Relationship of construction sector to economic growth

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Abstract

Construction is a major industry throughout the world accounting for a sizeable proportion of most countries' Gross Domestic Product (GDP) and Gross National Product (GNP). The importance of the construction sector is not only related to its size but also to its role in economic growth. An industry sector this big could not but have an impact on the economy. In relation to the importance of the construction sector in both national and world economies, current knowledge of it is poor. As a result, policy-makers may be misguided or even destructive. Economic growth is currently an issue of global concern as most economies are finding it difficult to create the necessary employment opportunities and achieve meaningful growth. This research mobilizes three economic growth theories in trying to explain the relationship between the construction sector and economic growth, namely: Harrod–Domar model, Solow growth model and Endogenous growth model. Central to the research is to ascertain how national governments stimulate economic growth, with a view to enabling policy-makers to make better use of the construction sector. Time series statistical analysis of construction output data for South Africa and the UK was used. This preliminary analysis, which is part of a PhD study, reveals that there is not an obvious link between construction investment and economic growth.

Keywords: Construction economics, economic growth, construction sector

1. Introduction

The construction sector is envisaged to play a powerful role in economic growth, in addition to producing structures that add to productivity and quality of life. Since construction is labour-intensive, when the sector is working at full capacity, large sections of the nation's work force are active. Given such characteristics, can the construction sector be used to build our way out of the recession? Apparently not. Econometric analysis of Cape Verde to test whether construction contribute to economic growth, concludes that construction activity follows economic growth (Lopes *et al*. 2011). Therefore the construction sector cannot cause economic growth. What then are the minimum necessary and sufficient conditions for economic growth?

Different standards are used in the categorization or classification of economies. The World Bank classifies economies of countries as low income, middle income (subdivided into lower middle and upper middle), and high income. The main criterion for these is the gross national income (GNI) per capita. Authors such as Tan (2002) use this standard. Another common standard of categorization based on development stage of the country was used mainly by Bon (1992) and Crosthwaite (2000). This standard is based on the perceived changing role of construction as economic development proceeds. It consists of less developed countries (LDCs), newly industrialised countries (NICs) and advanced industrial countries (AICs). The IMF classifies countries as developed or advanced economies and developing or undeveloped countries. The United Nations human development index also uses first world and third world classifications to denote developed and developing countries respectively. Although the criteria used to arrive at all these different classifications remain a contentious issue, they will be used interchangeably throughout this research.

Turok (2008), in his book on the evolution of the African National Congress economic policy, argued that the term developing countries implies that economic growth is the only way forward, while it is not necessarily the most beneficial. He continues to say the term third world implies the false notion that those countries are not a part of the global economic system. It is of interest to note that different writers use different classifications to try and understand the fundamental socio-economic status of the countries they may be dealing with at any given point in time.

2. Literature review

Turin (1978), using time series analysis, examined briefly the place of construction in the world economy, its dynamic relationships with other major development indicators, the main technological problems facing the industry in developing countries and finally a set of broad policy issues. Turin's work is based on his personal experience of construction in developing countries and on the results of research carried out by members of the Building Economics Research Unit (BERU) of the University College London. Turin's sample was composed of 87 countries and spanned 1960-78. His findings on the relationship of construction and economic growth are shown in Figures 1 and 2. The data from each country were plotted in a graph and the line drawn, represented the regression fit.

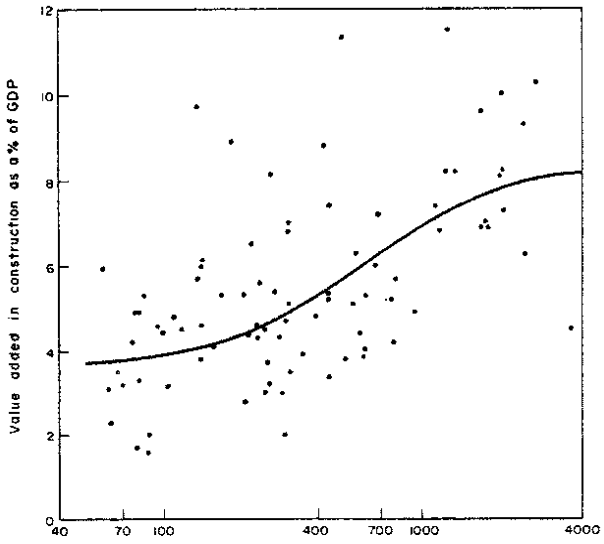

Figure 1: S-shaped relationship (Source: Turin 1978)

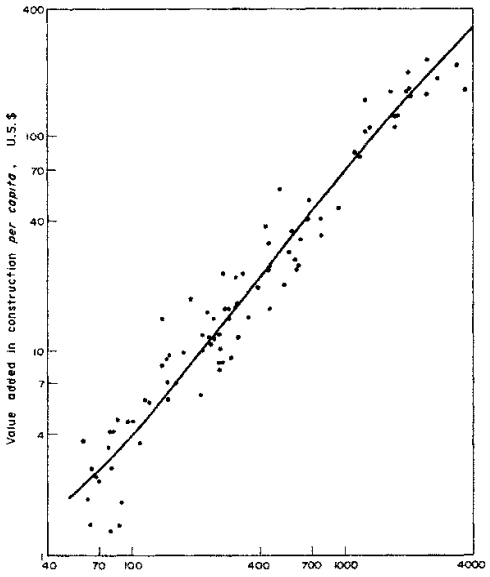

Figure 2: Effect on growth (Source: Turin 1978)

Figure 1 shows that the share of construction grows from 4-8% between US$100-4000 per capita and that the highest rate of increase occurs in the middle range of countries (US$400-1000). Turin hypothesized the relationship to be S-shaped. Figure 2 shows that the value added in construction per capita grows more rapidly than GDP per capita. At both extremes of the range, the slope of the relationship is approximately one. This means that above a certain level of GDP per capita, construction accounts for an approximately fixed share of the national product. Turin (1978) concluded that the share of construction in the national product and the value added in construction per capita grow with economic development. The construction sector exhibits unique features in terms of its significance, which need to be understood for their impact in economic growth. Turin (1978) found that an S-shaped relationship exists, however, the intrinsic nature of the relationship remains unknown.

Bon (1992) discussed the changing role of the construction sector at the various stages of economic development. He studied the construction activity since World War II in Finland, Ireland, Italy, Japan, the UK, and the USA. The data underlying his analysis spans a 50-year period and appears to place special emphasis on Europe. He argued that construction follows the bell-shaped pattern of development or an inverted U-shaped relationship as shown in Figure 3. This assumption is founded on the observation that the share of construction in GNP first grows and then declines with the level of economic development. The inverted U-shaped relationship is associated with less population growth, less migration and the assumption that most physical capital is already in place in later stages of economic development. Of interest to note is that the output data used by Bon excludes housing as well as repairs and maintenance (R&M).

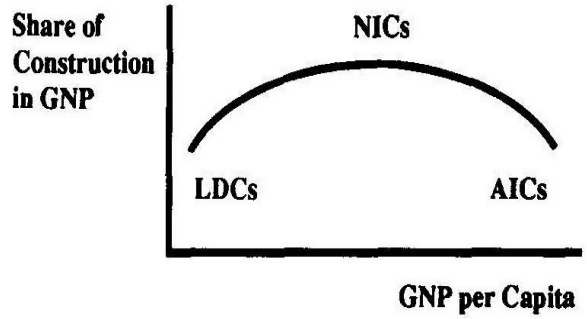

Figure 3: The Bon curve (Source: Bon 1992)

The inverted U-shaped relationship presented by Bon (1992) is very different from the S-shaped relationship found by Turin (1978). Bon argued that the main reason for Turin's S-shaped relationship is that his sample is dominated by less developed countries (LDCs) and newly industrialised countries (NICs), so that the trends characteristic of advanced industrial countries (AICs) were obscured. It may be argued though that Bon's study also gives emphasis on AICs primarily due to the paucity of reliable economic data concerning NICs and LDCs. This therefore presents the need for further holistic study of the relationship between the construction sector and economic growth.

Authors on construction economics such as Jackman (2010), Myers (2008), Hillebrandt (2000), Tan (2002), Bon (1992), Wells (1986) and Turin (1978) all emphasized the importance of the role that the construction sector play in economic growth. However, they seemed to base their work purely on the power of their argument, without reporting any empirical data or observations, and without analysis or questioning of their own ideas. It would appear that writers in this area, generally, start with the assumption that the construction sector drives economic growth. It is very difficult to find anyone who questioned this.

Most governments believe that the construction sector plays a powerful role in economic growth, in addition to producing the structures that add to our productivity and quality of life. Policy-makers assume that the construction sector is a driver for economic growth. The linkages that the construction sector has with other economic sectors are not clear. Why is growth needed?

Economic growth is about stimulating the economy. The government stimulates the economy to achieve economic growth so that this will help create jobs. Increased economic activity requires a corresponding increase in the provision of roads, and other infrastructure. So, a double investment is needed if the jobs created are outside construction. In addition, international trade rules may obstruct direct subsidies to businesses, because that would create unfair market advantage.

Therefore the research question is:

What is the relationship between the construction sector and economic growth?

3. Methodology

Time series statistical analysis of construction output and construction share of GDP for South Africa (SA) have been undertaken to establish the trends and get a handle on the intricate dynamic interrelationships between the construction sector and economic growth. Secondary data on construction output and GDP was sourced initially from electronic archives of Statistics South Africa (SSA). More data was also sourced from national accounts and national economic outlook reports from the South African Reserve Bank (SARB). Collected data ranged from annual, quarterly and monthly output reports illustrating real and nominal figures.

Empirical analysis of the secondary data collected for SA was benchmarked against similar data for the UK, to ensure a balanced analysis. The 2 countries are at different developmental trajectories. The UK is a developed economy and older data was available as opposed to SA where relevant construction data only started to be documented in 1993 by SSA. It would have given a broader picture of the trends if older data was available for SA. The initial aim of the researcher was to look at data covering the last 100 years. Statistical and graphical analysis of the data was undertaken to establish the correlation of construction and economic growth.

4. Research findings

The South African economy, like the political change that took place in South Africa since the release of former state president Dr Nelson Mandela in 1990, had to undergo remarkable growth. The dismantling of apartheid ended years of the country's isolation and local political instability. The birth of democracy opened up the country to the global economic stage as economic sanctions were lifted, which had a substantial effect not only on the everyday life of the citizens but also on the business and financial investment climate.

4.1 The SA construction sector

The construction sector responded positively to the developments that took place in political circles and in the overall structure of the SA economy. From 1990, there was a steady growth both in total construction output up to 1994 when the first democratic elections took place. This steady increase may be associated with confidence in the overall economy and hope for the country that was generated by Dr Mandela's release from prison. Figures 4 and 5 illustrate this at constant 2005 prices.

Although no related construction data could be found for the period before 1986, the available data suggest that like other sectors of the SA economy, the construction sector suffered significantly from international isolation in the hands of the apartheid government. Annual change in construction output for the period 1986 to 1988 suggest that the contribution of the construction sector to the economy was declining (see Figure 5).

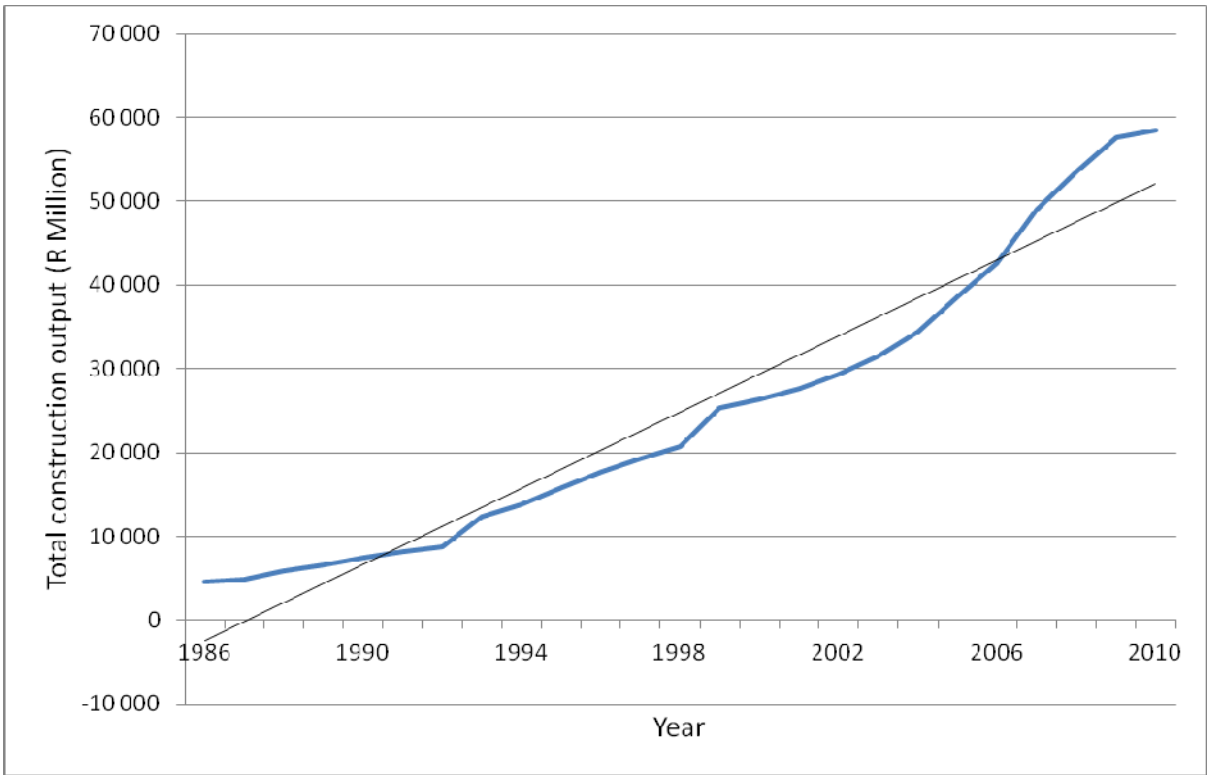

Figure 4: Total construction output 1986-2010
(Data source: Statistics South Africa, 2011)

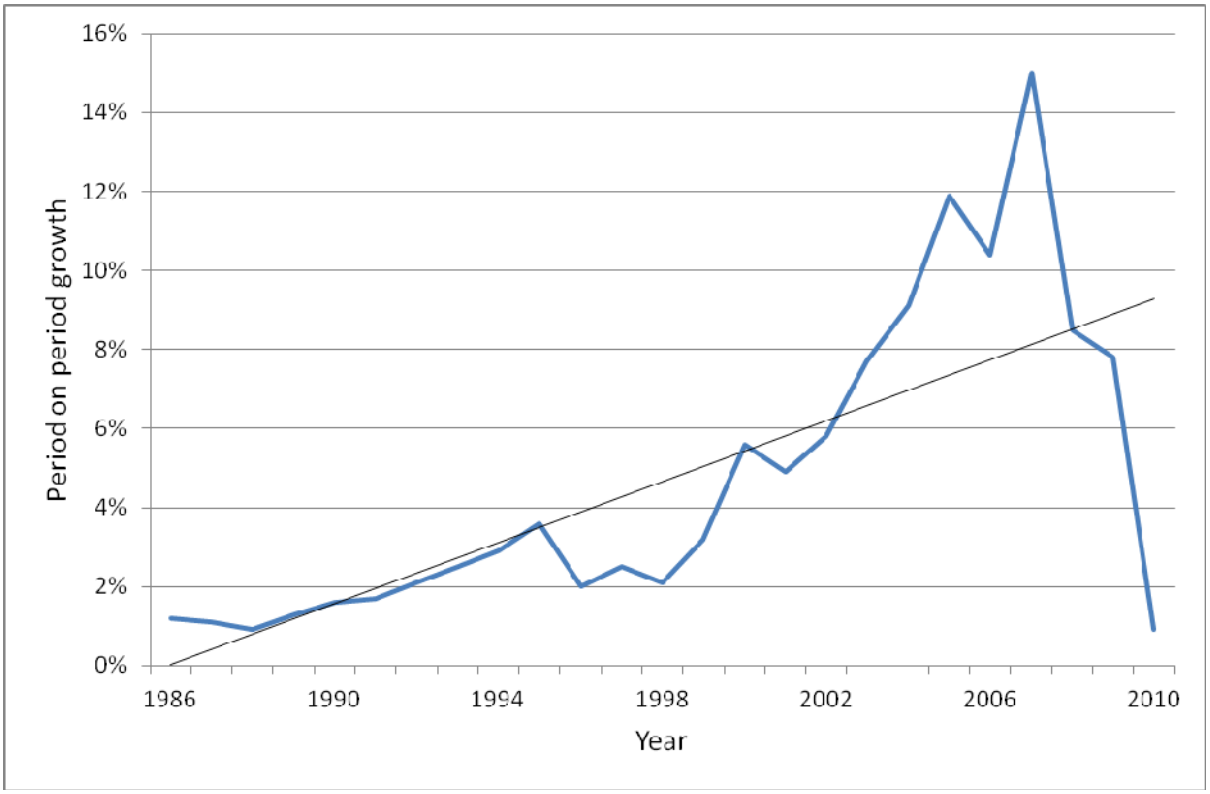

Figure 5: Annual change in construction output, 1986-2010
(Data source: Statistics South Africa, 2011)

The construction sector experienced a steady increase in construction output from 1990 through 1994 to 2010 as shown in Figure 4. From 1989, when former state president FW de Klerk came into power and promised significant political reforms including the release from prison of Dr Nelson Mandela, unbanning of political parties and the repealing of apartheid laws, annual change in construction output started to show signs of growth. The growth trend gained momentum when Dr Mandela was released from prison in 1990 and continued growing until 1994.

After the ANC government came into power in 1994, the annual change in construction output continued to show growth by a further 0.7% in 1995 as the new government started implementing the reconstruction and development programme (RDP). Subsequent to some structural difficulties with the implementation of the RDP, the annual change in construction output plummeted by a whopping 1.6% in 1996 as may be seen in Figure 5. As the RDP office closed down in 1996 and the implementation of RDP projects decentralised to related departments, mainly the Department of Public Works and the Department of Housing, annual change in construction output increased by 0.5% to 2.5%.

This robust growth was temporarily stopped in 1997 and 1998 when overall economic growth dwindled to only 0.5%, as exports and foreign capital inflows decreased due to various international economic movements, for example a drop in the price of gold, the weakness in the United States, European and Japanese economies, the East Asian financial crisis and the delayed effects of the stronger rand in 1997. The SA economy had been recovering quite robustly from the setbacks suffered at the time of the international financial crises of 1997 and 1998 when world economic conditions began to deteriorate towards the end of 2000. Real GDP was growing at an average annualised rate of some 3½% in the second half of 2000, but when weaker international demand conditions began to spill over into SA, economic growth fell back to an annualised rate of about 2½% in the first half of 2001(South African Reserve Bank, 2006).

The sharp decline in annual change in construction output (see Figure 5) that SA experienced from 2008 to 2010 was in part a consequence of the global financial crisis. The SA economy has not reached its maturity yet so it is to be expected that this trough will be reversed as economic recovery strengthens. The rate of economic recovery and the share of construction thereof remains an interesting subject for economists' prediction. Economic recovery in the Euro-zone and the US, as significant trade partners, continues to have major repercussions on the SA economy. During the global economic downturn SA's construction sector managed, on the whole, to avoid some of the worst effects of the crisis, as a result of the many infrastructure projects that were being implemented, including those related to South Africa's hosting of the 2010 FIFA world cup. However, the hangover from the world cup has caused a slump in construction activity.

4.2 The UK construction sector

The data used to generate the graphs presented herewith was sourced from the Office of National Statistics (ONS) website. Figure 6 shows construction output figures at constant 2005 prices, whilst Figure 7 illustrates the annual change in construction output as a percentage.

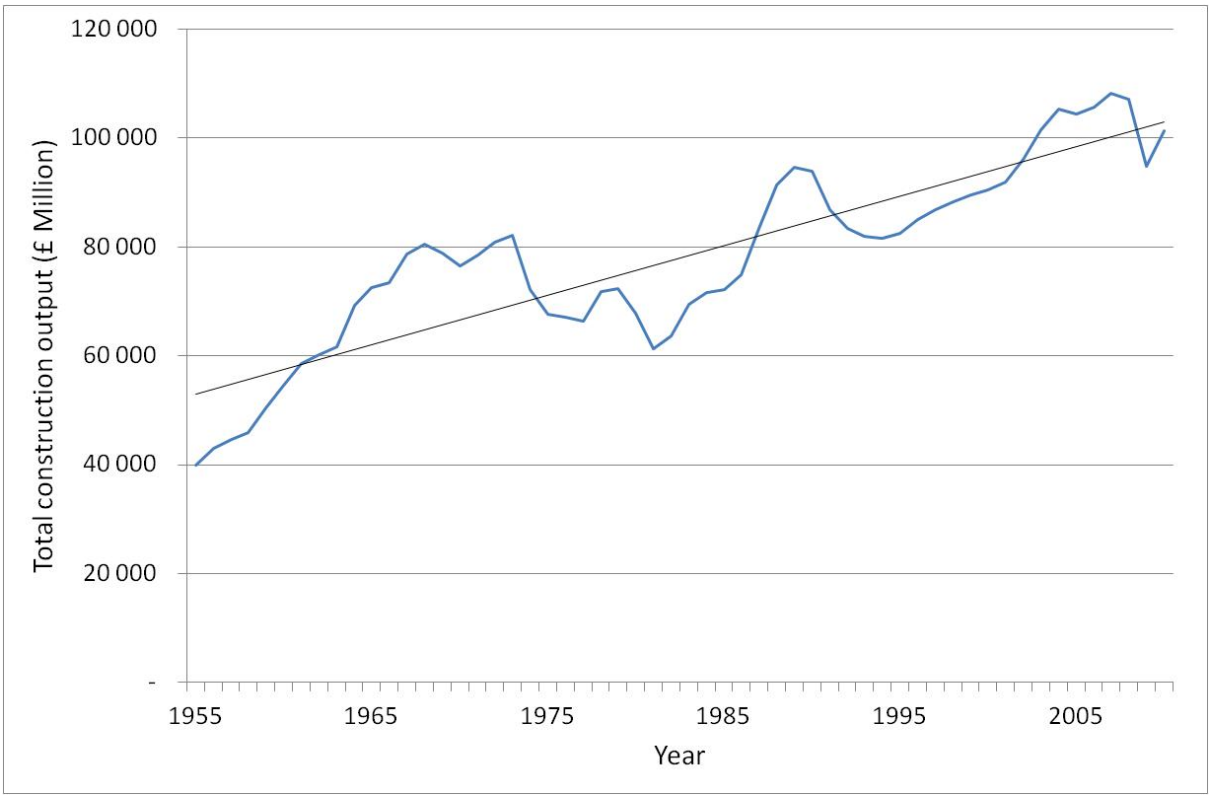

Figure 6: Total construction output, 1955-2010
(Data source: ONS, 2011)

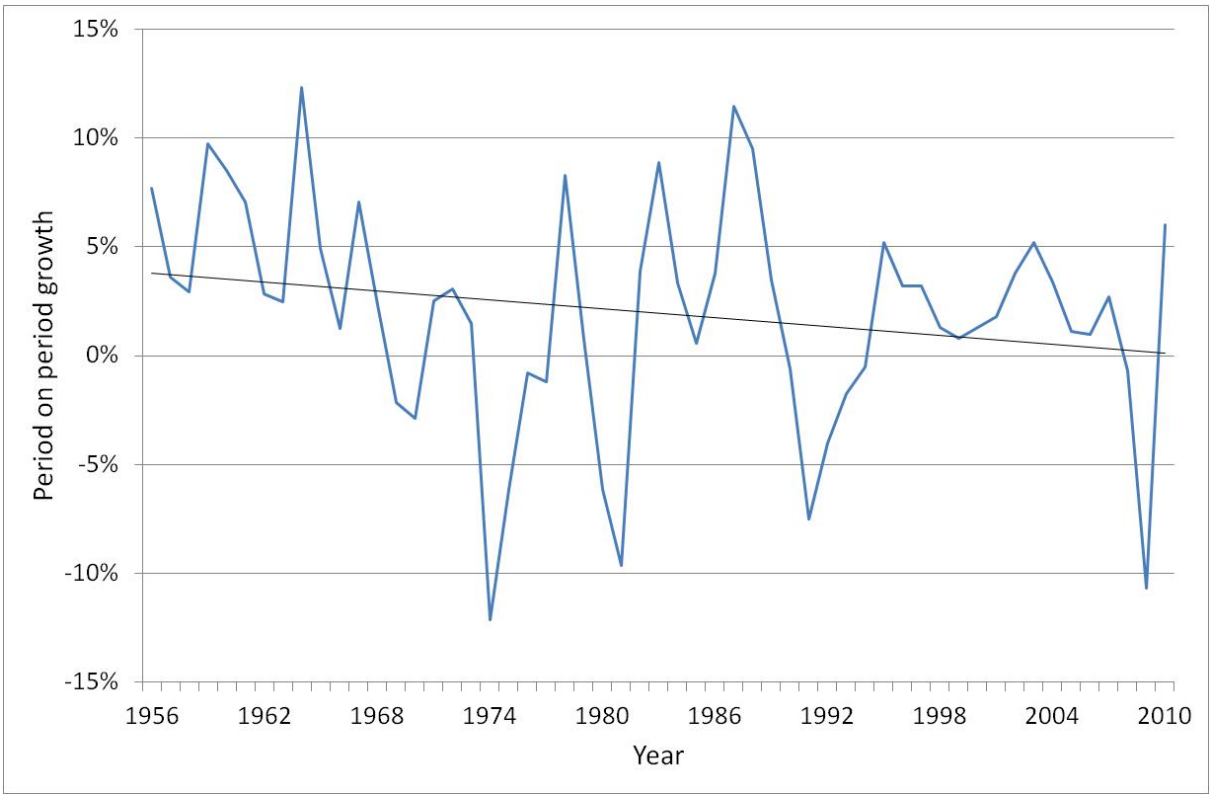

Figure 7: Annual change in construction output, 1956-2010
(Data source: ONS, 2011)

A linear trend line (see Figure 7) across the period under review (1955-2010) reveals a downward spiral of the annual change in construction output. This is in contrast to the upward spiral that can be observed in Figure 5 pertaining to the year on year growth of construction output experienced by SA over the period 1986 to 2010. The two seemingly contradictory trends that emerge here tend to support the view by Bon (1992) that the contribution of construction will increase whilst the economy is developing, and then decline as the economy reaches its maturity. South Africa is still a developing economy hence it is to be expected that the annual change in construction output should go up.

On the other hand, the UK is a developed economy and as such the annual change in construction output is declining. While capital formation in construction is a measure of the gross output of the construction sector, and therefore does include the value of goods and services supplied to the construction industry from other sectors, it unfortunately excludes that which is not considered to accrue to the formation of new capital - which is much of repairs and maintenance work (Wells, 1986). This explains why the UK total construction output is on an upward spiral whilst the annual change in construction output is declining.

5. Analysis and synthesis

Trends in construction output and GDP have been scrutinized to test the existence of a relationship between the construction sector and economic growth. Tables 1 and 2 illustrate the relationships found. Analysis of 3, 5, and 8 year moving averages applied to all variables shows that booms and busts in the economy do not have a significant impact in long-term construction output and economic growth. They actually distort the 'natural growth' path.

The correlation coefficient with GDP reveals a very strong relationship between construction output and GDP for both the UK and SA. The correlation coefficient with growth for the UK reveals a weak relationship. The SA data shows that construction output influences growth, as represented by the correlation coefficient that leans more to the positive side.

The contrast in correlation coefficients between Table 1 and 2 confirms the assumption that in the upward growth trend in LDCs and NICs, the pattern of the construction sector tends to follow that of the general economy. The SA data shows that whenever there is growth in the economy, there is also growth of the annual change in construction output (see Figure 5). Wells (1986) also attested to this relationship.

Figure 5 shows a significant increase in the annual change in construction output between 2004 and 2008. This was the time when most of the major infrastructure projects related to the hosting of the 2010 FIFA World Cup started. This demonstrates an association between construction investment and economic growth. It is also important to note that this finding is consistent with economic growth theory, in particular, the endogenous growth models.

The growth in construction output reflected in Figures 4-5 and also in Table 1 indicates that growth in the SA economy was pulling the growth that was experienced by the construction sector particularly

Table 1: Trends in construction output & GDP in SA 1986-2011

Year	GDP (Constant)	Growth (ΔGDP)	Total Constr Output	3yr MA Growth	5yr MA Growth	8yr MA Growth
1986	129 488	0.2	11 718			
1987	464 786	1.6	12 779			
1988	552 516	3.8	15 137	1.87		
1989	644 831	2.2	17 084	2.53		
1990	734 725	-0.6	19 359	1.80	1.44	
1991	830 642	-0.5	21 322	0.37	1.30	
1992	916 403	-2.3	22 924	-1.13	0.52	
1993	1 081 261	1.8	24 892	-0.33	0.12	0.78
1994	1 116 228	3.2	25 611	0.90	0.32	1.15
1995	1 125 139	3.1	26 521	2.70	1.06	1.34
1996	1 173 600	4.3	27 056	3.53	2.02	1.40
1997	1 204 721	2.7	27 987	3.37	3.02	1.46
1998	1 221 086	0.5	26 338	2.50	2.76	1.60
1999	1 249 881	2.4	25 980	1.87	2.60	1.96
2000	1 301 813	4.2	27 448	2.37	2.82	2.78
2001	1 336 962	2.7	28 800	3.10	2.50	2.89
2002	1 386 435	3.7	30 473	3.53	2.70	2.95
2003	1 427 322	2.9	31 575	3.10	3.18	2.93
2004	1 492 330	4.6	34 451	3.73	3.62	2.96
2005	1 571 082	5.3	38 558	4.27	3.84	3.29
2006	1 659 122	5.6	42 582	5.17	4.42	3.93
2007	1 751 165	5.6	48 971	5.50	4.80	4.33
2008	1 814 532	3.6	53 145	4.93	4.94	4.25
2009	1 786 637	-1.5	57 279	2.57	3.72	3.73
2010	1 838 264	2.9	57 781	1.67	3.24	3.63
2011	1 895 668	3.1	58 241	1.50	2.74	3.65
Correlation coefficient with Growth			0.28	0.70	0.51	0.27
Correlation coefficient with GDP			0.93	0.51	0.79	0.93

between 2004 and 2008. Since economic growth leads construction, policy – makers can keep track of the trends in the main stream economy and devise responsive policies that seek to respond to the economic conditions of the time.

Construction influences investment. Economic growth models since Harrod-Domar have shown the importance of investment in determining economic growth. More recently, both the Solow and endogenous growth models continue to attribute an important role to capital formation. It therefore follows that it is likely that construction can influence short-run growth. To test the impact of the construction sector on long-run growth, it is necessary to get more data on labour, capital and R&D statistics covering the periods under review. Due to the unavailability of this data at this stage, it is not possible to test the impact of construction on long-run growth.

Table 2: Trends in construction output & GDP in the UK 1955-2011

Year	GDP (Constant)	Growth (ΔGDP)	Total Constr Output	3yr MA Growth	5yr MA Growth	8yr MA Growth
1955	385 425	4.2	39 934			
1956	389 004	5.6	43 001			
1957	395 426	3.7	44 560	4.50		
1958	396 699	3.1	45 906	4.13		
1959	413 664	1.2	50 349	2.67	3.56	
1960	435 716	1.5	54 649	1.93	3.02	
1961	445 870	2.8	58 515	1.83	2.46	
1962	450 695	3.4	60 150	2.57	2.40	3.19
1963	470 067	2	61 665	2.73	2.18	2.91
1964	495 835	3.6	69 206	3.00	2.66	2.66
1965	506 915	5.5	72 614	3.70	3.46	2.89
1966	516 673	4.1	73 513	4.40	3.72	3.01
1967	529 418	2.6	78 694	4.07	3.56	3.19
1968	551 664	4.6	80 566	3.77	4.08	3.58
1969	563 097	4.2	78 838	3.80	4.20	3.75
1970	575 736	2.7	76 579	3.83	3.64	3.66
1971	587 805	3.7	78 468	3.53	3.56	3.88
1972	609 275	2.9	80 861	3.10	3.62	3.79
1973	653 124	4.6	82 073	3.73	3.62	3.68
1974	644 539	5.3	72 121	4.27	3.84	3.83
1975	640 534	5.6	67 690	5.17	4.42	4.20
1976	657 418	5.6	67 183	5.50	4.80	4.33
1977	673 025	3.6	66 368	4.93	4.94	4.25
1978	694 765	-1.5	71 853	2.57	3.72	3.73
1979	713 380	2.9	72 381	1.67	3.24	3.63
1980	698 528	3.1	67 911	1.50	2.74	3.65
1981	689 289	6.2	61 376	4.07	2.86	3.85
1982	703 711	7.5	63 741	5.60	3.64	4.13
1983	729 215	5.3	69 420	6.33	5.00	4.09
1984	748 691	4.9	71 709	5.90	5.40	4.00
1985	775 643	5.5	72 101	5.23	5.88	4.24
1986	806 765	4.5	74 866	4.97	5.54	4.99
1987	843 572	5.2	83 426	5.07	5.08	5.28
1988	886 020	5.7	91 383	5.13	5.16	5.60
1989	906 236	6.9	94 566	5.93	5.56	5.69
1990	913 299	0.8	94 017	4.47	4.62	4.85
1991	900 580	-1.4	86 930	2.10	3.44	4.01
1992	901 901	0.1	83 443	-0.17	2.42	3.41
1993	921 945	2.2	82 000	0.30	1.72	3.00
1994	961 407	4.3	81 607	2.20	1.20	2.98
1995	990 751	3.1	82 428	3.20	1.66	2.71
1996	1 019 337	2.9	85 067	3.43	2.52	2.36
1997	1 054 232	3.3	86 845	3.10	3.16	1.91
1998	1 094 704	3.6	88 366	3.27	3.44	2.26
1999	1 134 723	3.5	89 535	3.47	3.28	2.88
2000	1 185 305	3.9	90 450	3.67	3.44	3.35
2001	1 222 650	2.5	91 998	3.30	3.36	3.39
2002	1 255 142	2.1	96 146	2.83	3.12	3.11
2003	1 299 381	2.8	101 507	2.47	2.96	3.08
2004	1 337 782	3	105 253	2.63	2.86	3.09
2005	1 365 685	2.2	104 428	2.67	2.52	2.95
2006	1 401 290	2.8	105 753	2.67	2.58	2.85
2007	1 449 861	2.7	108 279	2.57	2.70	2.75
2008	1 433 871	-0.1	107 073	1.80	2.12	2.25
2009	1 371 163	-4.9	94 811	-0.77	0.54	1.33
2010	1 399 850	1.4	101 306	-1.20	0.38	1.24
2011	1 409 015	0.7	107 331	-0.93	-0.04	0.98
Correlation coefficient with Growth			-0.31	0.74	0.56	0.53
Correlation coefficient with GDP			0.90	-0.41	-0.42	-0.48

6. Conclusion

There is evidence of the existence of a very strong relationship between construction activity and economic growth. As an investment sector, construction has the potential to impact positively on short-run growth. Construction can thus be regarded as a major component of investment programmes, particularly for developing economies like South Africa.

It can be concluded that the generally sharp growth in construction share of GDP in the period leading up to the 2010 FIFA World Cup in SA, resulted in a huge demand for additional resources in the form of material, plant and manpower. Whilst these were successfully imported to meet the schedule demands of the 2010 FIFA World Cup infrastructure projects, such a trend could not be sustainable for continuous economic growth hence the sharp decline in construction share of GDP from 15% in 2007 to 1.5% in 2010. The importation of resources may be costly as these have to be paid for in foreign currency. The effect of foreign direct investment in this regard, would need to be explored further.

Construction is an important part of the development and modernisation process. While it is closely correlated with economic growth, it does not follow that providing incentives and increased spending on projects necessarily leads to economic growth. In the Keynesian sense, like in any other sector, increased spending in the construction sector does stimulate economic growth. The construction sector deals mainly with the provision of capital infrastructure, which has an impact on economic growth. The delivery of such infrastructure creates significant employment opportunities for the population, which generates further investment in other sectors of the economy through the multiplier effect.

Considering the fundamental significance of the construction sector in employment creation, capital formation and its aggregate spillover effects, it is clearly an important sector in the economy. That does not mean that it drives economic growth. This makes it all the more important to identify the minimum necessary and sufficient conditions for economic growth. As economies develop from LDC status through NIC status to AIC status, construction sector spillovers accrue to propel productivity in other sectors of the economy, most notably, the services sector. Further research needs to establish a reasoned explanation of the relationship of the construction sector to economic growth, with emphasis on post-industrial developmental consequences. Insight into these issues will enable LDCs to better manipulate their economic policies to grow their economies and provide progressive policy alternatives for AICs to achieve economic recovery and progress towards post-industrial country (PIC) status or super-AIC status.

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