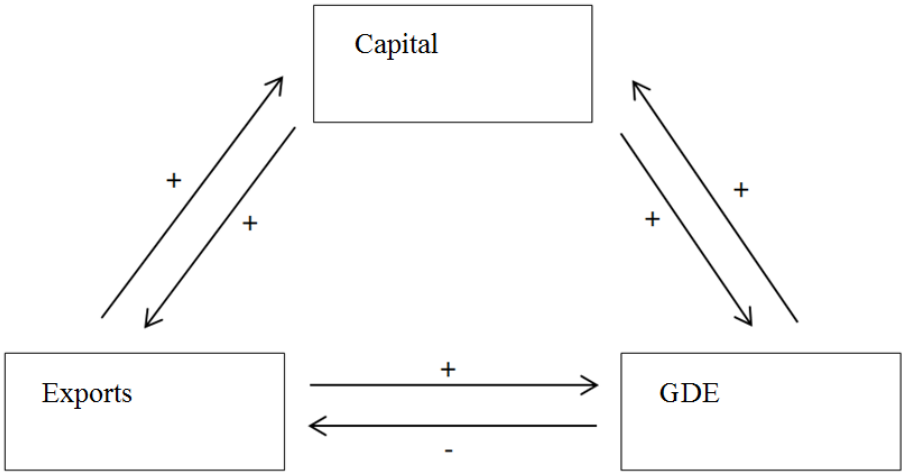

Figure 5.12. Summary of results – the exports-capital-output connection

(vii) Weak exogeneity

As Enders (2004:368) highlights, if the adjustment parameter α_i is not found to be significantly different from zero, the variable in question is weakly exogenous and hence does not experience the type of feedback effect that requires the use of a VAR in the first place. In other words, the weakly exogenous variable does not respond to the discrepancy from the long-run cointegrating relationship. In this case, the weakly exogenous variable should rather be modelled in a single equation framework (Enders, 2004:368). Hence, a test for weak exogeneity on the α_i coefficients of economic growth and exports is critical in order to assure the validity of the VECM model, as well as all consequent causality tests and innovation accounting techniques. Table 5.6 shows a summary of the weak exogeneity tests for the main variables of interest, namely GDE and exports. Both variables were found to be endogenous, as the null hypothesis of weak exogeneity is rejected at the 1% level in both cases. Hence, both economic output and exports form part of the long-run equilibrium relationships between the cointegrated variables.

Table 5.6. Summary of weak exogeneity tests

	GDE	**Exports**
Restriction	$\alpha_{11} = 0$	$\alpha_{22} = 0$
Chi-square(1)	14.78792	7.336863
Probability	0.000120	0.006755

(viii) Summary of results

Section 5.5 merely outlines the results of Johansen's methodology, that is, the long-run cointegrating relationships, as well as the short-run VECM results, impulse response functions, variance decompositions and VEC Granger causality/block exogeneity Wald tests. It is important that these results are still placed in the context of the theoretical and empirical discussions on export-led growth, so that the role of exports can be better understood. In other words, the question of what the above results mean and what could be deduced regarding the role of exports in the growth process in South Africa depends to a large extent on the way in which they relate to the theories of export-led growth, as well the existing empirical studies on the topic. The implications of the results with respect to theories of export-led growth and existing empirical studies on the topic will be discussed in Section 5.6.

5.6 IMPLICATIONS OF RESULTS WITH RESPECT TO THEORIES OF EXPORT-LED GROWTH AND EXISTING EMPIRICAL FINDINGS

5.6.1 Capital: explaining the role of exports from a supply-side perspective

As shown in the long-run equilibrium relationships of Equations 5.16 and 5.17, capital shares a highly significant positive long-run association with both GDE and exports respectively. Moreover, the short-run VECM shows that capital has a positive impact on GDE at one lag at the 10% level of significance. Interestingly, the results therefore not only suggest the presence of a capital-output connection, but also suggest that exports play a role in supporting the accumulation of capital stock. The impulse response functions in Figure 5.5 indicate that a shock to exports leads to an improvement in capital, the variance decompositions in Table 5.4 showed that changes in capital are to a large extent explained by shocks from exports, and the Granger causality tests indicate that exports Granger causes capital at a 1% level of significance. Hence, it is possible that exports stimulates growth in capital stock, which in turn clearly encourages better economic performance. This view is reflected by Figure 5.12, which was discussed earlier.

Thus, although the results shown in Equation 5.16 indicate that exports share an insignificant negative long-run relationship with GDE, this result should be seen in the broader context in which higher exports is linked to capital, which in turn is linked better economic output in South Africa. Concluding that better export performance does not lead to improved economic performance would be premature. Instead, it may be more appropriate to view the growth stimulus contained within exports as lying to a large extent in the channel to capital. In other words, the more exports are directed towards supporting increases in capital, the more it may indirectly support economic growth. Furthermore, there is evidence pointing to the presence of a virtuous export-capital cycle, since higher capital also leads to improved export performance (see Equation 5.17 or the variance decomposition of exports for example). This suggests that the success of the export sector depends on the amount of fixed investment spending in the South African economy.

Theories of export-led growth tend to predict a direct positive connection between exports and economic growth. While they discuss at length the ways export growth could trigger growth-enhancing changes in the economy, they generally do not anticipate that such effects may not be visible in the long-run, as in this study. Nevertheless, a number of theories discuss the role of investment as the key variable that is positively affected by export growth and in turn supports higher economic growth. Particularly supply-side models of export-led growth, which highlight the need for productivity improvements, emphasise the importance of the export-investment connection for economic growth. As noted in Section 2.4, the notion that export expansion could promote higher economic output by triggering the required investments in technological improvements, resulting from pressures of international competition, is well documented in studies of export-led growth (Balassa, 1978:181 & Bhagwati, 2007:63-4).

The link between exports and capital is discussed in 'new' new trade theory for example, which highlights the role of the firm in international trade (Ciuriak *et al.*, 2011:1). It emphasises the trade-productivity nexus and suggests learning-by-exporting as a possible channel through which export expansion can promote higher levels of investment, productivity and hence economic growth (Harrison and Rodríguez-Clare, 2009:61). The idea is that lower productivity firms will tend to invest and learn in order to achieve the necessary level of competitiveness required to compete in international export markets (Lileeva and Trefler, 2010:1053). Evidence of a significant causal link between export status and productivity in developing economies could suggest that such countries have most to gain

from exposure to export markets (Harrison and Rodríguez-Clare, 2009:62). As Islam (1998:416) highlights, "an increase in exports allows an increase in imported capital goods, which raises the growth rate of capital formation and […] export industries are more susceptible to productivity improvements and these lead to more investment." Furthermore, Singh and Jun (1995) established that export growth has a positive impact on FDI. Export orientation, in particular, was found to be the strongest variable accounting for a country's ability to attract FDI. This suggests, according to the authors, that there exists significant complementarity between the tradable sector and FDI (Singh and Jun, 1995:20). As noted in Chapter 3, export-oriented economies may find that foreign investment is more forthcoming in relation to import-substituting countries. By not being aimed merely at the domestic market, as in the case of an import-substituting economy, foreign investment would no longer be constrained by a lack of effective demand in the long-run (Bhagwati, 1988:38). Thus, since a booming tradables sector has been found to be associated with higher FDI and aggregate investment, frequently through the workings of virtuous cycles (Culem, 1988; Islam, 1998; Liu, Wang and Wei, 2001 & Sharma *et al*., 2012), it is not surprising that the results of this study suggest that exports in South Africa indeed supports increases in capital stock and vice versa.

The idea of linking exports to capital and consequently improvements in productivity and economic growth is also advocated by one of the first economists to put forward the export-led growth theory - Lamfalussy (1963). According to him, exports can set off a self-sustaining virtuous cycle of growth that runs from higher exports to higher investment spending, leading to improvements in productivity that in turn promote higher economic growth (Lamfalussy, 1963:110). While it is clear that output is dependent on factor inputs, Thirlwall (1997:383) stresses that this is only a partial explanation of growth – demand is also important. The link between export growth and Thirlwall's Law identified on the basis of this study's empirical results will be discussed further in Section 5.6.2.

The extended Chenery-Strout model also offers an explanation why higher exports could support the accumulation of capital stock, as the results above suggest. Importantly, the two *ex ante* gaps (savings and trade gap) are interconnected. Therefore exports, according to the extended model, play a significant role in overcoming the two financing gaps that curtail economic growth prospects. A rise in the anticipated rate of growth of exports reduces not only the *ex ante* trade gap as before, but also leads to a reduction in the *ex ante* savings gap, depending on the increase in the income of the export sector and that sector's marginal

propensity to save. Empirical evidence exists that supports the hypothesis that higher exports induce higher domestic savings rates (Wilbur and Haque, 1991:144 & Yang, 2012:126). Thus, the model suggests that exports support a higher economic growth rate by overcoming both the limit on the ability to invest and the limit on accessing the required supply of complementary inputs (via imports) to achieve the desired growth rate. In view of the insights derived from the extended Chenery-Strout model, it is likely that due to the observed export-capital relationship, the export sector in South Africa may indeed support the bridging of both the trade gap as well as the savings gap, which in total supports higher investment rates and hence faster economic growth.

As discussed in Section 4.2, a number of empirical studies support the detection of export-investment-growth linkages. For example, for ten European Transition countries between 1994 and 2008, Acaravci and Ozturk (2012) detect cointegrating relationships and causality between exports, growth and FDI, with investment posing the main engine of growth. Acaravci and Ozturk's (2012) finding emphasising the centrality of investments is supported by this study's results for South Africa – the magnitude of the positive long-run impact of capital is by far the largest compared to the other variables included in the model. Furthermore, Herrerias and Orts (2010) detect both an export-led growth and an investment-led growth effect in the Chinese economy from 1964 to 2004. While the results in this study suggest that exports play a notable role, for example, by supporting improvements in capital stock and economic performance particularly in the short-run, the most substantial long-run relationship was detected between capital and GDE in South Africa.

Given that capital shares a particularly noteworthy positive relationship with GDE, as Equation 5.16 shows, it is worth investigating whether any variables within the model, apart from exports as discussed earlier, support the accumulation of capital stock.

The variance decompositions show, for instance, that capital responds positively to a shock in GDE, with GDE explaining 14.86% of the changes in capital. In addition, the Granger causality tests show that GDE Granger causes changes in capital at the 1% level of significance. Both theoretical and empirical evidence support the notion that economic growth influences the accumulation of capital. De Haan, Sturm and Sikken (1996:66), for example, tested the theory that government capital spending rises during periods of accelerated economic expansion and falls during periods of lower economic growth. Evidence was found that during periods of fiscal stringency resulting from low economic

growth, governments view capital expenditure as a category of government spending that encounters less political resistance when cut than other spending categories (De Haan *et al.*, 1996:71). As a result, a positive relationship between economic growth and capital expenditure is anticipated (De Haan *et al.*, 1996; Henrekson, 1988 & Van Dalen and Swank, 1996). In a discussion of determinants of private investment, Ghura and Goodwin (2000:1820), moreover, emphasised the importance of economic growth as a significant stimulus of private investment in developing countries. Since the empirical evidence in Ghura and Goodwin's (2000) study supported the positive relationship between capital and economic growth in developing countries, the authors proposed that a virtuous cycle exists that connects higher private investment and economic growth (Ghura and Goodwin, 2000:1824). Indeed, the results of this study suggest not only that investments, leading to the accumulation of capital, lead to improved economic performance (see Equation 5.16), but also that higher GDE in turn supports capital (see variance decompositions in Table 5.4 or Granger causality tests in Table 5.5 for example). This result is supported by Cipamba and Cipamba's (2013:13) study on export-led growth in South Africa in which capital was found to Granger cause both economic output and exports and vice versa.

Another relevant variable in determining capital is the real effective exchange rate. As Ghura and Goodwin (2000:1822) discussed, the impact of changes in the real exchange rate on investment is somewhat unclear. On the one hand, a real appreciation could lower the cost of imported goods for a country, which given that a large proportion of capital inputs are imported in developing economies, means that an appreciation could support higher investment (Serven and Solimano, 1993:130). On the other hand, an appreciation of the real exchange rate, through lowering the profitability of the export sector, would be expected to reduce investment in that sector – with possible negative spillovers across the entire economy (Ghura and Goodwin, 2000:1822 & Serven and Solimano, 1993:130). As the impulse response functions would suggest, a shock to the real effective exchange rate leads to a notable positive response from growth in capital stock (see Appendix). Hence, it is likely that an appreciation of the currency supports rather than depresses the accumulation of capital stock in South Africa. This finding is supported by Serven and Solimano (1993:130) or Carranza, Galdon-Sanchez and Gomez-Biscarri (2011:1278), for example, who note that most empirical studies found that a real appreciation has a positive impact on investment due to the cost-of-capital-imports effect. The higher a country's dependence on imported capital goods with a proportionately low share of the export sector in aggregate investment, the more

marked the effect of an appreciation of the currency. Indeed the results of the variance decomposition for imports indicates that in period 20, 25.53% of movements in imports are due to the innovations of the real effective exchange rate. The VEC Granger Causality tests suggest that the real effective exchange rate Granger causes imports at a 1% level of significance. This view is also supported by the impulse response functions (see Figure 5.7 b)) where a shock to the real effect exchange rate leads to a pronounced positive response in imports. Overall, these results suggest that imports are intricately linked to developments in the real effective exchange rate. Given that a notable fraction of goods targeted towards fixed investment is imported in South Africa, it is not surprising that the appreciation of the currency supports the accumulation of capital stock, as suggested by the Granger causality tests for example. In addition, as the variance decomposition of capital shows, an increasingly large proportion of movements in capital are explained by shocks from the real effective exchange rate. This proportion rises to 34.65% in period 20. Hence the influence of the real effective exchange rate on capital is particularly felt in the long-run.

Overall, the export-capital-output nexus is an important theme in theories of export-led growth. Whether it be supply-side theories that emphasise the importance of raising productivity and levels of competitiveness, or demand-side and development theories that view exports as the key to bridging savings and trade gaps and ensuring the sustainability of growth in view of balance of payments constraints – all emphasise that exports can impact economic performance by supporting investment and hence the accumulation of capital stock. The empirical results of this study lend support to the idea that the role of exports in the economic growth process fundamentally lies in its ability to encourage investment and therefore the accumulation of capital. At the same time, support for export-led growth is not without caveat. The direct connection between exports and GDE is insignificant in the long-run and only by tracing the impact of exports to capital, and in turn the impact of capital to GDE in South Africa, can the positive role of exports be determined. This would suggest, at least for the case of South Africa, that theories of export-led growth that do not explicitly emphasise the export-capital connection fall short of reflecting the dynamics contained within the exports-growth relationship.

5.6.2 Balance of payments constrained growth: explaining the role of exports from a demand-side perspective

Although the results of Section 5.5 suggest that supply-side growth theories are correct in that economic growth and the achievement of socio-economic targets will be based on increased

investment in physical and human capital, export expansion is still critical to make such growth both possible and sustainable in the long-run (Hussain, 2006:27). As Thirlwall's Law implies, pressure on the current account balance brought about by higher economic growth rates and subsequent increases in import demand can only be lifted by improved export expansion, otherwise growth will be curtailed (Araujo and Lima, 2007:756). Export expansion is the only component of demand that finances the import requirements of growth and thus allows the other components of demand to grow at a faster rate – a phenomenon that purely investment-led growth does not support (Thirlwall, 2011:327). Especially in view of the critical role that investments play in supporting growth in South Africa, as established in Section 5.6.1, it is important that such investment-led growth is not stunted by a balance of payments constraint.

Pressure on the current account as a result of deficient exports and reduced capacity for investment spending is discussed in detail also in the Chenery-Strout model outlined in Section 4.4. For any target growth rate, two *ex ante* financing gaps occur with the savings gap being attributed to the difference between domestic savings and investment and the trade gap occurring as a result of the relationship between the growth of income and the growth of the 'minimum' level of imports consistent with that level of income growth (Maizels, 1968:53). A trade gap occurs when the structure of the economy is such that the level of imports required for economic expansion could only be obtained by running a consistent balance of trade deficit (Cochrane, 1972:385). The Chenery-Strout model highlights that imports are needed for accelerated long-run growth and at the same time, financing the required imports can prove problematic unless export growth is substantial. Similarly, Thirlwall's Law highlights that a lack of export earnings limits the achievement of the desired economic growth rate due to balance of payments problems. The results of this study lend support particularly to the applicability of Thirlwall's Law in the South African economy, while simultaneously not supporting the notion that higher imports are a definite requirement for higher long-run growth in South Africa.

In fact, imports were found to have a significant negative impact on both GDE and exports in the long-run (see Equation 5.16 and 5.17). This is also supported by the impulse response functions shown in Figure 5.6 d). A positive shock to imports is shown to lead to a negative response in economic output with GDE permanently stabilising at a lower level. Hence, the results strongly suggest that higher imports reduce economic outptu in South Africa, both in the long- and short-run.

Apart from the negative impact of higher import growth on economic growth in South Africa, the results, shown in Section 5.5, also suggest that higher economic growth strongly encourages higher import growth. Clearly, an income-induced import growth effect can be detected. The variance decomposition of imports suggests the presence of an income-induced import growth effect, since 29.52% of changes in imports are explained by innovations to GDE in period 5. This is supported also by the VEC Granger causality results, where GDE Granger causes imports at the 1% level, as well as the impulse response function shown in Figure 5.6 in which a shock to GDE leads to a significant positive spike in imports, peaking at four quarters after the initial shock.

Hence, there is a strong income-induced import growth effect. However, higher imports in turn diminish rather than support economic performance, at least in the short- to medium-term. This outcome suggests the presence of a balance of payments constraint to growth in the South African economy. As Thirlwall's Law suggests, increased imports reduces the growth rate that can be achieved while maintaining balance of payments equilibrium, *ceteris paribus*. The results of this study indicate the same: an increase in imports suggests diminished economic output. Hence, the role of exports within these dynamics is clear. Exports are needed in order to allow for higher economic growth, without at the same time re-introducing the balance of payments constraint. Based on the results, any other strategy that could help reduce the balance of payments constraint present in South Africa should be considered in order to improve South Africa's growth performance. Particularly, Hussain (2006) who has written extensively on the relevance of balance of payments constraints in emerging economies of Africa and ways to overcome these challenges, could be consulted when searching for solutions. Policy implications that can be drawn from this study's results will be discussed in Section 6.2.

While the importance of the balance of payments constraint has already been established in a number of empirical studies such as for Spain (Alonso, 1999), Mexico (Moreno-Brid, 2003) and Brazil (Britto and McCombie, 2009), which were discussed in more detail in Section 4.3, the question is whether other studies have found such a balance of payments constraint to be relevant in South Africa. The results of this study suggest by showing that higher imports diminish GDE performance and by showing that higher GDE in turn strongly encourages higher imports, the balance of payments constraint is very likely to pose a key limiting factor in South Africa. This finding is supported by Ozturk and Acaravci (2010), who tested for the presence of a balance of payments constraint in South Africa during the period 1984-2006.

Their empirical results indicate that South Africa's economy was constrained mainly by a balance of payments constraint, hence providing support for Thirlwall's hypothesis in the South African case.

Since exports play a critical role by supporting the accumulation of capital stock, as well as making investment-led growth possible by alleviating the balance of payments constraint on growth, it is relevant to analyse which factors within the model would support exports in South Africa.

While in the short-run, changes in the real effective exchange rate have no significant impact on exports (see Equation 5.19), in the long-run, however, an appreciation of the currency has a significant negative impact on South African exports ((Figure 5.8 a) and Equation 5.19)). These findings are comparable to those of Sharma (2000:15), for example, who found a similar negative relationship for the case of Indian exports.

Furthermore, it is also interesting to note the significant positive link between South Africa's export performance and world income (Equation 5.19), which indicates that higher exports are dependent on buoyant demand from abroad – as demand-side theories of export-led growth predict. In addition, the world financial crisis of 2008, as well as the consequent sovereign debt crisis in Europe, had a significant negative impact on export performance in South Africa. While Cipamba and Cipamba (2013) focus their model on five variables, namely economic growth (net of exports), capital, labour, exports and imports, the individual significance and theoretical importance of the additional variables included in this study's model (particularly, the real effective exchange rate and world income) would suggest that their inclusion was necessary.

Moreover, the recent emphasis on identifying sectors and product niches in rapidly expanding international markets – particularly emerging centres of economic power such as China, India and Brazil – can be supported by the empirical findings. In this regard, the inclusion of South Africa in the global partnership of BRICS is a crucial step forward in South Africa's foreign policy interaction that builds on the ongoing economic and trade cooperation efforts of the Department of Trade and Industry (DTI, 2011:9). In addition, the demand-side model of export-led growth seems highly applicable to the case of South Africa. As Thirlwall and Dixon's demand-side model predicts (Thirlwall and Dixon, 1979:183), exports growth in South Africa is strongly influenced by world demand and negatively related to the real effective exchange rate index. Thus, it is likely that the economy will be hit hard if foreign

demand for exports declines or the exchange rate strengthens notably. This is especially the case when the current account balance is unfavourable and capital inflows are not forthcoming.

As discussed in Section 4.3.1, empirical evidence regarding the export-led growth theory for South Africa mostly supports the notion that exports cause better economic performance in South Africa. From 1960q1 to 2008q3, Ziramba (2011) for example detected evidence of export-led growth in the case of merchandise exports, whereas no evidence of Granger causality in either direction was found for the case of net gold exports. Rangasamy's (2009) findings suggested unidirectional Granger causality running from exports to economic growth in South Africa for the period 1975q1 to 2007q3. These findings support Ziramba's (2011) in the sense that non-primary exports were found to support economic growth more strongly than primary exports (Rangasamy, 2009:613). Clear support for the export-led growth strategy for South Africa can be drawn from Cipamba and Cipamba's (2013) Granger causality tests in a multivariate VAR model. The authors established strong bidirectional causality between exports and economic growth for the period 1970q1 to 2012q4. The most tentative support for a strong export-growth connection in South Africa is the study conducted by Ajmi *et al.* (2013). For the period 1911 to 2011, the authors found no evidence of linear causality between exports and GDP. Only when applying nonlinear methods, Ajmi *et al*. (2013) detected evidence of unidirectional causality running from GDP to exports for the test based on Hiemstra and Jones (1994) and bidirectional causality based on the test proposed by Diks and Panchenko (2005). Clearly, the relationship between exports and GDP in South Africa is dynamic and changes with time. The results of Section 5.5 mirror most closely those of the study by Ajmi *et al*. (2013). Equations 5.16 and 5.17 show that a clear long-run relationship running from GDE to exports exists that does not apply conversely – at least not in the long-run. However, the multifaceted nature of the exports-output link found in this study, with exports playing a role in supporting investment-led growth both by supporting the accumulation of capital stock and alleviating possible balance of payments constraints, has not been discussed by these studies of exports and output in South Africa.

5.7 SUMMARY OF IMPLICATIONS OF EMPIRICAL RESULTS

In summary, while exports were not found to lead to improved economic performance in the long-run, they were found to directly support increased economic output in the short-run. At the same time, for both the short- and long-run, higher exports were shown to be a critical requirement for the accumulation of capital stock (a key success factor in encouraging higher

economic growth), as well as for mitigating the inhibiting effect of the balance of payments constraint on output in South Africa. Hence, the supply side, demand side, as well as development theories of export-led growth are all relevant in order to gain a more complete understanding of the role of exports in South Africa. In other words, the results support the idea that multifaceted channels play a role in modifying the export-output relationship in South Africa (Nissanke and Thorbecke, 2006:1340). In addition to being linked to output, exports are intricately linked to a number of macroeconomic variables including capital, employment and imports. The results therefore support the notion put forward by Nissanke and Thorbecke (2006), which is that the picture is highly complex due to the simultaneous operation of multiple transmission mechanisms.

Chapter 6

CONCLUSION

6.1 SUMMARY AND CONCLUSIONS

Through the application of Johansen's approach to cointegration and a series of tests based on the resulting VECM with two cointegrating vectors, including Granger causality tests, impulse responses and variance decompositions, several links have been analysed shedding light on the way in which exports operate within the economic growth process in South Africa both in the short- and long-run. Exports were found to play a prominent role in supporting improved economic performance, in particular, by encouraging the accumulation of capital stock. It may be most appropriate to view the impetus to growth stemming from exports as lying in the channel to capital. This positive influence of exports on capital most likely stems from the provision of the required resources that make investment-led growth a more viable possibility, although productivity related gains are also expected. Additionally, there is evidence pointing to the presence of a virtuous export-capital cycle, since growth in capital was conversely found to encourage higher exports. It is important to note that only by tracing the impact of exports to capital, and in turn the impact of capital to GDE could the extent of the positive role of exports in South Africa be determined. This suggests, at least for the case of South Africa, that studies of export-led growth that do not explicitly emphasise the export-capital connection are likely to fall short of reflecting the dynamics contained within the economic growth process in South Africa. Indeed, whether it be supply-side theories which highlight the importance of productivity and levels of competitiveness, or demand-side and development theories which emphasise that exports are the key to bridging savings and trade gaps and ensuring sustainable growth in view of balance of payments constraints – all tend to stress that exports can impact economic growth by supporting investment and hence the accumulation of capital.

Furthermore, as will be discussed further in Section 6.2, the rewards of an economic policy plan that simultaneously emphasises export growth and investment may be substantial; due to the operation of a virtuous cycle between both variables that consequently leads to improved economic performance in South Africa. In other words, given the clear positive feedback relationship between exports and capital in South Africa, a two-pronged strategy would be most desirable. In view of the tentativeness of capital inflows today, export expansion gains further urgency, since alternative ways to finance investment growth become increasingly

risky. The policy implications of the empirical findings will be discussed further in Section 6.2.

The results of Section 5.5 supported the idea that a number of variables play a role in modifying the export-output relationship in South Africa. In addition to being connectd to economic activity, exports are intricately linked to several macroeconomic variables including capital, employment, imports and the real effective exchange rate. The results, therefore, support the notion that the picture is highly complex due to the simultaneous operation of multiple transmission mechanisms. Despite this complexity, the export-capital-output nexus perhaps best encapsulates the role exports play in encouraging higher economic growth in South Africa.

6.2 POLICY IMPLICATIONS

6.2.1 Introduction

From the empirical findings of Section 5.5, two key policy implications stand out in particular. First, due to the significant role fixed capital was found to play within the model, it is apparent that high levels of investment spending are needed for increased economic growth and policymakers should direct much attention to finding ways to raise investment rates in South Africa. Second, considerable export earnings are a critical requirement of higher investment, as well as lifting the balance of payments constraint that makes investment-led growth possible in the first place. As noted in Section 5.6, the positive relationship between exports and GDE in the short-run supports the notion that export growth promotes higher economic growth rates in South Africa. This would suggest that policymakers should focus on raising the export growth rate in South Africa as a precondition for higher economic growth. The results suggest furthermore that South Africa's export sector without significant investment growth will struggle to compete successfully in the global market. Conversely, investment without notable export growth will be inhibited by lacking the required resources for expansion, as well as leading to a balance of payments constraint that puts an end to accelerated growth. Hence, a two-pronged strategy is needed that simultaneously supports exports and investment growth in South Africa. The rewards arising from such a strategy may be substantial, since both variables share a positive feedback relationship suggesting the operation of a virtuous cycle that consequently supports higher economic growth in South Africa.

6.2.2. Capitalising on the export-capital-output connection

Significant potential benefits could arise from explicitly coordinating policies that link and simultaneously drive export expansion and investment in some sectors due to the anticipated positive feedback effects between the two. Such policies could be used to capitalise on the virtuous cycle that exists between exports and fixed capital that in turn raises economic growth in South Africa. In other words, for higher economic growth to be viable in the long-run, it is imperative that the link between exports and fixed investment is emphasised – as only through the positive relationship between exports and fixed investment will the positive influence on economic growth be maximised.

In light of this study's empirical findings, it is encouraging to note that the NDP fully acknowledges the importance of raising both investment as well as exports in order to support faster economic growth and job creation. The document connects investments and exports in a broader productivity-centred virtuous cycle by stating the following:

> "…we propose to enhance human capital, productive capacity and infrastructure to raise exports, which will increase resources for investment and reduce reliance on capital inflows. Higher investment, supported by better public infrastructure and skills, will enable the economy to grow faster and become more productive. Rising employment and productivity will lead to rising incomes and living standards and less inequality. Shifting the economy towards more investment and lower consumption is necessary for long-term economic prosperity" (NPC, 2011:39).

Therefore, the NDP views the role of exports as encouraging faster investment spending, with investments, in turn, supporting higher levels of productivity and economic growth.

In Section 5.6 the highly positive influence of capital on exports was noted, underpinning the interconnectedness of both variables. Therefore, the study's findings support the NDP's view that competitiveness and export earnings, in turn, will be lifted through better infrastructure, reduced cost of conducting business and improved skills endowments, which will be made possible by significant investment spending (NPC, 2011:39).

As noted in Section 5.6, increased fixed capital is a crucial strategy to support both higher exports and better economic performance in South Africa. This is particularly the case in view of the constraints on increased and diversified production output in South Africa, which includes, as pointed out by the DTI (2013:68), underdeveloped infrastructure, such as roads, railway lines, electricity and water supply. Deficient infrastructure investment spending

would lead to worsening economic growth performance. Thus, there is abounding evidence for increased infrastructure spending targets to help lift economic growth in South Africa. This study, therefore, fully supports the significant infrastructure spending plans set out by the NDP, targeted to reach 10% of GDP (NPC, 2011:34). Infrastructure spending on this scale will be a major catalyst for growth and development with notable employment generation benefits for South Africa. In his annual budget speech, Minister of Finance Pravin Gordhan announced that R827 billion public sector spending would be earmarked for infrastructure over the next three years, that is, 2013-2015 (Gordhan, 2013). Additionally, the Presidential Infrastructure Coordinating Commission (PICC) has announced that it plans to roll out a set of major infrastructure development projects amounting to R4 trillion in spending over the next 15 years. The DTI acknowledges that all programmes of the IPAP must be aligned with the roll-out of the government's planned infrastructure development (DTI, 2013:7).

While expanded infrastructure spending is desirable given the role of fixed capital found in Section 5.5, there is nonetheless the danger that demand for inputs to infrastructure expansion spills over into imports, putting pressure on the current account balance. The impact of a 'sucking in' of imports on economic growth may be highly problematic given the negative influence of increased imports on economic output, which was found in Section 5.5 and discussed further in Section 5.6.2. Therefore, it is important that industrial expansion programmes managed by the DTI are fully synchronised with infrastructure related programmes to maintain alignment with overall efforts to support local manufacturers through localisation programmes. Wherever possible, requirements for infrastructure expansion should be sourced locally – thereby building capacity in upstream industries. Additionally, to enable such infrastructure spending, export earnings need to be substantial to lift pressure on the current account, especially if increased infrastructure-related input imports are anticipated nonetheless.

6.2.3 Raising export earnings

As noted in Section 5.6, the empirical evidence points towards the operation of Thirlwall's Law and hence balance of payments constrained growth in South Africa. This would suggest that policy makers should aim to raise export earnings, thereby allowing an escape from the constraints of the balance of payments that inhibit the possibility of investment-led growth.

Especially in the long-run, value-added exports face a more favourable world income elasticity of demand over time and as a result provide South Africa with higher export earnings and more income to support higher investment spending in the long-run. A stable and developmentally oriented government needs to be in place that assumes a long-term visionary strategy with the objective of carving out new export niches in the global marketplace; with such export niches fulfilling certain requirements. This implies that the promotion of exports and pursuit of export niches should be founded on an understanding of the relevance of not only price competitiveness, but also the income dimension of global competition, which was discussed in Section 2.3.9. As world income grows, a smaller and smaller proportion will be devoted to the purchase of primary commodities, whereas an increasingly larger proportion will be spent on more knowledge-intensive and sophisticated goods and services. Strategic visionary planning requires that export niches are pursued that are found in new industries in which future world demand will be high. Furthermore, the export sector should be directed towards adopting the role of processing and manufacturing, aiming to propel some manufacturers into such market niches, inviting and hosting foreign investment, and hence acting as the catalyst pulling the overall economy towards higher economic growth rates. Important for such a strategy is to achieve buy-in from the public, the private sector and political parties. It is furthermore clear that the importance of raising foreign exchange earnings is emphasised among all stakeholders, as it is potentially the most critical determinant of whether investment produces suitable returns and economic growth would therefore be sustainable.

Given that export earnings in the long-run will be more sustainable if the production of diversified manufacturing goods can be encouraged, this study lends support to the DTI's emphasis on growing and diversifying South Africa's manufacturing sector, which is laid down as the overriding goal of the 2013 IPAP (DTI, 2013:5). As noted in Section 3.6, the focus is no longer on facilitating trade as an end in itself, but rather on shifting focus towards targeted strategic support for the manufacturing sector (DTI, 2013:7). Therefore, while the export sector, in general, is seen as relevant, efforts are increasingly directed towards expanding and diversifying the export basket with particular focus on beneficiated commodities and downstream manufacturing goods.

In light of the importance of raising export earnings, the findings of Hussain's (2006) study regarding possible ways to capitalise on future growth areas of world income elasticity of demand are particularly relevant and are supported by the findings of this study. It is clear

that a transition is needed to ensure the sustainability of South Africa's economic growth and development in the long-run. The findings of Section 5.5 suggest that economic performance is strongly dependent on improvements in capital stock, which in turn can only be financed from strong export performance - particularly in the wake of increasingly fickle capital inflows (IMF, 2013:13). This poses a problem, since export earnings in South Africa currently still largely depend on unprocessed commodities in which South Africa has revealed comparative advantages. Two issues stand out. First, South Africa is currently in need of continued and substantial export earnings; otherwise the prospect of large capital outflows severely threatens the balance of payments, as well as aims to maintain high investment spending. Second, economic policy must strive to promote the sustainability of such export earnings by promoting the expansion of income-attractive export goods. How the transition to a more value-add export base should occur is a highly complex question. Nonetheless, export earnings should remain as high as possible throughout that time to continuously finance the current account. With a view to maintaining high export earnings, the NDP emphasises that the focus should be on exporting goods and services in which South Africa has such revealed comparative advantages (NPC, 2011:120). Industrial policy documents such as the IPAP emphasise, however, that "…primacy must be given to the production sectors of the economy – particularly to non-traditional tradable, value-added exports, green industries and renewable energy" (DTI, 2013:8). As a result, a sense of ambiguity arises that needs to be addressed and resolved, so that both policy clarity and focus can be achieved. Only with a clear and coordinated vision can policy in South Africa help steer economic development in the right direction including the safeguarding of substantial export earnings now and in the future.

Economic development zones in South Africa, particularly those focussed on supporting the export sector, are particularly worth encouraging on the basis of the findings of Section 5.5. The process of transforming the industrial and export base towards the desired value-add manufacturing production requires significant investments in infrastructure and other production servicing facilities. In confined areas, such investment could yield tangible results much more quickly than if such investments were equally spread across the entire country (Hussain, 2006:42). The results of the study highlight the highly virtuous link between investment and exports and economic development zones are particularly adept at leveraging off such a virtuous connection between the two variables and hence support higher economic growth. Therefore, the identification of Special Economic Zones (SEZs) by the DTI as key

levers of long-term industrial and economic development with particular potential for supporting increased exports of value-add manufacturing goods is particularly promising. New industrial hubs that draw in domestic and foreign direct investment are viewed as critical vehicles for the development of strategic industrial capabilities including the diversification of the export base (DTI, 2013:68). Furthermore, it is important to stress that the education system, in particular vocational training, must be aligned with the particular needs of the private sector and especially those involved in the expansion of new export niches. Therefore, it may even be possible to go so far as to say that regulation, industrial and trade policies, institution building, infrastructure development programmes, and human capital formation must all be shaped and put into practice with a fundamental objective in mind - economic transformation that strives towards the expansion of income-attractive exportable goods production.

6.2.4 Summary

The anticipated end of quantitative easing in the United States does not bode well for South Africa's balance of payments. Already, a slowdown in capital inflows and currency depreciation can be felt across emerging markets including South Africa (IMF, 2013:13). As the IMF (2013:12) highlights, the main risk the South African economy faces is a protracted stop in capital inflows, forcing a harsh adjustment of the twin deficits and causing a recession. Therefore, emphasis must again lay on export promotion in order to reduce dependence on increasingly fickle capital inflows. Global liquidity has made it possible for South Africa to finance simultaneous current account and fiscal deficits (IMF, 2013:2). However, South Africa is increasingly vulnerable to capital outflows and shocks stemming from highly turbulent global market conditions, unless the country can lift export earnings and diversify its export base. Especially with the accumulation of capital having been found to be the most significant contributor to improved economic performance, export earnings are a critical requirement to finance the desired investment-led growth. Depending on capital inflows is increasingly risky and could put all envisioned economic growth plans in jeopardy as well as endanger South Africa's economic sovereignty. It is therefore apparent that much effort should be directed towards export promotion – preferably in sectors where future growth is promising and where potential for labour absorption and productivity growth lie.

6.3 RECOMMENDATIONS FOR FURTHER RESEARCH

From the results of Section 5.5 it is apparent that a significant income-induced increase in imports exists in South Africa. It would be relevant, therefore, to analyse the income

elasticity of import demand in South Africa to gain a better understanding of the transmission mechanisms running between exports, capital, imports and economic growth. As a result, it may be possible to gain further insights into the applicability of Thirlwall's growth law to the South African growth experience.

Moreover, as the literature on exports and economic growth consistently highlights, productivity growth as a result of exports growth is a key channel through which exports may drive economic growth. Both in supply-side and demand-side theories of export-led growth, exports growth is seen to set off virtuous cycles of growth due to the link between export-induced output growth and productivity, which is summarised by Verdoorn's Law. As Hussain (2006:42) highlights, the export sector can furthermore function as a window through which a country can draw in new technological and managerial know-how. Therefore, further research is needed to test whether higher exports in South Africa can be related specifically to productivity growth and technological progress. As the results suggest, the positive feedback relationship between capital and exports would imply that productivity may indeed be enhanced as a result of better export performance.

Additionally, given that the results suggest that exports support GDE by enabling investment spending, the question is which sectors most prominently exhibit this link. As the DTI (2013:8) highlights, policy makers need to make trade-offs in terms of difficult monetary, fiscal and policy choice, hence prioritisation is necessary when setting trade policy focus areas. A sectoral analysis is likely to help point towards sectors that would most benefit from trade and industrial policy support. Therefore, further research could take into account the idea that comparative advantage is increasingly dynamic, man-made and can be consciously developed (Hussain, 2006:42). Therefore, it would be important to investigate sectors and industries in South Africa with possible potential regarding significant future comparative advantages and hence sustained export earnings in the future.

The results of Section 5.5 suggest that the export-capital connection is the key to export-led growth. Moreover, Section 5.6 highlighted that policy should take a two-pronged approach emphasising the interdependence and potential for symbiosis between both macroeconomic variables. In light of the export-capital link, more work is needed to unpack this connection in more detail. In other words, further research is needed to analyse whether there is evidence of the bridging of a trade and/or savings gap, or whether exports support investments by lifting balance of payments constraints on growth, as the results of Section 5.5 would suggest.

Another possibility is that exports support capital accumulation mainly through their impact on productivity improvements that subsequently support economic growth. Overall, the more in-depth the understanding of the manner in which exports operate within the export-capital-growth transmission mechanism, the more policy can intervene in a focused and measured way to help support South Africa's economic growth and development goals.

REFERENCES

ABEDIAN, I. and STANDISH, B. (1992). *Economic Growth in South Africa – Selected Policy Issues.* Cape Town: Oxford University Press.

ABUAL-FOUL, B. (2004). Testing the Export-Led Growth Hypothesis: Evidence from Jordan. *Applied Economics Letters* 11: 393-396.

ACARAVCI, A. and OZTURK, I. (2012). Foreign Direct Investment, Export and Economic Growth: Empirical Evidence from New EU Countries. *Romanian Journal of Economic Forecasting* 2: 52-67.

AJMI, A.N., AYE, G.C., BALCILAR, M. and GUPTA, R. (2013). *Causality between Exports and Economic Growth in South Africa: Evidence from Linear and Nonlinear Tests.* Working Paper No. 201339. Pretoria: UP.

AL MAMUN, K.A. and NATH, H.K. (2005). Export-Led Growth in Bangladesh: A Time Series Analysis. *Applied Economics Letters* 12: 361-364.

ALONSO, J. A. (1999). Growth and the External Constraint: Lessons from the Spanish Case. *Applied Economics* 31 (2): 245-253.

ALVES, P. and EDWARDS, L. (2009). South Africa's Trade Policy Reforms: Unfinished Business? In: Draper, P. and Alves, P. (eds). *Trade Reform in South Africa: Vision 2014?* Auckland Park: Fanele.

ANC (2013). 53rd National Conference: Resolutions. [Online] African National Congress. Available: http://www.anc.org.za/docs/res/2013/resolutions53r.pdf [Accessed 14 October 2013].

ANTUNES, M. and SOIKIAZIS, E. (2012). Foreign Trade, Human Capital and Economic Growth: An Empirical Approach for the EU Countries. *Journal of International Trade & Economic Development* 21 (1): 3-24.

ARAUJO, R.A. and LIMA, G. (2007). A Structural Economic Dynamics Approach to Balance-of-Payments-Constrained Growth. *Cambridge Journal of Economics* 31: 755-774.

ARAUJO, R.A. and SOARES, C. (2011). *Export Led Growth x Growth Led Exports: What Matters for the Brazilian Growth Experience after Trade Liberalisation?* MPRA Paper. Munich: LMU.

ARIFF, M and HILL, H. (2011). *Export-oriented Industrialisation: The ASEAN Experience*. London: Routledge.

ARRIGHI, G. (2003). The Social and Political Economy of Global Turbulence. *New Left Review* 20 (March-April): 5-80.

ATHUKORALA, P. (2006). Trade Policy Reforms and the Structure of Protection in Vietnam. *World Economy* 29: 191-187.

AWOKUSE, T.O. (2003). Is the Export-Led Growth Hypothesis Valid for Canada? *Canadian Journal of Economics* 36 (1): 126-136.

AWOKUSE, T.O. (2006). Export-Led Growth and the Japanese Economy: Evidence from VAR and Directed Acyclic Graphs. *Applied Economics* 38: 593-602.

BAJONA, C. and KEHOE, T.J. (2010). Trade, Growth, and Convergence in a Dynamic Heckscher–Ohlin Model. *Review of Economic Dynamics* 13 (3): 487-513.

BAJO-RUBIO, O. and DIAZ-ROLDAN, C. (2012). Do Export Cause Growth? Some Evidence for the New EU Members. *Post-Communist Economics* 24 (1): 125-131.

BALASSA, B. (1978). Exports and Economic Growth: Further Evidence. *Journal of Development Economics* 5 (2): 181-189.

BALASSA, B. (1984) Exports, Policy Choices, and Economic Growth in Developing Countries after the 1973 Oil Shock. *Journal of Development Economics* 18: 23-35.

BECKERMAN, W. (1962). Projecting Europe's Growth. *Economic Journal* 72 (December): 912-25.

BELL, T. (1993). Should South Africa Further Liberalise its Foreign Trade? In: Lipton, M. and Simkins, C. (eds). *State and Market in Post-Apartheid South Africa.* Johannesburg: Witwatersrand University Press.

BELL, T. and MADULA, N. (2001). *Where Has All the Growth Gone? South African Manufacturing Industry 1970-2000.* Johannesburg: The National Institute for Economic Policy.

BELL, T., FARRELL, G. and CASSIM, R. (1999). *Competitiveness, International Trade and Finance in a Minerals-rich Economy: The Case of South Africa.* IDCR Project.

BERNHOFEN, D.M. (2009). Multiple cones, factor price differences and the factor content of trade. *Journal of International Economics* 79 (2): 266-271.

BEZUIDENHOUT, H and NAUDÉ, W. (2010). Foreign Direct Investment and Trade in the Southern African Development Community. In: Santos-Paulino, A.U. and Wan, G. (eds). *Southern Engines of Global Growth*. New York: Oxford University Press.

BHAGWATI, J.N. (1988). Export-Promoting Trade Strategy: Issues and Evidence. *World Bank Research Observer* 3 (1): 27-57.

BHAGWATI, J.N. (2007). *In Defense of Globalization: With a New Afterword.* New York: Oxford University Press.

BLECKER, R.A. (2013). Long-Run Growth in Open Economies: Export-Led Cumulative Causation or Balance-of-Payments Constraint? In: Harcourt, G. and Kriesler, P. (eds). *Handbook of Post-Keynesian Economics.* Oxford: Oxford University Press.

BLOMSTRÖM, M., LIPSEY, R.E. and ZEJAN, M. (1996). *Is Fixed Investment the Key to Economic Growth?* NBER Working Paper No. 4436. Cambridge: NBER.

BOIANOVSKY, M. and HOOVER, K.D. (2009). The Neoclassical Growth Model and Twentieth-Century Economics. *History of Political Economy* 41 (1): 1-23.

BRITTO, G. and MCCOMBIE, J.S.L. (2009). Thirlwall's Law and the Long-Term Equilibrium Growth rate: an Application to Brazil. *Journal of Post Keynesian Economics* 32 (1): 115-136.

BROOKS, C. (2008). *Introductory Econometrics for Finance (2e).* New York: Cambridge University Press.

CARRANZA, L., GALDON-SANCHEZ, J.E. and GOMEZ-BISCARRI, J. (2011). The relationship between Investment and Large Exchange rate Depreciations in Dollarized Economies. *Journal of International Money and Finance* 30: 1265-1279.

CASSIM, R., ONYANGO, D. and VAN SEVENTER, D.E. (2004). *The State of Trade Policy in South Africa.* Johannesburg: Trade and Industry Policy Strategies.

CAVES, R. (1970). Export-Led Growth: The Post War Industrial Setting. In: Eltis, W., Scott, M. and Wolfe, J.N. (eds). *Induction Growth and Trade: Essays in Honour of Sir Roy Harrod.* London: Oxford University Press.

ÇETINTAŞ, H. and BARIŞIK, S. (2009). Export, Import and Economic Growth: The Case of Transition Economies. *Transition Studies Review* 15 (4): 636-649.

CHAN, K.S. and DANG, V.Q.T. (2010). Multilateral Trade and Export-Led Growth in the World Economy: Some Post-War Evidence. *Empirical Economics* 38 (3): 689-703.

CHANG, T., SIMO-KENGNE, B.D. and GUPTA, R. (2013). *The Causal Relationship between Exports and Economic Growth in the Nine Provinces of South Africa: Evidence from Panel-Granger Causality Test.* Department of Economics Working Paper No. 201317. Pretoria: University of Pretoria.

CHENERY, H.B. (1960). Patterns of Industrial Growth. *American Economic Review* 50 (4): 624-654.

CHENERY, H.B. and STROUT, A.M. (1966). Foreign Assistance and Economic Development. *American Economic Review* 56 (4): 679-733.

CHIGUSIWA, L., BINDU, S., MUDAVANHU, V., MUCHABAIWA, L. and MAZAMBANI, D. (2011). Export-Led Growth Hypothesis in Zimbabwe: Does Export Composition Matter? *International Journal of Economic Research* 2 (4): 111-129.

CIMOLI, M., PORCILE, G. and ROVIRA, S. (2010). Structural Change and the BOP Constraint: Why Did Latin America Fail to Converge? *Cambridge Journal of Economics* 34: 389-411.

CIPAMBA, P. and CIPAMBA, W. (2013). *The Export-Output Relationship in South Africa: An Empirical Investigation.* ERSA Working Paper 355. Cape Town: Economic Research South Africa.

CIURIAK, D., LAPHAM, B., WOLFE, R., COLLINS-WILLIAMS, T. and CURTIS, J.M. (2011). New-New Trade Policy. *Queen's Economics Department Working Paper 1263.*

COCHRANE, S.H. (1972). Structural Inflation and the Two-Gap Model of Economic Development. *Oxford Economic Papers* 24 (3): 385-398.

CULEM, C.G. (1988). The Locational Determinants of Direct Investments among Industrialized Countries. *European Economic Review* 32 (4): 885-904.

CULPEPER, R. (2005). *Approaches to Globalization and Inequality within the International System*. Programme Paper No 6. Geneva: United Nations Research Institute for Social Development.

CUÑAT, A. and MAFFEZZOLI, M. (2004). Neoclassical Growth and Commodity Trade. *Review of Economic Dynamics* 7 (3): 707-736.

CYPHER, J.M. and DIETZ, J.L. (2004). *The Process of Economic Development* (2e). London: Routledge.

DASH, R.K. (2009). Revisited Export-Led Growth Hypothesis: An Empirical Study on India. *South Asia Economic Journal* 10 (2): 305-324.

DE HAAN, J., STURM, J.E. and SIKKEN, B.J. (1996). Government capital formation: explaining the decline. *Weltwirtschaftliches Archiv* 132 (1): 5-74.

DE MELO, J. and ROBINSON, S. (1992). Productivity and Externalities Models of Export-Led Growth. *Journal of International Trade & Economic Development* 1 (1): 41-68.

DELGADO, M. A., FARINAS, J. C., and RUANO, S. (2002). Firm productivity and export markets: a non-parametric approach. *Journal of International Economics* 57 (2): 397-422.

DI LIBERTO, A. (2007). Convergence and Divergence in Neoclassical Growth Models with Human Capital. *Economia politica* 2: 289-322.

DIKS, C.G.H. and PANCHENKO, V. (2005). A Note on the Hiemstra-Jones Test for Granger Noncausality. *Studies in Nonlinear Dynamics and Econometrics* 9 (2): 1-7.

DIXON, R. and THIRLWALL, P.A. (1975). A Model of Regional Growth-Rate Differences on Kaldorian Lines. *Oxford Economic Papers* 27 (2): 201-214.

DODARO, S. (1991). Comparative Advantage, Trade and Growth: Export-Led Growth Revisited. *World Development* 19 (9): 1153-1165.

DREGER, C. and HERZER, D. (2012). A Further Examination of the Export-Led Growth Hypothesis. *Empirical Economics* 1-22.

DTI (2007). A National Industrial Policy Framework. [Online] The Department of Trade and Industry. Available: www.thedti.gov.za/industrial_development/docs/niPF-3aug.pdf [Accessed 7 July 2013].

DTI (2010a). Export Marketing and Investment Assistance Annual Report 2008/09. [Online] The Department of Trade and Industry. Available: http://www.thedti.gov.za/trade_investment/docs/emia/emia_annual_report_08_09.pdf [Accessed 6 March 2013].

DTI (2010b). Industrial Policy Action Plan (IPAP) 2012/13 – 2014/15. [Online] The Department of Trade and Industry. Available: www.info.gov.za/view/DownloadFileAction?id=162797 [Accessed 7 July 2013].

DTI (2011). Annual Report 2010-2011. [Online] The Department of Trade and Industry. Available: http://www.dti.gov.za/DownloadFileAction?id=631 [Accessed 27 April 2012].

DTI (2013) Industrial Policy Action Plan (IPAP) 2013/14 – 2015/16. [Online] The Department of Trade and Industry. Available: http://www.thedti.gov.za/news2013/ipap_2013-2016.pdf [Accessed 10 November 2013].

DUESENBERRY, J.S. (1959). *Income, Saving and the Theory of Consumer Behaviour.* Cambridge, Massachusetts: Harvard University Press.

DURKHEIM, É. (1938). *The Rules of Sociological Method.* Glencore, Illinois: The Free Press.

DUTT, A. (1990). *Growth, Distribution and Uneven Development.* Cambridge: Cambridge University Press.

DUTT, A.K. (2005). International Trade in Early Development Economics. In: Jomo, J.K.S. and Reinert, E.S. (eds). *The Origins of Development Economics*. India: Tulika Books.

EATON, J. and KORTUM, S. (2001). Technology, Trade, and Growth: A Unified Framework. *European Economic Review* 45 (4-6): 742-755.

EDWARDS, L. (2005). Has South Africa Liberalised its Trade? *South African Journal of Economics* 73: 754-775.

EDWARDS, L. and LAWRENCE, R.Z. (2006). *South African Trade Policy Matters: Trade Performance and Trade Policy.* Working Paper No. 12760. Cambridge: NBER.

EFTA-SACU (2006). Free Trade Agreement between the EFTA States and the SACU States. [Online] EFTA-SACU. Available: www.sacu.int/docs/tradeneg/efta-fta2006.pdf [Accessed 6 March 2013].

ENDERS, W. (2004). *Applied Econometric Time Series (2e).* New York: Wiley.

ENGLE, R.F. and GRANGER, C.W.J. (1987). Cointegration and error correction: Representation, estimation, and testing. *Econometrica* 55: 251-276.

FEDDERKE, J.W. and SCHALING, E. (2005). Modelling Inflation in South Africa: a Multivariate Cointegration Analysis. *South African Journal of Economics* 73 (1): 79-92.

FEDER, G. (1983). On Export and Economic Growth. *Journal of Development Economics*. 12: 59-73.

FELIPE, J., MCCOMBIE, J.S.L. and NAQVI, K. (2010). Is Pakistan's Growth Rate Balance-of-Payments Constrained? Policies and Implications for Development and Growth. *Oxford Development Studies* 38 (4): 477-496.

FERREIRA, F.H.G. and RAVALLION, M. (2008). *Global Poverty and Inequality: A Review of the Evidence*. Washington, D.C.: The World Bank.

FREUND, N. and WITT, H. (2010). *Development Dilemmas in Post-Apartheid South Africa.* Scottsville: University of KwaZulu-Natal Press.

GARCÍA-MOLINA, M. and RUÍZ-TAVERA, J.K. (2009). Thirlwall's Law and the Two-Gap Model: Toward a Unified "Dynamic Gap" Model. *Journal of Post Keynesian Economics* 32 (2): 269-290.

GERN, K., JANNSEN, N., SANDER, B., SCHEIDE, J. and VAN ROYE, B. (2008). Abkühlung der Weltkonjunktur. *Institut für Weltwirtschaft* 2: 3-37.

GHATEK, S., MILNER, C. and UTKULU, U. (1997). Exports, Export Composition and Growth: Cointegration and Causality Evidence for Malaysia. *Applied Economics* 29: 213-223.

GHURA, D. and GOODWIN, B. (2000). Determinants of private investment: a cross-regional empirical investigation. *Applied Economics* 32 (14): 1819-1829.

GONZALEZ-NUÑEZ, X. (2010). *15-Year Review: Trade Policy in South Africa*. Johannesburg: Trade and Industrial Policies.

GORDHAN, P. (2013). Minister of Finance Pravin Gordhan presents the 2013 Budget Speech, February 27 2013. [Online] Ministry of Finance. Available: http://www.info.gov.za/speech/DynamicAction?pageid=461&sid=34533&tid=99785 [Accessed: 15 July 2013].

GOUVEA, R.R. and LIMA, G. (2010). Structural Change, Balance of Payments Constraint and Economic Growth: Evidence from the Multi-Sectoral Thirlwall's Law. *Journal of Post Keynesian Economics* 33 (3): 169-190.

GREENAWAY, D., MORGAN, W. and WRIGHT, P. (1999). Exports, Export Composition and Growth. *Journal of International Trade & Economic Development* 8 (1): 41-51.

GRINDLE, M.S. (2004). Good Enough Governance: Poverty Reduction and Reform in Developing Countries. *Governance: An International Journal of Policy, Administration, and Institutions* 17 (4): 525-548.

GUTIÉRREZ, M.A. (2005). *Economic Growth in Latin America: the Role of Investment and other Growth Sources.* New York: United Nations.

HALPERN, L., KOREN, M. and SZEIDL, A. (2005). Imports and Productivity. *CEPR Discussion Paper No. 5139.*

HAMDI, H. (2013). Testing Export-Led Growth in Tunisia and Morocco: New Evidence using the Toda and Yamamoto Procedure. *Economics Bulletin* 33 (1): 677-686.

HARRISON, A. and RODRÍGUEZ-CLARE, A. (2009). Trade, Foreign Investment, and Industrial Policy for Developing Countries. *NBER Working Paper No. 15261.*

HARROD, R. (1933). *International Economics*. Cambridge: Cambridge University Press.

HELLEINER, G.K. (1992). *Trade Policy, Industrialization, and Development: New Perspectives*. New York: Clarendon Press Oxford.

HENREKSON, M. (1988). Swedish Government Growth: A Disequilibrium Analysis. In: J.A. Lybeck, M. Henrekson (eds). *Explaining the Growth of Government.* Amsterdam: North-Holland.

HERRERIAS, M.J. and ORTS, V. (2010). Is the Export-Led Growth Hypothesis Enough to Account for China's Growth? *China & World Economy* 18 (4): 34-51.

HERZER, D., NOWAK-LEHMANN, D. and SILIVERSTOVS, B. (2006). Export-Led Growth in Chile: Assessing the Role of Export Composition in Productivity Growth. *Developing Economies* 44 (3): 306-328.

HICKS, J. (1950). *A contribution to the theory of the trade cycle.* Oxford: Clarendon Press.

HIEMSTRA, C. and JONES, J.D. (1994). Testing for Linear and Nonlinear Granger Causality in the Stock Price-Volume Relation. *Journal of Finance* 49 (5): 1639-1664.

HIRSCH, A. (2005). *Season of Hope: Economic Reform under Mandela and Mbeki.* Scottsville: University of KwaZulu Natal Press.

HIRSCHMAN, A.O. (1958). *The Strategy of Economic Development.* New Haven: Yale University Press.

HOLDEN, M. (1990). The Choice of Trade Strategy: Past Reflections and Future Prospects. In: Nattrass, N. and Ardington, E. (eds). *The Political Economy of South Africa.* Cape Town: Oxford University Press.

HOLDEN, M. (2005a). Trade Liberalisation in South Africa Once Again. *South African Journal of Economics* 73: 776-784.

HOLDEN, M. (2005b). Growth in South Africa. In: Bernstein, A. and Johnston, S. (eds). *The Next Decade: Perspectives on South Africa's Growth and Development.* Johannesburg: The Centre for Development and Enterprise.

HOLDEN, M. and GOUWS, A. (1997). *Determinants of Exports in South Africa.* Paper presented during the Trade and Industrial Policy Secretariat Annual Forum, 21-23 September. Johannesburg: Glenburn Lodge.

HOSSAIN, M.H. and KARUNARATNE, N.D. (2004). Exports and Economic Growth in Bangladesh: Has Manufacturing Exports Become a New Engine of Export-Led Growth? *International Trade Journal* 18 (4): 303-334.

HUSSAIN, M.N. (1999). The Balance of Payments Constraint and Growth Rate Differences among African and East Asian Countries. *African Development Review* 11 (1): 103-137.

HUSSAIN, M.N. (2001). "Exorcising the Ghost": An Alternate Model for Measuring the Financing Gap in Developing Countries. *Journal of Post Keynesian Economics* 24 (1): 89-124.

HUSSAIN, M.N. (2006) The Implications of Thirlwall's Law for Africa's Development Challenges. In: Arestis, P., McCombie, J. and Vickerman, R. (eds). *Growth and Economic Development: Essays in Honour of A.P. Thirlwall.* Edward Elgar: Cheltenham.

HUTCHISON, M. and SINGH, N. (1992). Exports, Non-Exports and Externalities: A Granger Causality Approach. *International Economic Journal* 6 (2): 76-94.

HYE, Q.M.A. and SIDDIQUI, M.M. (2011). Export-Led Growth Hypothesis: Multivariate Rolling Window Analysis of Pakistan. *African Journal of Business Management* 5 (2): 531-536.

IBARRA, C.A. (2010). Capital flows, real exchange rate, and growth constraints in Mexico. *International Review of Applied Economics* 25 (6): 653-668.

IMF (2013). *South Africa: Staff Report for the 2013 Article IV Consultation.* IMF Country Report No. 13/303. Washington, D.C.: International Monetary Fund.

ISLAM, A. (1998). *The Dynamics of Asian Economic Crisis and Selected Policy Implications: Expert Group Meeting on What Have We Learned One Year into the Emerging Market Countries Financial Crisis.* New York: United Nations.

JAHED, M. and KIMATHI, S. (2008). The Economics of Developmental States. In: Turok, B. (ed). *Wealth Doesn't Trickle Down: The Case For a Developmental State in South Africa.* Cape Town: New Agenda: South African Journal of Social and Economic Policy.

JENKINS, C. (2001). *Integration and Co-operation in Southern Africa.* Working Paper No. 172. Paris: OECD Development Centre.

JIRANYAKUL, K. (2010). Recent Evidence of the Validity of the Export-Led Growth Hypothesis for Thailand. *Economics Bulletin* 30 (3): 2151-2159.

JOHANSEN, S. (1988). Statistical Analysis of Cointegration Vectors. *Journal of Economic Dynamics and Control* 12 (2): 231-254.

JOHANSEN, S. (1991). Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregressive Models. *Econometrica* 1551-1580.

JOHANSEN, S. (1995). *Likelihood-based Inference in Cointegrated Vector Auto-regressive Models – Advanced Texts in Econometrics.* New York: Oxford University Press.

JOHANSEN, S. and JUSELIUS, K. (1990). Maximum Likelihood Estimation and Inference on Cointegration—with Applications to the Demand for Money. *Oxford Bulletin of Economics and Statistics* 52 (2): 169-210.

JOHANSEN, S. and JUSELIUS, K. (1992). Testing Structural Hypotheses in a Multivariate Cointegration Analysis of the PPP and the UIP for UK. *Journal of Econometrics* 53 (1): 211-244.

JORDAAN, A.C. and EITA, J.H. (2009). Testing the Export-Led Growth Hypothesis for Botswana: A Causality Analysis. *Botswana Journal of Economics* 6 (10): 2-14.

JURAJDA, Š. and MITCHELL, J. (2003). 4 Markets and Growth. In: McMahon, G. and Squire, L. (eds). *Explaining Growth: A Global Research Project.* New York: Palgrave Macmillan.

JUSELIUS, K. (2006). *The Cointegrated VAR Model: Methodology and Applications*. New York: Oxford University Press.

KALDOR, N. (1966). *Causes of the Slow Rate of Economic Growth in the United Kingdom.* Cambridge: Cambridge University Press.

KAPLINSKY, R. (2002). *Spreading the Gains from Globalisation: What can be Learned from Value Chain Analysis.* Sussex: Institute of Development Studies, University of Sussex.

KAPLINSKY, R. (2006). Revisiting the Revisited Terms of Trade: Will China Make a Difference? *World Development* 34 (6): 981-995.

KATTEL, R., KREGEL, J.A. and REINERT, E.S. (2011). *Ragnar Nurkse: Trade and Development.* London: Anthem Press.

KAVOUSSI, R.M. (1984). Export Expansion and Economic Growth: Further Empirical Evidence. *Journal of Development Economics* 14: 241-250.

KIYOTA, K. (2012). Trade Liberalization, Economic Growth, and Income Distribution in a Multiple-Cone Neoclassical Growth Model. *Oxford Economic Papers* 64 (4): 655-674.

KNELLER, R. and PISU, M. (2007). Industrial Linkages and Export Spillovers from FDI. *World Economy* 30: 105-134.

KNIGHT, M., LOAYZA, N. and VILLANUEVA, D. (1993). Testing the Neoclassical Theory of Economic Growth: A Panel Data Approach. *IMF Staff Papers* 40 (3): 512-541.

KOZUL-WRIGHT, R. and RAYMENT, P. (2004). *Globalization Reloaded: An UNCTAD Perspective.* Geneva: UNCTAD.

KRAVIS, I.B. (1970). Trade as a Handmaiden of Growth: Similarities between the Nineteenth and Twentieth Centuries. *Economic Journal* 80 (320): 850-872.

KRUGMAN, P. (1987). The Narrow Moving Band, the Dutch Disease, and the Competitive Consequences of Mrs. Thatcher: Notes on Trade in the Presence of Dynamic Scale Economies. *Journal of Development Economics* 27 (1-2): 41-55.

KRUGMAN, P. (1989). Differences in the Income Elasticities and Trends in the Real Exchange Rates. *European Economic Review* 33: 1031-1054.

KWAN, A.C.C., YANGRU, W. and ZHANG, J. (1999). Fixed Investment and Economic Growth in China. *Economics of Planning* 32 (1): 67-79.

LAMFALUSSY, A. (1963). *The United Kingdom and the Six: an Essay on Economic Growth in Western Europe.* New Haven: Macmillan.

LEMON, A. and GIBB, R. (2002). Trade, Aid and Foreign Investment: South Africa, Southern Africa and the European Union. In: Lemon, A. and Rogerson, C.M. (eds). *Geography and Economy in South Africa and its Neighbours.* Hampshire: Ashgate.

LEWIS, J.D. (2001). *Reform and Opportunity: The Changing Role and Patterns of Trade in South Africa and SADC*. Working Paper No. 14. Washington, D.C.: The World Bank.

LILEEVA, A. and TREFLER, D. (2010). Improved Access to Foreign Markets Raises Plant-level Productivity…For Some Plants. *Quarterly Journal of Economics* 125 (3): 1051-1099.

LIM, S.Y. and HO, C.M. (2013). Nonlinearity in ASEAN-5 Export-Led Growth Model: Empirical Evidence from Nonparametric Approach. *Economic Modelling* 32: 136-145.

LIM, S.Y., CHIA, R.C. and HO, C.M. (2010). Long-Run Validity of Export-Led Growth: An Empirical Reinvestigation from Linear and Nonlinear Cointegration Test. *Economics Bulletin* 30 (2): 1182-1190.

LIN, J.Y. and LI, Y. (2003). Export and Economic Growth in China: A Demand-Oriented Analysis. *China Economic Quarterly* 2: 779-794.

LIU, X., WANG, C. and WEI, Y. (2001). Causal Links between Foreign Direct Investment and Trade in China. *China Economic Review* 12 (2): 190-202.

LOVE, J. and CHANDRA, R. (2005). Testing Export-Led Growth in South Asia. *Journal of Economic Studies* 32 (2): 132-145.

LUCAS, R.E. (1988). On the Mechanics of Economic Development. *Journal of Monetary Economics* 22 (1): 3-42.

LÜTKEPOHL, H. (2011). *Vector Autoregressive Models*. EUI Working Papers 2011/30. Florence: EUI.

MADDALA, G.S. and KIM, I. (1998). *Unit Roots, Cointegration, and Structural Change.* Cambridge: Cambridge University Press.

MAIZELS, A. (1968). *Exports and Economic Growth of Developing Countries.* London: Cambridge University Press.

MARCUS, G. (2012). Address by Gill Marcus, Governor of the South African Reserve Bank to the Nordic Business Chamber of South Africa, October 20 2012. [Online] South African Reserve Bank. Available: http://www.resbank.co.za/Lists/Speeches/Attachments/359/Address%20to%20Nordic%20Business%20Chamber%202%20October%202012.pdf [Accessed: 29 July 2013].

MARCUS, G. (2013). Address by Gill Marcus, Governor of the South African Reserve Bank, to the FM Top Companies awards function Johannesburg, June 26 2013. [Online] South African Reserve Bank. Available: http://www.politicsweb.co.za/politicsweb/view/politicsweb/en/page71656?oid=386700&sn=Detail&pid=71616 [Accessed: 29 July 2013].

MARIN, D. (1992). Is the Export-Led Growth Hypothesis Valid for Industrialized Countries? *Review of Economics and Statistics* 74 (4): 678-688.

MARTIN, R. and SUNLEY, P. (2011). The New Economic Geography and Policy Relevance. *Journal of Economic Geography* 11 (2): 357-369.

MELITZ, M. J. (2003). The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity. *Econometrica* 71: 1695-1725.

MICHAELY, M., PAPAGEORGIOU, D. and CHOKSI, A.M. (1990). *Liberalizing Foreign Trade-Lessons of Experience in the Developing World.* Washington, D.C.: The World Bank.

MICHALOPOULOS, C. and JAY, K. (1973). *Growth of Exports and Income in the Developing World: A Neoclassical View.* AID Discussion Paper No. 28. Washington, D.C.: Agency for International Development.

MILL, J.S. (1844). *Essays on Some Unsettled Questions of Political Economy*. London: Longmans.

MISHRA, V., SHARMA, S.S. and SMYTH, R. (2010). Is Economic Development in the Pacific Island Countries Export Led or Import Led? *Pacific Economic Bulletin* 25 (1): 46-63.

MOHAMED, S. and ROBERTS, S. (2008). Questions of Growth, Questions of Development. In: Turok, B. (ed). *Wealth Doesn't Trickle Down: The Case For a Developmental State in South Africa*. Cape Town: New Agenda: South African Journal of Social and Economic Policy.

MORENO-BRID, J. (1998). On Capital Flows and the Balance-of-Payments-Constrained Growth Model. *Journal of Post Keynesian Economics.* 21 (2): 283-298.

MORENO-BRID, J. (2003). Capital Flows, Interest Payments and the Balance of Payments Constrained Growth Model: A Theoretical and Empirical Analysis. *Metroeconomica* 54 (2-3): 346-365.

MORENO-BRID, J.C. and CALDENTEY, E.P. (2011). Trade and Economic Growth: A Latin American Perspective on Rhetoric and Reality. In: Setterfield, M. (ed). *Handbook of Alternative Theories of Economic Growth*. Cheltenham: Edward Elgar Publishing.

MOSCHOS, D. (1989). Export Expansion, Growth and the Level of Economic Development: An Empirical Analysis. *Journal of Development Economics* 30 (1): 93-102.

MYINT, H. (1958). The "Classical Theory" of International Trade and the Underdeveloped Countries. *Economic Journal* 68 (270): 317-337.

MYINT, H. (1987). The Neoclassical Resurgence in Development Economics: Its Strength and Limitations. In: Meier, G.M. (ed). *Pioneers in Development: Second Series*. Washington D.C.: Oxford.

MYRDAL, G. (1956). *International Economy, Problems and Prospects*. New York: Harper.

NAIN, Z. and AHMAD, W. (2010). Export-Led Growth Hypothesis in India: Some Further Evidences. *IUP Journal of Monetary Economics* 8 (3): 69-82.

NARAYAN, P.K., NARAYAN, S., PRASAD, B.C. and PRASAD, A. (2007). Export-Led Growth Hypothesis: Evidence from Papua New Guinea and Fiji. *Journal of Economic Studies* 34 (4): 341-351.

NELL, K.S. (2003). A 'Generalised' Version of the Balance-of-Payments Growth Model: an Application to Neighbouring Regions. *International Review of Applied Economics* 17 (3): 249-267.

NISSANKE, M. and THORBECKE, E. (2006). Channels and Policy Debate in the Globalization-Inequality-Poverty Nexus. *World Development* 34 (8): 1338-1360.

NPC (2011). *National Development Plan: Vision for 2030.* Pretoria: National Planning Commission.

NURKSE, R. (1952). Some International Aspects of the Problem of Economic Development. *American Economic Review* 42 (2): 571-583.

NURKSE, R. (1953). *Problems of Capital Formation in Underdeveloped Countries*. New York: Oxford University Press.

OZTURK, I. and ACARAVCI, A. (2010). An Application of Thirlwall's Law to the South African Economy: Evidence from ARDL Bounds Testing Approach. *African Journal of Business Management* 4 (1): 262-266.

PACHECO-LÓPEZ, P. and THIRLWALL, A.P. (2006). Trade Liberalization, the Income Elasticity of Demand for Imports, and Growth in Latin America. *Journal of Post Keynesian Economics* 29 (1): 41-66.

PATEL, E. (2010). The *New Growth Path: Framework.* Pretoria: Economic Development Department.

PAUL, B.P. and DAS, A. (2012). Export-Led Growth in India and the Role of Liberalisation. *Journal of Applied Economic Research* 6 (1): 1-26.

PAVCNIK, N. (2002). Trade Liberalization, Exit, and Productivity Improvements: Evidence from Chilean Plants. *Review of Economic Studies* 69 (1): 245-276.

PERRATON, J. (2003). Balance of Payments Constrained Growth and Developing Countries: an Examination of Thirlwall's Hypothesis. *International Review of Applied Economics* 17 (1): 1-22.

PODRECCA, E. and CARMECI, G. (2001). Fixed investment and economic growth: new results on causality. *Applied Economics* 33 (2): 177-182.

PREBISCH, R. (1950). The Economic Development of Latin America and its Principal Problems. New York: United Nations ECLA.

PREBISCH, R. (1952). *Theoretical and practical problems of economic growth.* Mexico City: ECLAC.

RAM, R. (1985). Exports and Economic Growth: Some Additional Evidence. *Economic Development and Cultural Change* 33 (2): 415-425.

RANGASAMY, L. (2009). Exports and Economic Growth: The Case of South Africa. *Journal of International Development* 21: 603-617.

RAY, S. and RAY, I.A. (2012). Empirical Nexus between Export and Productivity Growth: Evidence from Selected Manufacturing Industries in India. *Advance in Asian Social Science* 1 (3): 301-311.

RICARDO, D. (1817). *Principles of Political Economy and Taxation*. (Reprint by Dover Publications, New York, 2004).

ROBERTS, M. (2007). The Conditional Convergence Properties of Simple Kaldorian Growth Models. *International Review of Applied Economics* 21 (5): 619-663.

RODRIK, D. (1994). *Getting Interventions Right: How South Korea and Taiwan Grew Rich.* Cambridge: National Bureau of Economic Research, Inc.

RODRIK, D. (2008). Understanding South Africa's economic puzzles. *Economics of Transition* 16 (4): 769-797.

ROMER, P. (1986). Increasing Returns and Long-Run Growth. *Journal of Political Economy* 94: 1002-1037.

ROS, J. (2005). The Pioneers of Development Economics and Modern Growth Theory. In: Jomo, J.K.S. and Reinert, E.S. (eds). *The Origins of Development Economics*. India: Tulika Books.

ROSENSTEIN-RODAN, P.N. (1943). Problems of Industrialisation of Eastern and South-Eastern Europe. *Economic Journal* 53 (210/211): 202-211.

ROSTOW, W. (1960). *The Stages of Economic Growth: A Non-Communist Manifesto.* Cambridge: Cambridge University Press.

SAAD-FILHO, A. (2005). The Rise and Decline of Latin American Structuralism and Dependency Theory. In: Jomo, J.K.S. and Reinert, E.S. (eds). *The Origins of Development Economics*. India: Tulika Books.

SAME, A.T. (2007). *Sub-Saharan Africa Strategy for Sustained Growth to Breakthrough in the 21st Century*. Working Paper. Washington, D.C.: World Bank Institute.

SEABRA, F. and GALIMBERTI, J. K. (2012). Conditioned Export-Led Growth Hypothesis: A Panel Threshold Regressions Approach. *Revista de Economia* 38 (2): 7-24.

SERVEN, L. and SOLIMANO, A. (1993) Debt Crisis, Adjustment Policies and Capital Formation in Developing Countries: Where do we stand? *World Development* 21 (1): 127-140.

SHAN, J. and SUN, F. (1998). On the Export-Led Growth Hypothesis: The Econometric Evidence from China. *Applied Economics* 30 (8): 1055-1065.

SHARMA, K. (2000). *Export Growth in India: Has FDI Played a Role?* Center Discussion Paper No. 816. New Haven: Yale Economic Growth Center.

SHARMA, K. (2003). Factors Determining India's Export Performance. *Journal of Asian Economics* 14 (3): 435-446.

SHARMA, K., NAYAGAM, J. and CHUNG, H.H. (2012). Determinants of Foreign Direct Investment in Malaysia: New Evidence from Cointegration and Error Correction Model. *Journal of Developing Areas* 46 (1): 71-89.

SHIRAZ, S.S. and MANAP, T.A. (2005). Export-Led Growth Hypothesis: Further Econometric Evidence from South Asia. *Developing Economies* 43 (4): 472-488.

SILIVERSTOVS, B. and HERZER, D. (2006). Export-Led Growth Hypothesis: Evidence for Chile. *Applied Economics Letters* 13 (5): 319-324.

SIMLEIT, C., KEETON, G. and BOTHA, F. (2011). The Determinants of Household Savings in South Africa. *Studies in Economics and Econometrics* 35 (3): 1-20.

SIMS, C.A. (1980). Macroeconomics and Reality. *Econometrica* 48 (1): 1-48.

SINGH, H. and JUN, K. (1995). *Some New Evidence on Determinants of Foreign Direct Investment in Developing Countries*. World Bank Policy Research Working Paper No. 1531. Washington D.C.: World Bank.

SMITH, A. (1776). *An Inquiry into the Nature and Causes of the Wealth of Nations*. London: W. Strahan & T. Cadell.

SOLOW, R.M. (1956). A Contribution to the Theory of Economic Growth. *Quarterly Journal of Economics* 70 (1): 65-94.

SPRAOS, J. (1991). Sub-optimal Market-led Adjustment to External Shock in Developing Countries. *South African Journal of Economics* 59 (3): 352-364.

SRINIVASAN, T.N. (2001). *Trade, Development, and Growth*. New Jersey: Princeton University.

SWAN, T.W. (1956). Economic Growth and Capital Accumulation. *Economic Record* 32: 334-361.

SZENTES, T. (2005). Development in the History of Economics. In: Jomo, J.K.S. and Reinert, E.S. (eds). *The Origins of Development Economics*. India: Tulika Books.

TABRIZY, S. and TROFIMENKO, N. (2010). *Scope for export-led growth in a large emerging economy: Is India learning by exporting?* Working Paper No. 1633. Kiel: Kiel Institute for the World Economy.

TANG, C.F. and LAI, Y.W. (2011). *The Stability of Export-Led Growth Hypothesis: Evidence from Asia's Four Little Dragons.* MPRA Paper. Munich: LMU.

TANG, T.C. and RAVIN, C. (2013). *Export-Led Growth in Cambodia: An Empirical Study.* Discussion Paper 03/13. Bandar Sunway: Monash University.

TEKIN, R.B. (2012). Economic Growth, Exports and Foreign Direct Investment in Least Developed Countries: A Panel Granger Causality Analysis. *Economic Modelling* 29: 868-878.

THIRLWALL A.P. and HUSSAIN M.N. (1982). The Balance of Payments Constraint, Capital Flows and Growth Rate Differences between Developing Countries. *Oxford Economic Papers* 34 (3): 498-510.

THIRLWALL, A.P. (1997). Reflections on the Concept of Balance-of-Payments-Constrained Growth. *Journal of Post Keynesian Economics* 19 (3): 377-385.

THIRLWALL, A.P. (2011). Balance of Payments Constrained Growth Models: History and Overview. *PSL Quarterly Review* 64 (259): 307-351.

THIRLWALL, A.P. and DIXON, R.J. (1979). 10 A Model of Export-Led Growth with a Balance of Payments Constraint. In: Bowers, J.K. (ed). *Inflation, Development and Integration.* Leeds: Leeds University Press.

THIRLWALL, A.P. and HUSSAIN, M.N. (1982). The Balance of Payments Constraint, Capital Flows and Growth Rate Differences between Developing Countries. *Oxford Economic Papers* 34 (3): 498-510.

THORBECKE, E. (2007). The Evolution of the Development Doctrine, 1950-2005. In: Mavrotas, G. and Shorrocks, A. (eds). *Advancing Development: Core Themes in Global Economics.* New York: Palgrave Macmillan.

TODA, H. Y. and YAMAMOTO, T. (1995). Statistical Inference in Vector Autoregressions with Possibly Integrated Processes. *Journal of Econometrics* 66 (1): 225-250.

TODARO, M.P. and SMITH, S.C. (2006). *Economic Development* (9e). Essex: Addison-Wesley.

TYLER, W.G. (1981). Growth and Export Expansion in Developing Countries: Some Empirical Evidence. *Journal of Development Economics* 9: 121-130.

VAN DALEN, H.P. and SWANK, O.H. (1996). Government Spending Cycles: Ideological or Opportunistic? *Public Choice* 89 (1-2): 183-200.

WATSON, R.T., BOUDREAU, M. and CHEN, A.J. (2010). Information Systems and Environmentally Sustainable Development: Energy Informatics and New Directions for the IS Community. *MIS Quarterly* 34 (1): 23-38.

WILBUR, W.L. and HAQUE, M.Z. (1991). An Investigation into the Export Expansion Hypothesis with Respect to Economic Development in Less Developed Countries. *Journal of Economic Development* 16 (1): 133-144.

WORLD BANK (1987). *World Development Report 1987*. Washington, D.C.: The World Bank.

WORLD BANK (2002). *Globalization, Growth and Poverty: A World Bank Research Report*. New York: Oxford University Press for the World Bank.

YAGHMAIAN, B. and GHORASHI, R. (1995). Export Performance and Economic Development: An Empirical Analysis. *The American Economist* 39 (2): 37-45.

YANG, D.T. (2012). Aggregate Savings and External Imbalances in China. *Journal of Economic Perspectives* 26 (4): 125-146.

ZIRAMBA, E. (2011). Export-Led Growth in South Africa: Evidence from the Components of Exports. *Studies in Economics and Econometrics* 35 (1): 1-13.

ZIVOT, E. and WANG, J. (2003). *Modeling Financial Time Series with S-Plus*. New York: Springer.

APPENDIX

Table A1. Estimates of an index of the income dimension of global competition

			Shares in Global Trade of Each Category				
Real World Exports by Category		**Global Income Elasticity**	Africa	Asia	USA	EU	Japan
1.	Machinery & transport equipment	2.30	0.02	0.11	0.281	0.192	0.355
2.	Chemical products	2.14	0.01	0.06	0.066	0.056	0.039
3.	Manufactured goods	2.13	0.02	0.353	0.46	0.411	0.492
4.	Other manufactured goods	1.38	0.03	0.211	0.113	0.164	0.098
5.	Primary commodities, incl. fuel	1.35	0.03	0.095	0.011	0.025	0.002
6.	All food items	1.26	0.05	0.105	0.045	0.063	0.004
7.	Ores and metals	1.16	0.1	0.053	0.011	0.069	0.007
8.	Agricultural raw materials	0.74	0.75	0.013	0.013	0.02	0.003
Weighted Global Income Elasticities			**0.918**	**1.756**	**2.017**	**1.871**	**2.101**

Note: All elasticities are significant at the 5% level

Source: Hussain (2006:39)

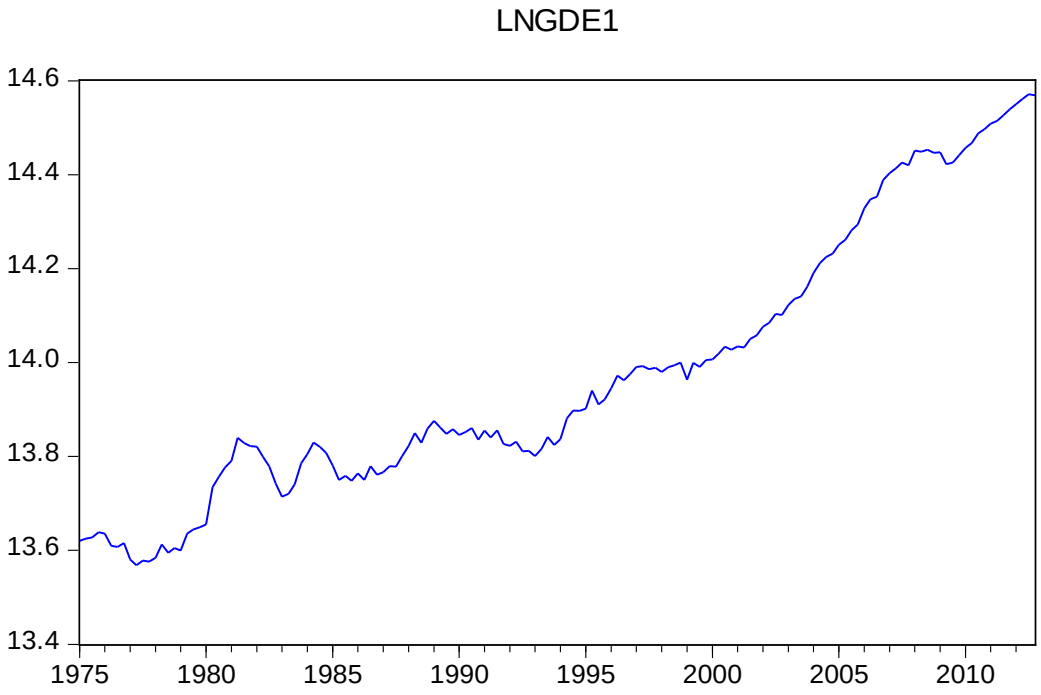

Figure A1. The log of gross domestic expenditure in level terms

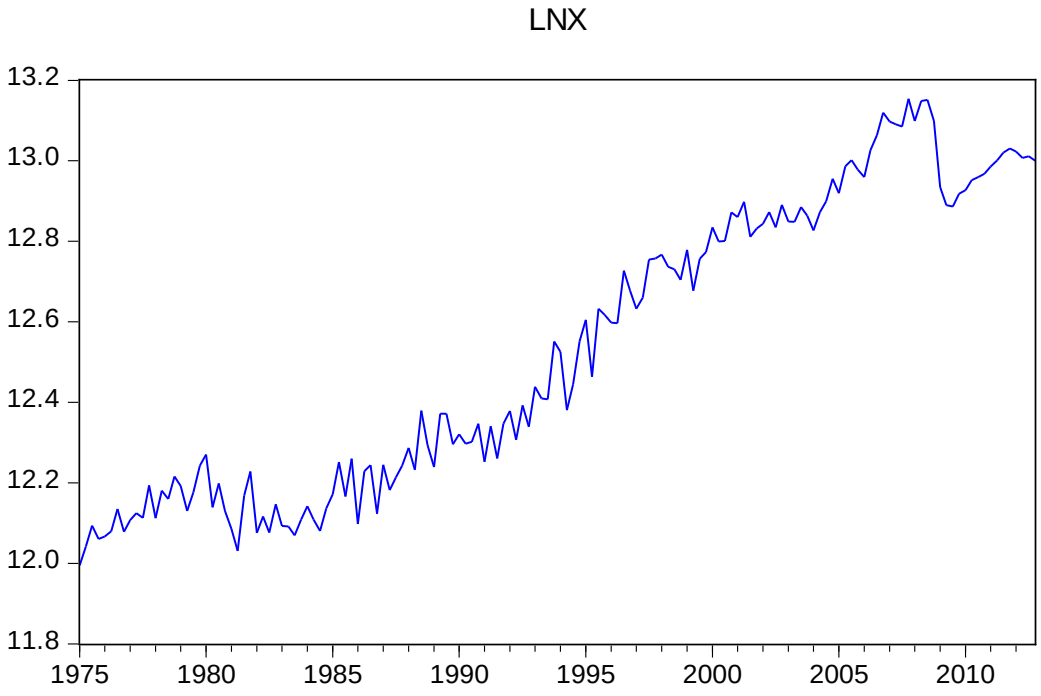

Figure A2. The log of exports in level terms

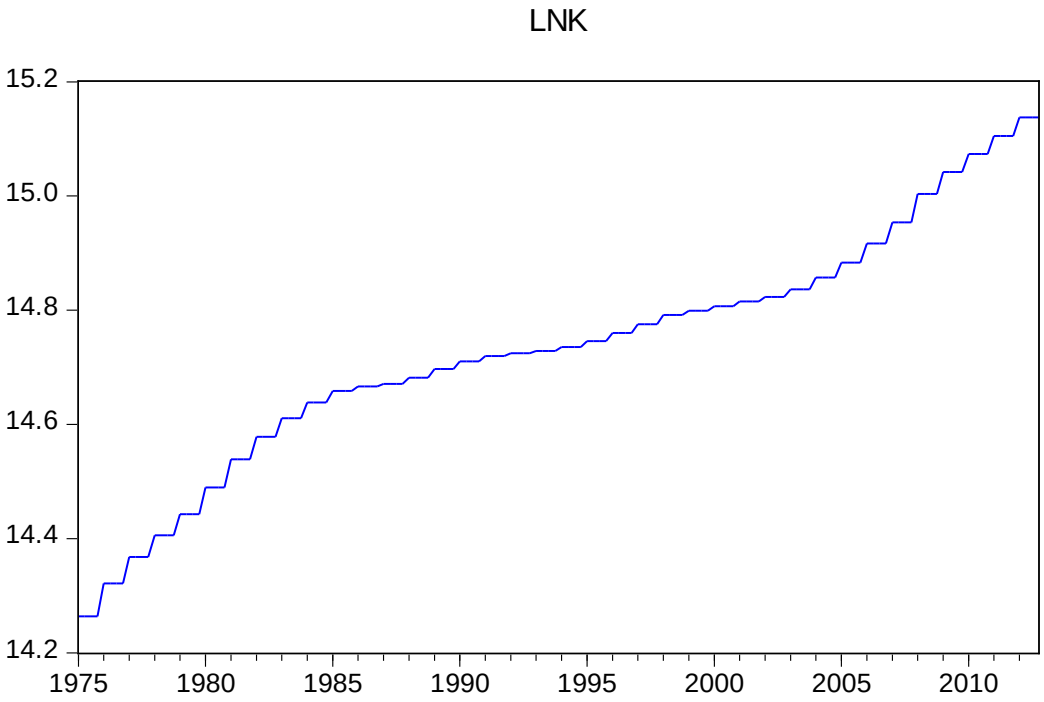

Figure A3. The log of capital in level terms

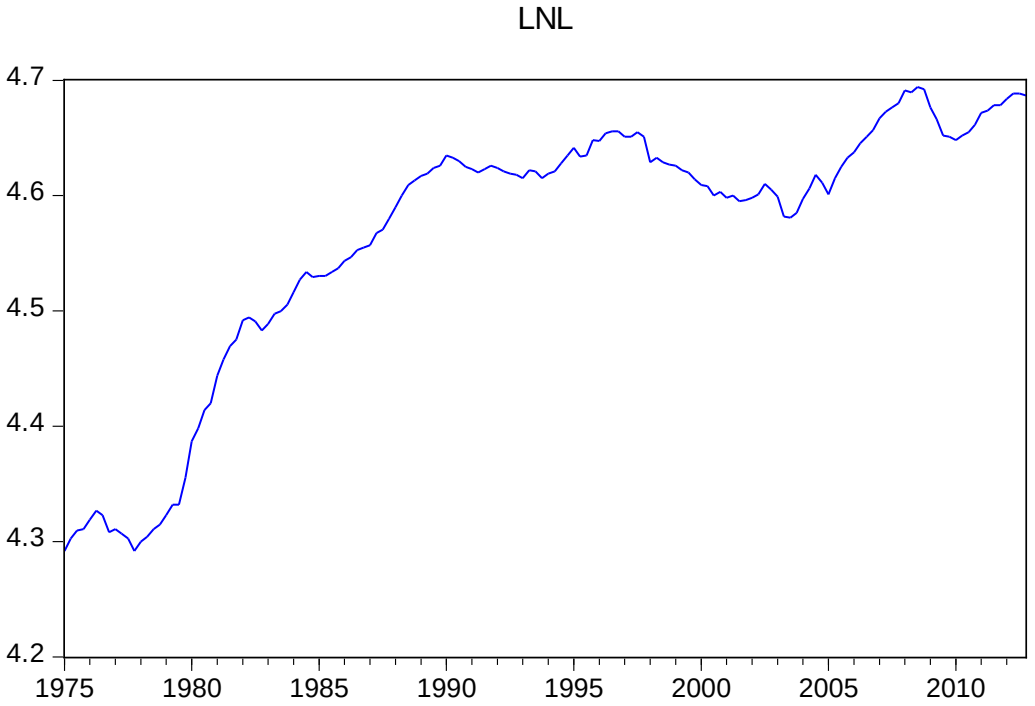

Figure A4. The log of employment in level terms

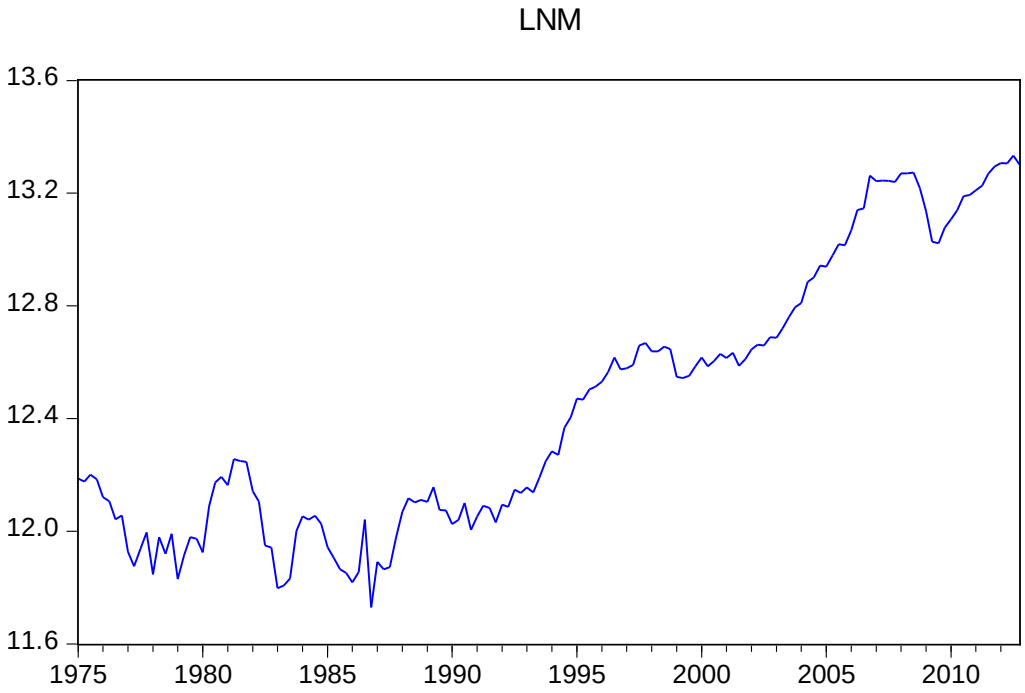

Figure A5. The log of imports in level terms

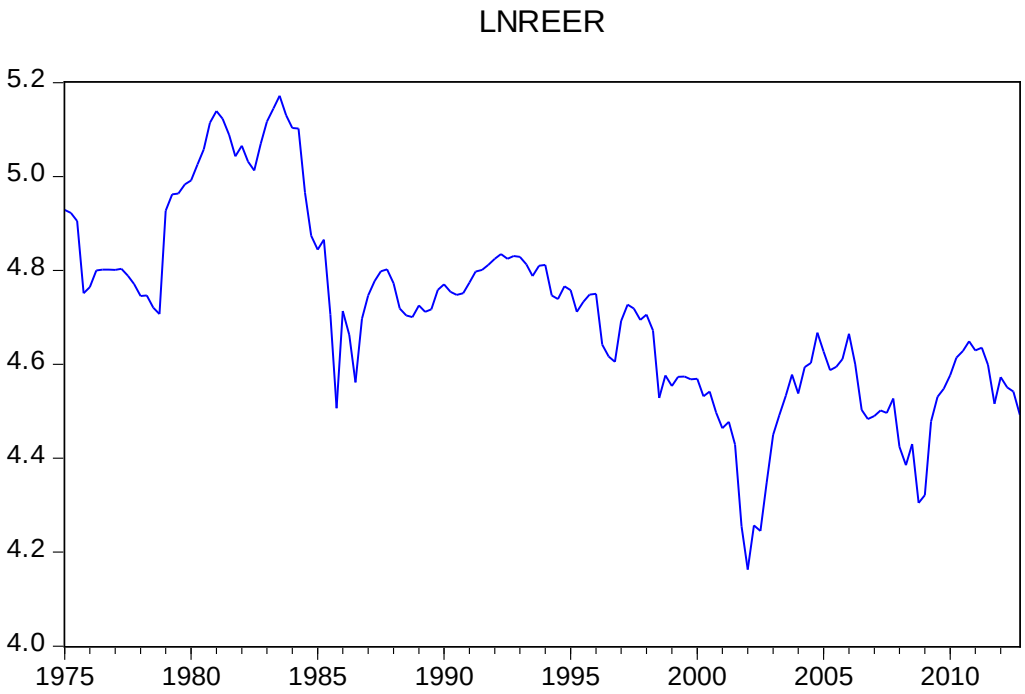

Figure A6. The log of the real effective exchange rate in level terms

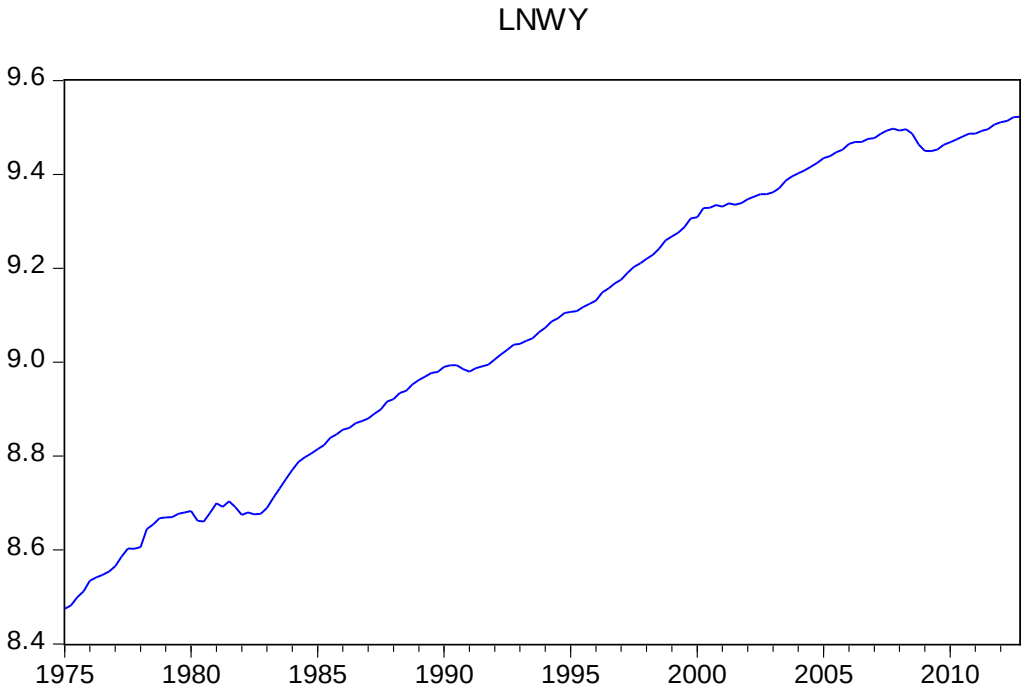

Figure A7. The log of world income in level terms

Table A2. KPSS test for GDE in level terms

Null Hypothesis: LNGDE1 is stationary
Exogenous: Constant
Bandwidth: 10 (Newey-West automatic) using Bartlett kernel

		LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic		1.363715
Asymptotic critical values*:	1% level	0.739000
	5% level	0.463000
	10% level	0.347000

Table A3. KPSS test for GDE in first differences

Null Hypothesis: D(LNGDE1) is stationary
Exogenous: Constant
Bandwidth: 7 (Newey-West automatic) using Bartlett kernel

		LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic		0.277875
Asymptotic critical values*:	1% level	0.739000
	5% level	0.463000
	10% level	0.347000

Table A4. ADF test for GDE in level terms

Null Hypothesis: LNGDE1 has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=13)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		1.400046	0.9990
Test critical values:	1% level	-3.473967	
	5% level	-2.880591	
	10% level	-2.577008	

Table A5. ADF test for GDE in first differences

Null Hypothesis: D(LNGDE1) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=13)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.743237	0.0000
Test critical values:	1% level	-3.474567	
	5% level	-2.880853	
	10% level	-2.577147	

Table A6. ERS test for GDE in level terms

Null Hypothesis: LNGDE1 has a unit root
Exogenous: Constant
Lag length: 0 (Spectral OLS AR based on SIC, maxlag=13)
Sample: 1975Q1 2012Q4
Included observations: 152

		P-Statistic
Elliott-Rothenberg-Stock test statistic		263.6970
Test critical values:	1% level	1.929200
	5% level	3.141200
	10% level	4.253200

Table A7. ERS test for GDE in first differences

Null Hypothesis: D(LNGDE1) has a unit root
Exogenous: Constant
Lag length: 1 (Spectral OLS AR based on SIC, maxlag=13)
Sample (adjusted): 1975Q2 2012Q4
Included observations: 151 after adjustments

		P-Statistic
Elliott-Rothenberg-Stock test statistic		0.491039
Test critical values:	1% level	1.929600
	5% level	3.140600
	10% level	4.251600

Table A8. KPSS test for capital in level terms

Null Hypothesis: LNK is stationary
Exogenous: Constant
Bandwidth: 10 (Newey-West automatic) using Bartlett kernel

		LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic		1.386688
Asymptotic critical values*:	1% level	0.739000
	5% level	0.463000
	10% level	0.347000

Table A9. KPSS test for capital in first differences

Null Hypothesis: D(LNK) is stationary
Exogenous: Constant
Bandwidth: 12 (Newey-West automatic) using Bartlett kernel

		LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic		0.274885
Asymptotic critical values*:	1% level	0.739000
	5% level	0.463000
	10% level	0.347000

Table A10. ADF test for capital in level terms

Null Hypothesis: LNK has a unit root
Exogenous: Constant
Lag Length: 8 (Automatic - based on SIC, maxlag=13)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.120116	0.9663
Test critical values:	1% level	-3.476472	
	5% level	-2.881685	
	10% level	-2.577591	

Table A11. ADF test for capital in first differences

Null Hypothesis: D(LNK) has a unit root
Exogenous: Constant
Lag Length: 7 (Automatic - based on SIC, maxlag=13)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.980936	0.2950
Test critical values:	1% level	-3.476472	
	5% level	-2.881685	
	10% level	-2.577591	

Table A12. ADF test for capital in second differences

Null Hypothesis: D(LNK,2) has a unit root
Exogenous: Constant
Lag Length: 6 (Automatic - based on SIC, maxlag=13)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.010797	0.0018
Test critical values:	1% level	-3.476472	
	5% level	-2.881685	
	10% level	-2.577591	

Table A13. ERS test for capital in level terms

Null Hypothesis: LNK has a unit root
Exogenous: Constant
Lag length: 8 (Spectral OLS AR based on SIC, maxlag=13)
Sample: 1975Q1 2012Q4
Included observations: 152

		P-Statistic
Elliott-Rothenberg-Stock test statistic		201.5626
Test critical values:	1% level	1.929200
	5% level	3.141200
	10% level	4.253200

Table A14. ERS test for capital in first differences

Null Hypothesis: D(LNK) has a unit root
Exogenous: Constant
Lag length: 7 (Spectral OLS AR based on SIC, maxlag=13)
Sample (adjusted): 1975Q2 2012Q4
Included observations: 151 after adjustments

		P-Statistic
Elliott-Rothenberg-Stock test statistic		40.00278
Test critical values:	1% level	1.929600
	5% level	3.140600
	10% level	4.251600

Table A15. ERS test for capital in second differences

Null Hypothesis: D(LNK,2) has a unit root
Exogenous: Constant
Lag length: 6 (Spectral OLS AR based on SIC, maxlag=13)
Sample (adjusted): 1975Q3 2012Q4
Included observations: 150 after adjustments

		P-Statistic
Elliott-Rothenberg-Stock test statistic		445.1632
Test critical values:	1% level	1.930000
	5% level	3.140000
	10% level	4.250000

Table A16. KPSS test for labour in level terms

Null Hypothesis: LNL is stationary
Exogenous: Constant
Bandwidth: 10 (Newey-West automatic) using Bartlett kernel

		LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic		1.033934
Asymptotic critical values*:	1% level	0.739000
	5% level	0.463000
	10% level	0.347000

Table A17. KPSS test for labour in first differences

Null Hypothesis: D(LNL) is stationary
Exogenous: Constant
Bandwidth: 0 (Newey-West automatic) using Bartlett kernel

		LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic		0.166470
Asymptotic critical values*:	1% level	0.739000
	5% level	0.463000
	10% level	0.347000

Table A18. ADF test for labour in level terms

Null Hypothesis: LNL has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=13)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.150402	0.9407
Test critical values:	1% level	-3.473967	
	5% level	-2.880591	
	10% level	-2.577008	

Table A19. ADF test for labour in first differences

Null Hypothesis: D(LNL) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=13)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-11.95752	0.0000
Test critical values:	1% level	-3.474265	
	5% level	-2.880722	
	10% level	-2.577077	

Table A20. ERS test for labour in level terms

Null Hypothesis: LNL has a unit root
Exogenous: Constant
Lag length: 0 (Spectral OLS AR based on SIC, maxlag=13)
Sample: 1975Q1 2012Q4
Included observations: 152

		P-Statistic
Elliott-Rothenberg-Stock test statistic		43.47308
Test critical values:	1% level	1.929200
	5% level	3.141200
	10% level	4.253200

Table A21. ERS test for labour in first differences

Null Hypothesis: D(LNL) has a unit root
Exogenous: Constant
Lag length: 0 (Spectral OLS AR based on SIC, maxlag=13)
Sample (adjusted): 1975Q2 2012Q4
Included observations: 151 after adjustments

		P-Statistic
Elliott-Rothenberg-Stock test statistic		0.341405
Test critical values:	1% level	1.929600
	5% level	3.140600
	10% level	4.251600

Table A22. KPSS test for exports in level terms

Null Hypothesis: LNX is stationary
Exogenous: Constant
Bandwidth: 10 (Newey-West automatic) using Bartlett kernel

		LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic		1.436123
Asymptotic critical values*:	1% level	0.739000
	5% level	0.463000
	10% level	0.347000

Table A23. KPSS test for exports in first differences

Null Hypothesis: D(LNX) is stationary
Exogenous: Constant
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic		0.037899
Asymptotic critical values*:	1% level	0.739000
	5% level	0.463000
	10% level	0.347000

Table A24. ADF test for exports in level terms

Null Hypothesis: LNX has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on SIC, maxlag=13)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.557366	0.8752
Test critical values:	1% level	-3.474567	
	5% level	-2.880853	
	10% level	-2.577147	

Table A25. ADF test for exports in first differences

Null Hypothesis: D(LNX) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=13)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-13.02821	0.0000
Test critical values:	1% level	-3.474567	
	5% level	-2.880853	
	10% level	-2.577147	

Table A26. ERS test for exports in level terms

Null Hypothesis: LNX has a unit root
Exogenous: Constant
Lag length: 2 (Spectral OLS AR based on SIC, maxlag=13)
Sample: 1975Q1 2012Q4
Included observations: 152

		P-Statistic
Elliott-Rothenberg-Stock test statistic		132.8579
Test critical values:	1% level	1.929200
	5% level	3.141200
	10% level	4.253200

Table A27. ERS test for exports in first differences

Null Hypothesis: D(LNX) has a unit root
Exogenous: Constant
Lag length: 1 (Spectral OLS AR based on SIC, maxlag=13)
Sample (adjusted): 1975Q2 2012Q4
Included observations: 151 after adjustments

		P-Statistic
Elliott-Rothenberg-Stock test statistic		0.322718
Test critical values:	1% level	1.929600
	5% level	3.140600
	10% level	4.251600

Table A28. KPSS test for imports in level terms

Null Hypothesis: LNM is stationary
Exogenous: Constant
Bandwidth: 10 (Newey-West automatic) using Bartlett kernel

		LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic		1.328163
Asymptotic critical values*:	1% level	0.739000
	5% level	0.463000
	10% level	0.347000

Table A29. KPSS test for imports in first differences

Null Hypothesis: D(LNM) is stationary
Exogenous: Constant
Bandwidth: 6 (Newey-West automatic) using Bartlett kernel

		LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic		0.238472
Asymptotic critical values*:	1% level	0.739000
	5% level	0.463000
	10% level	0.347000

Table A30. ADF test for imports in level terms

Null Hypothesis: LNM has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=13)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.095835	0.9645
Test critical values:	1% level	-3.473967	
	5% level	-2.880591	
	10% level	-2.577008	

Table A31. ADF test for imports in first differences

Null Hypothesis: D(LNM) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=13)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-14.35739	0.0000
Test critical values:	1% level	-3.474265	
	5% level	-2.880722	
	10% level	-2.577077	

Table A32. ERS test for imports in level terms

Null Hypothesis: LNM has a unit root
Exogenous: Constant
Lag length: 0 (Spectral OLS AR based on SIC, maxlag=13)
Sample: 1975Q1 2012Q4
Included observations: 152

		P-Statistic
Elliott-Rothenberg-Stock test statistic		33.24267
Test critical values:	1% level	1.929200
	5% level	3.141200
	10% level	4.253200

Table A33. ERS test for imports in first differences

Null Hypothesis: D(LNM) has a unit root
Exogenous: Constant
Lag length: 0 (Spectral OLS AR based on SIC, maxlag=13)
Sample (adjusted): 1975Q2 2012Q4
Included observations: 151 after adjustments

		P-Statistic
Elliott-Rothenberg-Stock test statistic		0.358338
Test critical values:	1% level	1.929600
	5% level	3.140600
	10% level	4.251600

Table A34. KPSS test for the real effective exchange rate in level terms

Null Hypothesis: LNREER is stationary
Exogenous: Constant
Bandwidth: 10 (Newey-West automatic) using Bartlett kernel

		LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic		1.049597
Asymptotic critical values*:	1% level	0.739000
	5% level	0.463000
	10% level	0.347000

Table A35. KPSS test for the real effective exchange rate in first differences

Null Hypothesis: D(LNREER) is stationary
Exogenous: Constant
Bandwidth: 4 (Newey-West automatic) using Bartlett kernel

		LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic		0.032779
Asymptotic critical values*:	1% level	0.739000
	5% level	0.463000
	10% level	0.347000

Table A36. ADF test for the real effective exchange rate in level terms

Null Hypothesis: LNREER has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=13)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.771326	0.3936
Test critical values:	1% level	-3.473967	
	5% level	-2.880591	
	10% level	-2.577008	

Table A37. ADF test for the real effective exchange rate in first differences

Null Hypothesis: D(LNREER) has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on SIC, maxlag=13)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.091329	0.0000
Test critical values:	1% level	-3.474874	
	5% level	-2.880987	
	10% level	-2.577219	

Table A38. ERS test for the real effective exchange rate in level terms

Null Hypothesis: LNREER has a unit root
Exogenous: Constant
Lag length: 0 (Spectral OLS AR based on SIC, maxlag=13)
Sample: 1975Q1 2012Q4
Included observations: 152

		P-Statistic
Elliott-Rothenberg-Stock test statistic		9.282400
Test critical values:	1% level	1.929200
	5% level	3.141200
	10% level	4.253200

Table A39. ERS test for the real effective exchange rate in first differences

Null Hypothesis: D(LNREER) has a unit root
Exogenous: Constant
Lag length: 2 (Spectral OLS AR based on SIC, maxlag=13)
Sample (adjusted): 1975Q2 2012Q4
Included observations: 151 after adjustments

		P-Statistic
Elliott-Rothenberg-Stock test statistic		0.621844
Test critical values:	1% level	1.929600
	5% level	3.140600
	10% level	4.251600

Table A40. KPSS test for world income in level terms

Null Hypothesis: LNWY is stationary
Exogenous: Constant
Bandwidth: 10 (Newey-West automatic) using Bartlett kernel

		LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic		1.482358
Asymptotic critical values*:	1% level	0.739000
	5% level	0.463000
	10% level	0.347000

Table A41. KPSS test for world income in first differences

Null Hypothesis: D(LNWY) is stationary
Exogenous: Constant
Bandwidth: 6 (Newey-West automatic) using Bartlett kernel

		LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic		0.336362
Asymptotic critical values*:	1% level	0.739000
	5% level	0.463000
	10% level	0.347000

Table A42. ADF test for world income in level terms

Null Hypothesis: LNWY has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=13)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.004073	0.2849
Test critical values:	1% level	-3.474265	
	5% level	-2.880722	
	10% level	-2.577077	

Table A43. ADF test for world income in first differences

Null Hypothesis: D(LNWY) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=13)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.187213	0.0000
Test critical values:	1% level	-3.474265	
	5% level	-2.880722	
	10% level	-2.577077	

Table A44. ERS test for world income in level terms

Null Hypothesis: LNWY has a unit root
Exogenous: Constant
Lag length: 1 (Spectral OLS AR based on SIC, maxlag=13)
Sample: 1975Q1 2012Q4
Included observations: 152

		P-Statistic
Elliott-Rothenberg-Stock test statistic		1239.006
Test critical values:	1% level	1.929200
	5% level	3.141200
	10% level	4.253200

Table A45. ERS test for world income in first differences

Null Hypothesis: D(LNWY) has a unit root
Exogenous: Constant
Lag length: 0 (Spectral OLS AR based on SIC, maxlag=13)
Sample (adjusted): 1975Q2 2012Q4
Included observations: 151 after adjustments

		P-Statistic
Elliott-Rothenberg-Stock test statistic		0.409911
Test critical values:	1% level	1.929600
	5% level	3.140600
	10% level	4.251600

Table A46. VAR lag order selection criteria

VAR Lag Order Selection Criteria
Endogenous variables: LNGDE1 LNK LNL LNX LNM LNREER
Exogenous variables: C DEM CRISIS CADUM LNWY
Sample: 1975Q1 2012Q4
Included observations: 144

Lag	LogL	LR	FPE	AIC	SC	HQ
0	1254.532	NA	1.66e-15	-17.00739	-16.38868	-16.75598
1	1918.047	1225.659	2.72e-19	-25.72287	-24.36171	-25.16977
2	1972.762	96.51230	2.11e-19	-25.98281	-23.87919	-25.12802
3	2013.373	68.24898	2.00e-19	-26.04685	-23.20078	-24.89037
4	2237.377	357.7833	1.49e-20	-28.65801	-25.06949*	-27.19984*
5	2285.144	72.31413*	1.30e-20*	-28.82144*	-24.49047	-27.06158
6	2307.473	31.94233	1.63e-20	-28.63156	-23.55813	-26.57001
7	2338.820	42.23167	1.83e-20	-28.56694	-22.75106	-26.20369
8	2374.250	44.77939	1.98e-20	-28.55902	-22.00068	-25.89408

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table A47. VAR residual serial correlation LM tests (4 lags)

VAR Residual Serial Correlation LM Tests
Null Hypothesis: no serial correlation at lag order h
Sample: 1975Q1 2012Q4
Included observations: 148

Lags	LM-Stat	Prob
1	49.05005	0.0721
2	45.56177	0.1319
3	68.93128	0.0008
4	50.40755	0.0560
5	33.33591	0.5960
6	43.20378	0.1906
7	33.05474	0.6094
8	33.36322	0.5946
9	37.53451	0.3987
10	41.06710	0.2582
11	28.84859	0.7956
12	28.32760	0.8153

Probs from chi-square with 36 df.

Table A48. Trace and Max-Eigenvalue rank tests

Sample (adjusted): 1976Q2 2012Q4
Included observations: 147 after adjustments
Trend assumption: Linear deterministic trend
Series: LNGDE1 LNK LNL LNX LNM LNREER
Exogenous series: DEM CRISIS CADUM LNWY
Warning: Critical values assume no exogenous series
Lags interval (in first differences): 1 to 4

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.325920	167.3237	95.75366	0.0000
At most 1 *	0.304837	109.3460	69.81889	0.0000
At most 2 *	0.167130	55.89541	47.85613	0.0073
At most 3	0.120291	29.01241	29.79707	0.0614
At most 4	0.066800	10.17229	15.49471	0.2677
At most 5	6.32E-05	0.009290	3.841466	0.9229

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.325920	57.97771	40.07757	0.0002
At most 1 *	0.304837	53.45057	33.87687	0.0001
At most 2	0.167130	26.88299	27.58434	0.0613
At most 3	0.120291	18.84013	21.13162	0.1016
At most 4	0.066800	10.16300	14.26460	0.2014
At most 5	6.32E-05	0.009290	3.841466	0.9229

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Table A49. VECM estimation results

Vector Error Correction Estimates
Sample (adjusted): 1976Q1 2012Q4
Included observations: 148 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegration Restrictions:
B(1,1)=1,B(1,6)=0,B(2,4)=1,B(2,3)=0
Convergence achieved after 1 iterations.
Restrictions identify all cointegrating vectors
Restrictions are not binding (LR test not available)

Cointegrating Eq:	CointEq1	CointEq2
LNGDE1(-1)	1.000000	6.574890
		(0.17608)
		[37.3399]
LNK(-1)	-0.955086	-6.424398
	(0.09171)	(0.50648)
	[-10.4144]	[-12.6844]
LNL(-1)	-0.043057	0.000000
	(0.01230)	
	[-3.50007]	
LNX(-1)	0.004850	1.000000
	(0.01865)	
	[0.25998]	
LNM(-1)	0.216233	0.871816
	(0.03667)	(0.20246)
	[5.89727]	[4.30607]
LNREER(-1)	0.000000	0.296216
		(0.05019)
		[5.90246]
C	-1.982440	-21.99116

Error Correction:	D(LNGDE1)	D(LNK)	D(LNL)	D(LNX)	D(LNM)	D(LNREER)
CointEq1	-1.062383	-0.302642	0.684260	3.152944	-1.361592	-0.234119
	(0.21807)	(0.04032)	(0.46631)	(0.81135)	(0.72879)	(0.87378)
	[-4.87184]	[-7.50657]	[1.46739]	[3.88605]	[-1.86830]	[-0.26794]
CointEq2	0.159298	0.062778	-0.103541	-0.497045	0.171882	0.041706
	(0.03406)	(0.00630)	(0.07284)	(0.12673)	(0.11384)	(0.13649)
	[4.67665]	[9.96851]	[-1.42151]	[-3.92194]	[1.50988]	[0.30557]
D(LNGDE1(-1))	0.473488	0.001851	0.576336	1.340162	3.114698	-0.083083
	(0.15604)	(0.02885)	(0.33368)	(0.58058)	(0.52150)	(0.62526)
	[3.03434]	[0.06414]	[1.72720]	[2.30830]	[5.97254]	[-0.13288]
D(LNGDE1(-2))	0.080800	-0.091143	-0.016610	0.828136	1.520549	-0.308594
	(0.17403)	(0.03218)	(0.37215)	(0.64751)	(0.58162)	(0.69734)
	[0.46428]	[-2.83266]	[-0.04463]	[1.27895]	[2.61433]	[-0.44253]
D(LNGDE1(-3))	-0.088987	-0.080808	-0.023165	-0.046295	0.124007	0.010190
	(0.17005)	(0.03144)	(0.36363)	(0.63269)	(0.56831)	(0.68138)

	[-0.52330]	[-2.57029]	[-0.06371]	[-0.07317]	[0.21820]	[0.01496]
D(LNK(-1))	0.197232	-0.859926	-0.012690	-0.073665	0.741184	-0.338820
	(0.12124)	(0.02241)	(0.25925)	(0.45108)	(0.40518)	(0.48579)
	[1.62682]	[-38.3641]	[-0.04895]	[-0.16331]	[1.82927]	[-0.69746]
D(LNK(-2))	0.011856	-0.894155	-0.120361	0.730477	0.695574	-0.985419
	(0.12524)	(0.02316)	(0.26782)	(0.46599)	(0.41857)	(0.50185)
	[0.09467]	[-38.6148]	[-0.44941]	[1.56757]	[1.66177]	[-1.96357]
D(LNK(-3))	-0.038474	-0.913849	-0.146095	0.885544	0.995789	-1.055695
	(0.12394)	(0.02291)	(0.26503)	(0.46114)	(0.41421)	(0.49662)
	[-0.31042]	[-39.8808]	[-0.55123]	[1.92035]	[2.40405]	[-2.12575]
D(LNL(-1))	-0.025225	-0.012607	-0.047306	-0.019412	-0.143453	0.286377
	(0.04013)	(0.00742)	(0.08582)	(0.14932)	(0.13413)	(0.16082)
	[-0.62852]	[-1.69899]	[-0.55121]	[-0.13000]	[-1.06951]	[1.78078]
D(LNL(-2))	0.051590	6.19E-05	-0.012878	-0.012761	0.110078	0.170128
	(0.04016)	(0.00742)	(0.08588)	(0.14942)	(0.13421)	(0.16091)
	[1.28465]	[0.00834]	[-0.14996]	[-0.08541]	[0.82018]	[1.05726]
D(LNL(-3))	-0.024895	-0.010930	-0.134628	0.003408	-0.055193	0.175254
	(0.03996)	(0.00739)	(0.08546)	(0.14869)	(0.13356)	(0.16013)
	[-0.62296]	[-1.47928]	[-1.57542]	[0.02292]	[-0.41326]	[1.09446]
D(LNX(-1))	0.089369	-0.030047	0.172714	-0.022089	0.379463	-0.072391
	(0.04675)	(0.00864)	(0.09997)	(0.17394)	(0.15624)	(0.18733)
	[1.91159]	[-3.47621]	[1.72763]	[-0.12699]	[2.42867]	[-0.38644]
D(LNX(-2))	-0.000967	-0.035843	0.031302	0.026269	0.113381	-0.244646
	(0.04526)	(0.00837)	(0.09679)	(0.16841)	(0.15127)	(0.18137)
	[-0.02137]	[-4.28313]	[0.32340]	[0.15598]	[0.74952]	[-1.34890]
D(LNX(-3))	-0.022083	-0.030319	0.006707	-0.034386	0.029616	-0.163496
	(0.04107)	(0.00759)	(0.08782)	(0.15281)	(0.13726)	(0.16457)
	[-0.53769]	[-3.99289]	[0.07636]	[-0.22503]	[0.21577]	[-0.99350]
D(LNM(-1))	-0.058532	0.002907	-0.032595	-0.348061	-0.814455	-0.041809
	(0.04360)	(0.00806)	(0.09324)	(0.16224)	(0.14573)	(0.17472)
	[-1.34233]	[0.36053]	[-0.34957]	[-2.14537]	[-5.58884]	[-0.23929]
D(LNM(-2))	0.050514	0.017967	0.026652	-0.172864	-0.196737	-0.009372
	(0.04786)	(0.00885)	(0.10233)	(0.17806)	(0.15994)	(0.19176)
	[1.05555]	[2.03071]	[0.26044]	[-0.97084]	[-1.23009]	[-0.04887]
D(LNM(-3))	0.043914	0.013677	-0.012350	-0.140620	-0.083554	0.042556
	(0.04315)	(0.00798)	(0.09228)	(0.16056)	(0.14422)	(0.17291)
	[1.01763]	[1.71431]	[-0.13383]	[-0.87582]	[-0.57935]	[0.24611]
D(LNREER(-1))	-0.019221	-0.011751	0.121193	0.125785	0.017968	0.072956
	(0.02364)	(0.00437)	(0.05056)	(0.08797)	(0.07902)	(0.09474)
	[-0.81298]	[-2.68828]	[2.39713]	[1.42991]	[0.22739]	[0.77010]
D(LNREER(-2))	0.060483	-0.002693	-0.024518	0.074468	0.299641	-0.194741
	(0.02286)	(0.00423)	(0.04889)	(0.08506)	(0.07640)	(0.09160)
	[2.64568]	[-0.63710]	[-0.50153]	[0.87549]	[3.92188]	[-2.12592]
D(LNREER(-3))	-0.040863	-0.008769	-0.144396	0.048933	-0.133496	0.235920
	(0.02433)	(0.00450)	(0.05203)	(0.09053)	(0.08132)	(0.09750)
	[-1.67938]	[-1.94919]	[-2.77513]	[0.54050]	[-1.64162]	[2.41973]

C	0.402819	0.769760	-0.596387	-2.310058	-0.830986	0.552637
	(0.20812)	(0.03848)	(0.44503)	(0.77433)	(0.69553)	(0.83391)
	[1.93555]	[20.0055]	[-1.34009]	[-2.98331]	[-1.19475]	[0.66270]
DEM	0.009969	-0.002056	-0.028020	-0.037177	-0.001991	0.001222
	(0.00996)	(0.00184)	(0.02129)	(0.03704)	(0.03327)	(0.03989)
	[1.00135]	[-1.11716]	[-1.31616]	[-1.00366]	[-0.05983]	[0.03063]
CRISIS	0.014401	0.004099	-0.018660	-0.062438	0.026475	0.022244
	(0.00567)	(0.00105)	(0.01213)	(0.02110)	(0.01896)	(0.02273)
	[2.53886]	[3.90827]	[-1.53843]	[-2.95857]	[1.39661]	[0.97870]
CADUM	-0.002952	-0.001891	-0.017065	-0.002503	-0.000434	-0.002979
	(0.00680)	(0.00126)	(0.01455)	(0.02532)	(0.02274)	(0.02727)
	[-0.43383]	[-1.50311]	[-1.17278]	[-0.09887]	[-0.01909]	[-0.10925]
LNWY	-0.044814	-0.082042	0.068116	0.256038	0.087801	-0.059385
	(0.02345)	(0.00434)	(0.05014)	(0.08725)	(0.07837)	(0.09396)
	[-1.91112]	[-18.9241]	[1.35844]	[2.93469]	[1.12038]	[-0.63203]
R-squared	0.494025	0.964187	0.192879	0.431548	0.535476	0.184757
Adj. R-squared	0.395298	0.957199	0.035393	0.320630	0.444837	0.025685
Sum sq. resids	0.025293	0.000865	0.115660	0.350145	0.282509	0.406104
S.E. equation	0.014340	0.002651	0.030665	0.053355	0.047925	0.057460
F-statistic	5.003954	137.9801	1.224733	3.890709	5.907795	1.161466
Log likelihood	431.9042	681.7321	319.4162	237.4471	253.3301	226.4756
Akaike AIC	-5.498705	-8.874758	-3.978597	-2.870906	-3.085542	-2.722643
Schwarz SC	-4.992419	-8.368472	-3.472311	-2.364620	-2.579256	-2.216358
Mean dependent	0.006242	0.005904	0.004266	0.006351	0.007544	-0.001753
S.D. dependent	0.018441	0.012815	0.031222	0.064732	0.064321	0.058213

Determinant resid covariance (dof adj.)	7.19E-21
Determinant resid covariance	2.37E-21
Log likelihood	2254.331
Akaike information criterion	-28.27475
Schwarz criterion	-24.99401

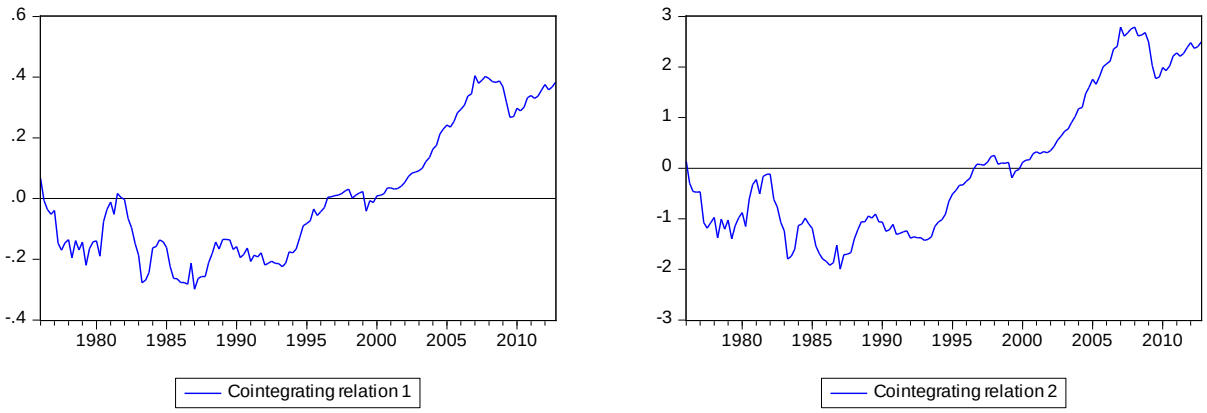

Figure A8. Cointegrating relations

Table A50. VEC residual serial correlation LM tests (3 lags)

VEC Residual Serial Correlation LM Tests
Null Hypothesis: no serial correlation at lag order h
Sample: 1975Q1 2012Q4
Included observations: 148

Lags	LM-Stat	Prob
1	68.40962	0.0009
2	51.96939	0.0414
3	63.86465	0.0029
4	57.14862	0.0139
5	36.00447	0.4684
6	42.31116	0.2171
7	24.07087	0.9357
8	30.01126	0.7484
9	35.16862	0.5079
10	40.95042	0.2622
11	30.09265	0.7449
12	29.43837	0.7722

Probs from chi-square with 36 df.

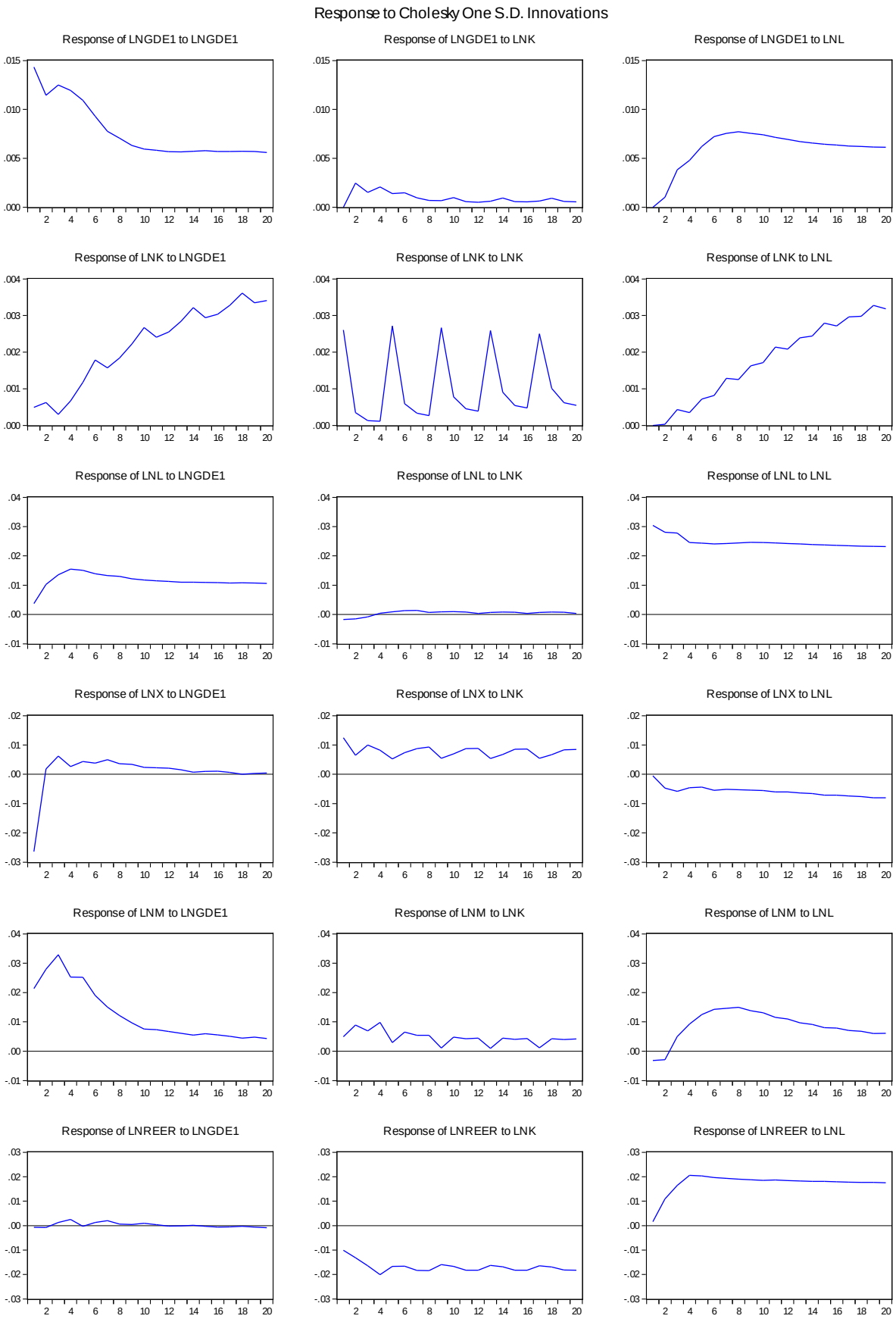

Figure A9. Impulse response functions (response to Cholesky one S.D. innovations)

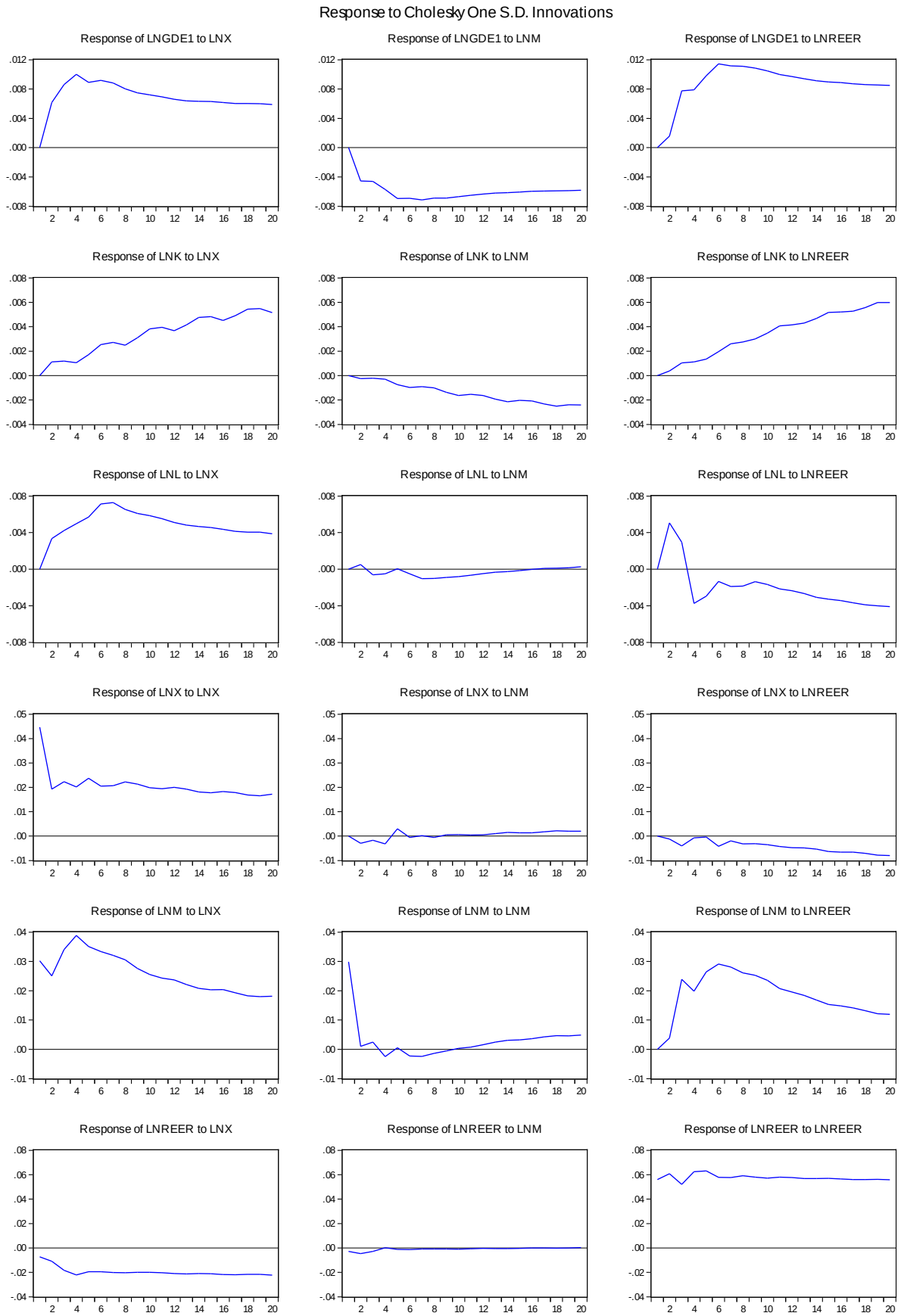

Figure A10. Impulse response functions (response to Cholesky one S.D. innovations)

Table A51. Variance decompositions

Variance Decomposition of LNGDE1:							
Period	S.E.	LNGDE1	LNK	LNL	LNX	LNM	LNREER
1	0.014340	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.020117	83.18071	1.504150	0.253020	9.365840	5.089902	0.606377
3	0.027072	67.22166	1.140358	2.125405	15.25201	5.715919	8.544645
4	0.033125	57.87183	1.149201	3.509305	19.31791	6.778084	11.37368
5	0.038481	50.94870	0.981349	5.213316	19.65940	8.271387	14.92585
6	0.043411	44.61889	0.887240	6.871299	19.91437	9.027999	18.68020
7	0.047499	39.93577	0.782208	8.273346	20.08801	9.799947	21.12071
8	0.051004	36.55224	0.696688	9.465666	19.90223	10.31916	23.06402
9	0.054040	33.93103	0.636225	10.38844	19.64421	10.81742	24.58268
10	0.056724	31.89167	0.606652	11.13275	19.44255	11.21360	25.71277
11	0.059100	30.34753	0.567750	11.71354	19.28720	11.54429	26.53970
12	0.061251	29.11373	0.535338	12.18986	19.12051	11.81404	27.22652
13	0.063221	28.13038	0.511480	12.56784	18.96692	12.05282	27.77056
14	0.065074	27.32397	0.503192	12.88107	18.85004	12.26583	28.17590
15	0.066832	26.65230	0.484417	13.13780	18.75729	12.45184	28.51636
16	0.068499	26.06281	0.467374	13.36829	18.66486	12.61091	28.82576
17	0.070080	25.56084	0.454539	13.56683	18.57074	12.76125	29.08580
18	0.071612	25.11548	0.451762	13.74400	18.49120	12.90201	29.29553
19	0.073092	24.71637	0.440201	13.89928	18.42565	13.03148	29.48702
20	0.074513	24.34540	0.428926	14.04953	18.35658	13.14640	29.67316

Variance Decomposition of LNK:							
Period	S.E.	LNGDE1	LNK	LNL	LNX	LNM	LNREER
1	0.002651	3.456702	96.54330	0.000000	0.000000	0.000000	0.000000
2	0.002997	7.026417	76.88527	0.011480	13.73401	0.706603	1.636223
3	0.003437	6.107710	58.60192	1.584452	22.29945	0.949898	10.45657
4	0.003857	7.875758	46.63619	2.088802	25.25528	1.359687	16.78428
5	0.005423	8.656186	48.63545	2.805644	22.64973	2.590139	14.66286
6	0.006697	12.77110	32.66852	3.334804	29.27059	3.805999	18.14899
7	0.008004	12.78612	23.04244	4.906448	32.07029	3.936538	23.25817
8	0.009159	13.79941	17.68139	5.607173	31.87928	4.232839	26.79990
9	0.010910	13.86310	18.43951	6.165569	30.56082	4.572915	26.39808
10	0.012613	14.85616	14.17878	6.455069	32.07429	5.097874	27.33782
11	0.014287	14.42246	11.15159	7.264230	32.63205	5.129935	29.39974
12	0.015763	14.46829	9.222182	7.714520	32.21538	5.280614	31.09902
13	0.017562	14.27516	9.600415	8.070001	31.53206	5.455150	31.06721
14	0.019359	14.50604	8.120663	8.234067	32.00579	5.714156	31.41928
15	0.021112	14.13990	6.893929	8.674488	32.14508	5.727120	32.41949
16	0.022679	14.04234	6.018377	8.953174	31.82689	5.803544	33.35567
17	0.024443	13.89021	6.225729	9.174823	31.42799	5.903478	33.37777
18	0.026219	13.96896	5.558784	9.267603	31.62799	6.049177	33.52748
19	0.027953	13.72649	4.939444	9.525829	31.67570	6.053446	34.07909
20	0.029522	13.63701	4.462617	9.703675	31.45335	6.095266	34.64808

Variance Decomposition of LNL:

Period	S.E.	LNGDE1	LNK	LNL	LNX	LNM	LNREER
1	0.030665	1.445508	0.321760	98.23273	0.000000	0.000000	0.000000
2	0.043292	6.362746	0.280297	91.37506	0.596668	0.013334	1.371894
3	0.053460	10.60166	0.205389	86.95476	1.014432	0.021610	1.202152
4	0.061166	14.52219	0.160880	82.56890	1.434015	0.023362	1.290654
5	0.067857	16.72670	0.149356	79.99533	1.871443	0.019012	1.238162
6	0.073701	17.75375	0.159650	78.45834	2.524376	0.020750	1.083128
7	0.079091	18.24770	0.170638	77.51123	3.038096	0.035069	0.997267
8	0.084085	18.53993	0.157733	77.03282	3.292843	0.045653	0.931020
9	0.088694	18.55927	0.152060	76.94548	3.431208	0.051380	0.860605
10	0.092982	18.48122	0.149779	76.98115	3.518053	0.054381	0.815417
11	0.097015	18.38726	0.145255	77.05889	3.555634	0.054719	0.798238
12	0.100789	18.28328	0.135717	77.18270	3.551276	0.053082	0.793950
13	0.104355	18.16725	0.131329	77.32001	3.525580	0.050551	0.805278
14	0.107758	18.08160	0.129597	77.41113	3.493047	0.047975	0.836654
15	0.111028	18.00854	0.126849	77.48440	3.459449	0.045391	0.875367
16	0.114154	17.93886	0.120942	77.56035	3.418328	0.042943	0.918571
17	0.117166	17.86970	0.118313	77.63135	3.369599	0.040808	0.970226
18	0.120084	17.81811	0.117407	77.67465	3.321670	0.038923	1.029239
19	0.122920	17.76781	0.115762	77.71280	3.278289	0.037310	1.088026
20	0.125661	17.71583	0.111605	77.75651	3.232345	0.036111	1.147599

Variance Decomposition of LNX:

Period	S.E.	LNGDE1	LNK	LNL	LNX	LNM	LNREER
1	0.053355	24.48687	5.458511	0.009328	70.04530	0.000000	0.000000
2	0.057412	21.25023	5.979487	0.676023	71.79246	0.258009	0.043790
3	0.063116	18.55299	7.440476	1.416944	71.86515	0.289539	0.434900
4	0.067047	16.59758	8.081292	1.717896	72.72364	0.482996	0.396599
5	0.071631	14.91352	7.621053	1.875601	74.64075	0.598168	0.350904
6	0.075282	13.75269	7.854338	2.231455	74.99378	0.546201	0.621533
7	0.078916	12.91780	8.378462	2.456572	75.12382	0.497805	0.625533
8	0.082828	11.91629	8.875960	2.634915	75.40178	0.456492	0.714562
9	0.085987	11.21186	8.633183	2.838833	76.09267	0.426916	0.796541
10	0.088795	10.58531	8.714343	3.056812	76.33624	0.405387	0.901914
11	0.091644	9.994875	9.096886	3.299385	76.16588	0.383075	1.059898
12	0.094544	9.440309	9.418291	3.506789	76.02471	0.363304	1.246595
13	0.096990	8.994223	9.254440	3.764352	76.19471	0.356484	1.435789
14	0.099267	8.591830	9.298871	4.032899	76.05306	0.362576	1.660768
15	0.101659	8.201132	9.570339	4.332784	75.56098	0.363873	1.970888
16	0.104115	7.829393	9.806616	4.602001	75.11836	0.364102	2.279529
17	0.106260	7.519987	9.678032	4.906446	74.94403	0.377546	2.573955
18	0.108311	7.237831	9.696173	5.212587	74.54768	0.403628	2.902106
19	0.110478	6.957601	9.891897	5.534462	73.90291	0.421977	3.291148
20	0.112706	6.686846	10.06993	5.820875	73.32667	0.435959	3.659724

Variance Decomposition of LNM:

Period	S.E.	LNGDE1	LNK	LNL	LNX	LNM	LNREER
1	0.047925	19.86204	1.073966	0.430407	39.79643	38.83716	0.000000
2	0.061719	32.47159	2.721997	0.477112	40.49280	23.44566	0.390833
3	0.081858	34.59283	2.257374	0.642486	40.33261	13.41716	8.757544
4	0.097109	31.35749	2.624989	1.360203	44.66840	9.597806	10.39111
5	0.110279	29.52234	2.106672	2.343079	44.77543	7.444927	13.80755
6	0.121391	26.81173	2.028130	3.312092	44.52484	6.178378	17.14483
7	0.130487	24.52727	1.925751	4.126001	44.57345	5.381546	19.46598
8	0.138013	22.70451	1.876824	4.863382	44.75554	4.820867	20.97887
9	0.143991	21.31304	1.729997	5.382996	44.78691	4.430292	22.35677
10	0.148973	20.17040	1.719812	5.802514	44.78101	4.139385	23.38689
11	0.153043	19.34342	1.706487	6.065395	44.95965	3.924514	24.00054
12	0.156696	18.63716	1.707890	6.276885	45.16768	3.753926	24.45647
13	0.159747	18.07742	1.646887	6.407485	45.37626	3.635213	24.85673
14	0.162414	17.60134	1.668292	6.514214	45.54362	3.552971	25.11957
15	0.164786	17.22866	1.681503	6.565397	45.76812	3.489644	25.26667
16	0.167073	16.87019	1.702583	6.608078	46.00916	3.442131	25.36786
17	0.169053	16.56745	1.667601	6.627851	46.23909	3.424343	25.47366
18	0.170856	16.28823	1.693970	6.647845	46.41206	3.426086	25.53181
19	0.172513	16.05387	1.714371	6.644303	46.61316	3.431731	25.54256
20	0.174148	15.81597	1.739609	6.641630	46.82414	3.445970	25.53268

Variance Decomposition of LNREER:

Period	S.E.	LNGDE1	LNK	LNL	LNX	LNM	LNREER
1	0.057460	0.013818	3.075916	0.075374	1.569831	0.230280	95.03478
2	0.086203	0.014816	3.685321	1.636730	2.305092	0.395469	91.96257
3	0.105033	0.024376	4.921112	3.557932	4.609783	0.341766	86.54503
4	0.127488	0.056557	5.809416	5.023093	6.136508	0.232151	82.74228
5	0.145971	0.043469	5.733388	5.764870	6.450190	0.183873	81.82421
6	0.160274	0.042528	5.827803	6.283668	6.817765	0.159258	80.86898
7	0.173600	0.049785	6.087454	6.594413	7.157277	0.137860	79.97321
8	0.186411	0.044230	6.255392	6.756327	7.386630	0.121445	79.43598
9	0.197760	0.039774	6.208218	6.899353	7.585687	0.109637	79.15733
10	0.208326	0.037992	6.233509	7.008968	7.762093	0.100854	78.85658
11	0.218749	0.034807	6.351815	7.083316	7.902162	0.092471	78.53543
12	0.228665	0.031966	6.451556	7.132020	8.070511	0.084981	78.22897
13	0.237843	0.029567	6.431554	7.182351	8.256656	0.078900	78.02097
14	0.246666	0.027516	6.447187	7.217790	8.399543	0.073823	77.83414
15	0.255322	0.025833	6.526895	7.240581	8.519903	0.069025	77.61776
16	0.263658	0.024795	6.601777	7.250936	8.670633	0.064730	77.38713
17	0.271534	0.023729	6.591995	7.264568	8.828638	0.061038	77.23003
18	0.279162	0.022574	6.603426	7.272791	8.950786	0.057791	77.09263
19	0.286688	0.021868	6.662890	7.275579	9.056978	0.054799	76.92789
20	0.294020	0.021692	6.721259	7.271163	9.184853	0.052175	76.74886

Cholesky Ordering: LNGDE1 LNK LNL LNX LNM LNREER

Table A52. VEC Granger Causality/Block Exogeneity Wald tests

VEC Granger Causality/Block Exogeneity Wald Tests
Date: 02/22/14 Time: 16:05
Sample: 1975Q1 2012Q4
Included observations: 148

Dependent variable: D(LNGDE1)

Excluded	Chi-sq	df	Prob.
D(LNK)	4.001099	3	0.2613
D(LNL)	2.475185	3	0.4798
D(LNX)	4.832023	3	0.1845
D(LNM)	5.549246	3	0.1357
D(LNREER)	10.10773	3	0.0177
All	21.10593	15	0.1335

Dependent variable: D(LNK)

Excluded	Chi-sq	df	Prob.
D(LNGDE1)	14.46996	3	0.0023
D(LNL)	4.766389	3	0.1897
D(LNX)	31.98381	3	0.0000
D(LNM)	5.555378	3	0.1354
D(LNREER)	9.847351	3	0.0199
All	82.65138	15	0.0000

Dependent variable: D(LNL)

Excluded	Chi-sq	df	Prob.
D(LNGDE1)	3.033333	3	0.3865
D(LNK)	0.434843	3	0.9330
D(LNX)	3.100384	3	0.3764
D(LNM)	0.363399	3	0.9477
D(LNREER)	16.59805	3	0.0009
All	22.39534	15	0.0978

Dependent variable: D(LNX)

Excluded	Chi-sq	df	Prob.
D(LNGDE1)	7.478859	3	0.0581
D(LNK)	6.214433	3	0.1016
D(LNL)	0.025105	3	0.9989
D(LNM)	4.800820	3	0.1870
D(LNREER)	2.829322	3	0.4187
All	21.47793	15	0.1222

Dependent variable: D(LNM)

Excluded	Chi-sq	df	Prob.
D(LNGDE1)	44.91104	3	0.0000
D(LNK)	6.701890	3	0.0820
D(LNL)	1.985747	3	0.5754
D(LNX)	6.008481	3	0.1112
D(LNREER)	18.05245	3	0.0004
All	101.9878	15	0.0000

Dependent variable: D(LNREER)

Excluded	Chi-sq	df	Prob.
D(LNGDE1)	0.223521	3	0.9737
D(LNK)	6.104801	3	0.1066
D(LNL)	5.106845	3	0.1641
D(LNX)	2.394979	3	0.4946
D(LNM)	0.150307	3	0.9852
All	15.33740	15	0.4274

Table A53. Test for weak exogeneity for GDE

Vector Error Correction Estimates
Sample (adjusted): 1976Q1 2012Q4
Included observations: 148 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegration Restrictions:
B(1,1)=1,B(1,6)=0,B(2,4)=1,B(2,3)=0, A(1,1)=0
Maximum iterations (500) reached.
Restrictions identify all cointegrating vectors
LR test for binding restrictions (rank = 2):
Chi-square(1) 14.78792
Probability 0.000120

Cointegrating Eq:	CointEq1	CointEq2
LNGDE1(-1)	1.000000	6.947171
		(0.04185)
		[166.020]
LNK(-1)	-0.897761	-6.314941
	(0.06939)	(0.46343)
	[-12.9370]	[-13.6264]
LNL(-1)	-0.008142	0.000000
	(0.00228)	
	[-3.56380]	
LNX(-1)	0.121065	1.000000
	(0.00345)	
	[35.0540]	
LNM(-1)	-0.076472	-0.527843
	(0.02756)	(0.18405)
	[-2.77484]	[-2.86787]
LNREER(-1)	0.000000	0.070410
		(0.01188)
		[5.92876]
C	-1.185781	-10.33336

Error Correction:	D(LNGDE1)	D(LNK)	D(LNL)	D(LNX)	D(LNM)	D(LNREER)
CointEq1	0.000000	-1.724357	9.491098	2.928176	-0.660645	4.708043
	(0.00000)	(0.21111)	(2.36652)	(3.81125)	(3.49810)	(4.66724)
	[NA]	[-8.16797]	[4.01057]	[0.76830]	[-0.18886]	[1.00874]
CointEq2	-0.006554	0.263350	-1.326598	-0.423596	0.040939	-0.651116
	(0.00386)	(0.02969)	(0.33281)	(0.53604)	(0.49198)	(0.65637)
	[-1.69736]	[8.87011]	[-3.98602]	[-0.79023]	[0.08321]	[-0.99200]
D(LNGDE1(-1))	0.615292	0.009049	0.299959	0.985008	3.435439	-0.204394
	(0.17155)	(0.02910)	(0.32207)	(0.61558)	(0.53688)	(0.63050)
	[3.58665]	[0.31101]	[0.93135]	[1.60014]	[6.39888]	[-0.32418]
D(LNGDE1(-2))	0.114333	-0.087433	-0.232023	0.755105	1.653431	-0.448841
	(0.19146)	(0.03247)	(0.35945)	(0.68702)	(0.59919)	(0.70368)
	[0.59716]	[-2.69246]	[-0.64550]	[1.09910]	[2.75943]	[-0.63785]

D(LNGDE1(-3))	-0.105058	-0.077359	-0.153674	-0.005347	0.138975	-0.095456
	(0.18538)	(0.03144)	(0.34803)	(0.66520)	(0.58016)	(0.68133)
	[-0.56671]	[-2.46037]	[-0.44155]	[-0.00804]	[0.23954]	[-0.14010]
D(LNK(-1))	0.139499	-0.861959	0.157238	0.052139	0.576277	-0.245998
	(0.13329)	(0.02261)	(0.25025)	(0.47830)	(0.41715)	(0.48990)
	[1.04655]	[-38.1268]	[0.62834]	[0.10901]	[1.38145]	[-0.50214]
D(LNK(-2))	-0.027754	-0.897638	0.056033	0.808083	0.557419	-0.877784
	(0.13814)	(0.02343)	(0.25934)	(0.49569)	(0.43232)	(0.50771)
	[-0.20091]	[-38.3123]	[0.21606]	[1.63023]	[1.28937]	[-1.72893]
D(LNK(-3))	-0.060716	-0.915975	-0.022788	0.921402	0.904322	-0.977131
	(0.13560)	(0.02300)	(0.25458)	(0.48658)	(0.42438)	(0.49838)
	[-0.44775]	[-39.8265]	[-0.08951]	[1.89362]	[2.13094]	[-1.96061]
D(LNL(-1))	-0.004373	-0.012248	-0.088265	-0.070331	-0.094617	0.268005
	(0.04374)	(0.00742)	(0.08212)	(0.15696)	(0.13689)	(0.16076)
	[-0.09996]	[-1.65089]	[-1.07485]	[-0.44809]	[-0.69119]	[1.66710]
D(LNL(-2))	0.068034	0.000606	-0.049456	-0.053321	0.149501	0.152547
	(0.04377)	(0.00742)	(0.08218)	(0.15707)	(0.13699)	(0.16088)
	[1.55423]	[0.08157]	[-0.60180]	[-0.33947]	[1.09131]	[0.94820]
D(LNL(-3))	-0.013669	-0.010631	-0.161933	-0.025152	-0.028105	0.161478
	(0.04349)	(0.00738)	(0.08165)	(0.15607)	(0.13611)	(0.15985)
	[-0.31428]	[-1.44122]	[-1.98318]	[-0.16116]	[-0.20648]	[1.01019]
D(LNX(-1))	0.182803	-0.026435	0.216685	-0.282819	0.495536	0.016581
	(0.04607)	(0.00781)	(0.08649)	(0.16530)	(0.14417)	(0.16931)
	[3.96822]	[-3.38341]	[2.50545]	[-1.71093]	[3.43718]	[0.09793]
D(LNX(-2))	0.050097	-0.033832	0.063734	-0.118811	0.171997	-0.189704
	(0.04778)	(0.00810)	(0.08971)	(0.17146)	(0.14954)	(0.17562)
	[1.04842]	[-4.17452]	[0.71045]	[-0.69293]	[1.15016]	[-1.08020]
D(LNX(-3))	-0.000371	-0.029115	0.023823	-0.098930	0.050957	-0.137488
	(0.04428)	(0.00751)	(0.08313)	(0.15890)	(0.13858)	(0.16275)
	[-0.00839]	[-3.87652]	[0.28656]	[-0.62261]	[0.36770]	[-0.84478]
D(LNM(-1))	-0.135518	-0.000663	0.065945	-0.149744	-0.967396	-0.014393
	(0.04650)	(0.00789)	(0.08731)	(0.16687)	(0.14554)	(0.17092)
	[-2.91410]	[-0.08403]	[0.75533]	[-0.89736]	[-6.64701]	[-0.08421]
D(LNM(-2))	0.008481	0.014825	0.119556	-0.066285	-0.293677	0.034385
	(0.05297)	(0.00898)	(0.09945)	(0.19007)	(0.16578)	(0.19468)
	[0.16011]	[1.65007]	[1.20221]	[-0.34873]	[-1.77154]	[0.17662]
D(LNM(-3))	0.022266	0.011346	0.048983	-0.085401	-0.137174	0.074891
	(0.04747)	(0.00805)	(0.08912)	(0.17033)	(0.14856)	(0.17446)
	[0.46906]	[1.40919]	[0.54964]	[-0.50138]	[-0.92337]	[0.42926]
D(LNREER(-1))	0.014113	-0.012156	0.152726	0.034288	0.056599	0.115854
	(0.02484)	(0.00421)	(0.04664)	(0.08915)	(0.07775)	(0.09131)
	[0.56804]	[-2.88477]	[3.27435]	[0.38461]	[0.72792]	[1.26877]
D(LNREER(-2))	0.083737	-0.003400	0.002391	0.010695	0.325330	-0.161314
	(0.02450)	(0.00416)	(0.04600)	(0.08792)	(0.07668)	(0.09005)
	[3.41749]	[-0.81806]	[0.05198]	[0.12164]	[4.24256]	[-1.79130]
D(LNREER(-3))	-0.028380	-0.009494	-0.131868	0.014627	-0.118840	0.252287
	(0.02631)	(0.00446)	(0.04940)	(0.09442)	(0.08235)	(0.09671)

	[-1.07858]	[-2.12746]	[-2.66945]	[0.15491]	[-1.44316]	[2.60878]
C	0.009173	0.714256	-1.007731	-1.100879	-1.127127	-0.008635
	(0.20716)	(0.03514)	(0.38893)	(0.74337)	(0.64834)	(0.76139)
	[0.04428]	[20.3279]	[-2.59104]	[-1.48093]	[-1.73849]	[-0.01134]
DEM	-0.006723	-0.002546	-0.018113	0.007496	-0.030260	-0.001302
	(0.01023)	(0.00174)	(0.01921)	(0.03671)	(0.03202)	(0.03760)
	[-0.65711]	[-1.46702]	[-0.94305]	[0.20419]	[-0.94512]	[-0.03463]
CRISIS	0.006241	0.004392	-0.026090	-0.040772	0.016205	0.012043
	(0.00593)	(0.00101)	(0.01113)	(0.02127)	(0.01855)	(0.02179)
	[1.05262]	[4.36737]	[-2.34398]	[-1.91652]	[0.87337]	[0.55267]
CADUM	-0.005863	-0.002066	-0.026908	0.007770	0.000483	-0.012129
	(0.00746)	(0.00127)	(0.01401)	(0.02678)	(0.02336)	(0.02743)
	[-0.78551]	[-1.63210]	[-1.92027]	[0.29013]	[0.02069]	[-0.44216]
LNWY	-0.000418	-0.075911	0.113103	0.120081	0.122091	0.002809
	(0.02331)	(0.00395)	(0.04377)	(0.08365)	(0.07296)	(0.08568)
	[-0.01794]	[-19.1992]	[2.58431]	[1.43553]	[1.67349]	[0.03279]
R-squared	0.404561	0.964532	0.267882	0.377784	0.520637	0.192849
Adj. R-squared	0.288377	0.957611	0.125030	0.256376	0.427103	0.035356
Sum sq. resids	0.029766	0.000856	0.104912	0.383261	0.291533	0.402073
S.E. equation	0.015556	0.002638	0.029205	0.055821	0.048685	0.057174
F-statistic	3.482091	139.3710	1.875240	3.111689	5.566282	1.224491
Log likelihood	419.8561	682.4478	326.6335	230.7597	251.0033	227.2138
Akaike AIC	-5.335894	-8.884430	-4.076129	-2.780536	-3.054098	-2.732619
Schwarz SC	-4.829608	-8.378144	-3.569843	-2.274250	-2.547813	-2.226333
Mean dependent	0.006242	0.005904	0.004266	0.006351	0.007544	-0.001753
S.D. dependent	0.018441	0.012815	0.031222	0.064732	0.064321	0.058213

Determinant resid covariance (dof adj.)	7.73E-21
Determinant resid covariance	2.55E-21
Log likelihood	2246.937
Akaike information criterion	-28.17483
Schwarz criterion	-24.89410

Table A54. Test for weak exogeneity for exports

Vector Error Correction Estimates
Sample (adjusted): 1976Q1 2012Q4
Included observations: 148 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegration Restrictions:
B(1,1)=1,B(1,6)=0,B(2,4)=1,B(2,3)=0, A(4,2)=0
Maximum iterations (500) reached.
Restrictions identify all cointegrating vectors
LR test for binding restrictions (rank = 2):
Chi-square(1) 7.336863
Probability 0.006755

Cointegrating Eq:	CointEq1	CointEq2
LNGDE1(-1)	1.000000	6.492192
		(0.01718)
		[377.968]
LNK(-1)	-0.876553	-5.738428
	(0.06698)	(0.42765)
	[-13.0859]	[-13.4186]
LNL(-1)	-0.004052	0.000000
	(0.00098)	
	[-4.14324]	
LNX(-1)	0.144762	1.000000
	(0.00148)	
	[97.9361]	
LNM(-1)	0.074166	0.454987
	(0.02659)	(0.16978)
	[2.78895]	[2.67992]
LNREER(-1)	0.000000	0.033218
		(0.00487)
		[6.81550]
C	-3.732923	-24.52195

Error Correction:	D(LNGDE1)	D(LNK)	D(LNL)	D(LNX)	D(LNM)	D(LNREER)
CointEq1	-8.562208	-4.262630	17.37312	-0.055710	-33.01114	11.74223
	(2.49613)	(0.52699)	(6.01826)	(0.07493)	(8.97803)	(11.3951)
	[-3.43020]	[-8.08866]	[2.88674]	[-0.74354]	[-3.67688]	[1.03046]
CointEq2	1.309655	0.672761	-2.666122	0.000000	5.029031	-1.797480
	(0.38372)	(0.08101)	(0.92518)	(0.00000)	(1.38018)	(1.75176)
	[3.41301]	[8.30430]	[-2.88173]	[NA]	[3.64374]	[-1.02610]
D(LNGDE1(-1))	0.530134	0.003694	0.554634	1.163464	3.187093	-0.058234
	(0.16065)	(0.02846)	(0.32522)	(0.60439)	(0.50786)	(0.62133)
	[3.29993]	[0.12976]	[1.70542]	[1.92502]	[6.27556]	[-0.09372]
D(LNGDE1(-2))	0.107887	-0.088472	-0.078247	0.819771	1.629622	-0.360194
	(0.18031)	(0.03195)	(0.36502)	(0.67836)	(0.57002)	(0.69738)
	[0.59833]	[-2.76925]	[-0.21436]	[1.20845]	[2.85891]	[-0.51650]

D(LNGDE1(-3))	-0.067453	-0.074163	-0.095645	-0.031900	0.231178	-0.057989
	(0.17627)	(0.03123)	(0.35684)	(0.66316)	(0.55724)	(0.68175)
	[-0.38267]	[-2.37460]	[-0.26803]	[-0.04810]	[0.41486]	[-0.08506]
D(LNK(-1))	0.197597	-0.856341	-0.015166	-0.087285	0.729917	-0.339652
	(0.12514)	(0.02217)	(0.25333)	(0.47080)	(0.39560)	(0.48399)
	[1.57900]	[-38.6216]	[-0.05987]	[-0.18540]	[1.84507]	[-0.70177]
D(LNK(-2))	-0.010840	-0.896424	-0.071913	0.723017	0.594039	-0.945596
	(0.12974)	(0.02299)	(0.26265)	(0.48811)	(0.41015)	(0.50179)
	[-0.08355]	[-38.9958]	[-0.27380]	[1.48127]	[1.44836]	[-1.88446]
D(LNK(-3))	-0.049430	-0.914927	-0.112138	0.857150	0.924068	-1.022940
	(0.12821)	(0.02272)	(0.25955)	(0.48235)	(0.40531)	(0.49586)
	[-0.38554]	[-40.2761]	[-0.43205]	[1.77705]	[2.27993]	[-2.06294]
D(LNL(-1))	-0.010297	-0.012643	-0.059712	-0.053201	-0.111857	0.284252
	(0.04144)	(0.00734)	(0.08388)	(0.15589)	(0.13099)	(0.16026)
	[-0.24851]	[-1.72210]	[-0.71186]	[-0.34128]	[-0.85394]	[1.77374]
D(LNL(-2))	0.067350	0.000770	-0.029012	-0.045174	0.146368	0.164419
	(0.04153)	(0.00736)	(0.08407)	(0.15625)	(0.13129)	(0.16062)
	[1.62168]	[0.10460]	[-0.34508]	[-0.28912]	[1.11484]	[1.02362]
D(LNL(-3))	-0.013950	-0.010595	-0.145815	-0.020544	-0.030993	0.171293
	(0.04133)	(0.00732)	(0.08366)	(0.15547)	(0.13064)	(0.15983)
	[-0.33757]	[-1.44698]	[-1.74296]	[-0.13214]	[-0.23724]	[1.07171]
D(LNX(-1))	0.128762	-0.026825	0.216109	-0.243280	0.332834	0.019280
	(0.04608)	(0.00816)	(0.09328)	(0.17336)	(0.14567)	(0.17822)
	[2.79431]	[-3.28561]	[2.31667]	[-1.40332]	[2.28482]	[0.10818]
D(LNX(-2))	0.021765	-0.033769	0.056407	-0.103607	0.084547	-0.191513
	(0.04598)	(0.00815)	(0.09309)	(0.17299)	(0.14536)	(0.17784)
	[0.47333]	[-4.14481]	[0.60596]	[-0.59891]	[0.58163]	[-1.07687]
D(LNX(-3))	-0.010239	-0.028634	0.016282	-0.099366	0.017350	-0.139881
	(0.04216)	(0.00747)	(0.08536)	(0.15863)	(0.13329)	(0.16307)
	[-0.24284]	[-3.83283]	[0.19075]	[-0.62641]	[0.13017]	[-0.85778]
D(LNM(-1))	-0.093461	0.001153	-0.028613	-0.223884	-0.843715	-0.069191
	(0.04389)	(0.00778)	(0.08886)	(0.16513)	(0.13876)	(0.16976)
	[-2.12928]	[0.14822]	[-0.32202]	[-1.35578]	[-6.08048]	[-0.40758]
D(LNM(-2))	0.019383	0.014469	0.055234	-0.099234	-0.258232	-0.003204
	(0.04938)	(0.00875)	(0.09995)	(0.18576)	(0.15609)	(0.19096)
	[0.39258]	[1.65386]	[0.55259]	[-0.53421]	[-1.65440]	[-0.01678]
D(LNM(-3))	0.021609	0.010311	0.014168	-0.095850	-0.135114	0.054164
	(0.04473)	(0.00793)	(0.09055)	(0.16828)	(0.14140)	(0.17300)
	[0.48309]	[1.30107]	[0.15647]	[-0.56958]	[-0.95552]	[0.31309]
D(LNREER(-1))	-0.023392	-0.014906	0.165648	0.072723	-0.050285	0.123668
	(0.02593)	(0.00459)	(0.05249)	(0.09754)	(0.08196)	(0.10028)
	[-0.90221]	[-3.24479]	[3.15594]	[0.74554]	[-0.61350]	[1.23326]
D(LNREER(-2))	0.054194	-0.005856	0.012491	0.041285	0.241636	-0.155307
	(0.02479)	(0.00439)	(0.05018)	(0.09326)	(0.07836)	(0.09587)
	[2.18626]	[-1.33333]	[0.24893]	[0.44270]	[3.08356]	[-1.61994]
D(LNREER(-3))	-0.048205	-0.011443	-0.119095	0.036860	-0.175459	0.259939
	(0.02571)	(0.00456)	(0.05205)	(0.09674)	(0.08129)	(0.09945)

	[-1.87466]	[-2.51168]	[-2.28786]	[0.38102]	[-2.15847]	[2.61375]
C	-0.256516	0.641492	-0.168988	-0.402272	-1.762022	0.436038
	(0.16071)	(0.02847)	(0.32533)	(0.60461)	(0.50804)	(0.62155)
	[-1.59617]	[22.5288]	[-0.51943]	[-0.66535]	[-3.46828]	[0.70153]
DEM	0.004717	-0.001858	-0.033822	-0.007692	0.003731	-0.010768
	(0.01014)	(0.00180)	(0.02052)	(0.03813)	(0.03204)	(0.03920)
	[0.46533]	[-1.03469]	[-1.64822]	[-0.20170]	[0.11643]	[-0.27468]
CRISIS	0.019479	0.005530	-0.034829	-0.056897	0.053216	0.007156
	(0.00676)	(0.00120)	(0.01368)	(0.02542)	(0.02136)	(0.02613)
	[2.88267]	[4.61850]	[-2.54610]	[-2.23810]	[2.49119]	[0.27382]
CADUM	-0.002628	-0.002033	-0.023352	0.008264	0.011257	-0.010700
	(0.00709)	(0.00126)	(0.01436)	(0.02668)	(0.02242)	(0.02743)
	[-0.37066]	[-1.61841]	[-1.62672]	[0.30978]	[0.50214]	[-0.39014]
LNWY	0.027897	-0.067964	0.021795	0.044371	0.189268	-0.045534
	(0.01823)	(0.00323)	(0.03690)	(0.06857)	(0.05762)	(0.07050)
	[1.53047]	[-21.0443]	[0.59067]	[0.64705]	[3.28465]	[-0.64590]
R-squared	0.459774	0.964883	0.227676	0.379453	0.556235	0.189062
Adj. R-squared	0.354364	0.958031	0.076978	0.258371	0.469646	0.030830
Sum sq. resids	0.027006	0.000848	0.110674	0.382233	0.269884	0.403959
S.E. equation	0.014818	0.002625	0.029996	0.055746	0.046842	0.057308
F-statistic	4.361773	140.8147	1.510814	3.133847	6.423895	1.194843
Log likelihood	427.0572	683.1835	322.6772	230.9585	256.7132	226.8675
Akaike AIC	-5.433206	-8.894372	-4.022666	-2.783223	-3.131259	-2.727939
Schwarz SC	-4.926920	-8.388086	-3.516380	-2.276937	-2.624974	-2.221653
Mean dependent	0.006242	0.005904	0.004266	0.006351	0.007544	-0.001753
S.D. dependent	0.018441	0.012815	0.031222	0.064732	0.064321	0.058213

Determinant resid covariance (dof adj.)	7.36E-21
Determinant resid covariance	2.43E-21
Log likelihood	2250.663
Akaike information criterion	-28.22517
Schwarz criterion	-24.94444

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