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SECTORAL ANALYSIS: GROWTH ACCOUNTING OF TERTIARY INDUSTRIES

Case Study

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C23; E23; E24

Abstract

The tertiary sector is one of the modern styles of economic systems in view of the share it occupies in the field of production as well as employment occupied share. Hence, just like other lands, the UAE, witnessed an economic structural change similar to developed and developing nations, where the tertiary industries contributed 55.4% in 2015 to total country's income. The empirical study aimed to analyze the contribution portion of growth in the tertiary industries through using the growth accounting framework in time-series from 1990 to 2015. The empirical study found that most of the industries contributed significantly to the growth of the tertiary sector. The contribution shares of growth due to labor and capital varied among industries. The main observed results show that there was a vice versa relationship between TFP performance and the size of labor, where the TFP positively corresponded with the decline in the size of labor specifically from 2010-2015.

INTRODUCTION

The tertiary sector is one of the modern styles of economies in view of the share it occupies in the field of operation and production as well as its important contribution to the economy's gross domestic product (GDP) and employment occupied share. After the industrial revolution and its development, the service sector became a key engine for growth, where the most economies have been transformed into service economies. Today, the service sector is the core of the modern economy, such as manufacturing industry was the heart of the manufacturing economy, and the agricultural sector was the core of the traditional economy.

The economies of the world have undergone radical transformations accompanied by changes in productivity through the structural change of the economy by productive sectors. By the time of the World War II, the United States of America (US) had become an economically productive country in the based-service economy, accounting for nearly 70% of GDP. For example, in Japan, after the 1980s, the manufacturing sector became small compared to the services sector.

Hence, just like other countries, the United Arab Emirates (UAE), witnessed an economic structural change similar to developed and developing countries. However, the non-oil industry development is considered a major objective issues for the country to reduce the reliance on a single industry such as oil production revenues. The UAE economy in the year 2016 achieved significant progress through the outgrowth of all non-oil economic sectors with a high growth rate about 5.5%supported mainly by financial service and tourism (NBK, 2016). According to **Figure 1,** the tertiary sector in the year 2015 occupied a lion quota contributing a share of 55% to aggregate income, 54.6% to total employment, and 59.2% to the total capital stock. Thus, the service sector is considered a major key sector for growth for the UAE' economy.

As illustrated in **Table 1**, which describes the contributed share for each service industry of the tertiary sector to aggregate sector's income for the year 2015. In terms of production government service (GS) significantly contributed to the tertiary sector generating 75%. indicated this industry. The wholesale, retail trade and repairing services industry (WRTRS) also contributed a significant share, namely 39%to total employment of the tertiary sector in the year 2015. The capital stock in the tertiary industry was convergent between three industries with 27%, 26%, and 21%, namely for transport, storage and communication (TSC), real estate and business services (REBS), and government services (GS), respectively.

The purpose of this study is to analyse the contribution of factors of production to the growth of the service industries in the tertiary sector of UAE's economy, and which has more impact to the growth to sector. Three variables were examined such as capital, labor, and TFP, through the growth accounting framework in time-series from 1990-2015. Also, beside long-term analysis, the investigation is divided into three phases of period of times such as 1990-2000, 2000-2010, and 2010-2015, to understand the differences among industries in terms of growth. The empirical study found that most of the industries contributed significantly to the output growth of the sector and with some difference among industries in terms of share growth due to the capital, labor, or TFP. In addition, it was found there was a visa versa relationship between TFP performance and the size of labor as described in the results below.

The structure of the study is as follows: section (1) present the literature review, section (2) presents the methodology and data sourcing, section (3) presents the empirical analysis, section (4) provides the discussion, and the last section (5) describes the conclusions of the study.

LITERATURE REVIEW

Economic sector.

The study "The concept of economic sectors" written by Martin Wolfe (1955) seemed to be the first work to clarify the characteristic and definitions of the major economic sectors, which were primary sector, secondary sector and tertiary sector. An importance was given to the three sectors in term of labor differences among them by Colin Clark in the book "The Conditions of Economic Progress" published in year 1976. The phenomenon of deindustrialization witnessed an increasing documentation in the 1970s, parallel with the decline in size of secondary sector in many of the developed countries (Mukherjee & Feller, 1978; UN, 1977; Bacon & Eltis, 1978; Blackaby, 1979).

The economy of the US is the first based-service economy, where this shifting could be noticed after post World War II as described by Illeris Sven (1996) in his book "The service economy". The economy of the US witnessed a dramatic economy structure transition over the past half-century. The production portion of secondary sector fell roughly to the half, while the service sector by its industries accounted for 75% in the early 2000s, followed by an increase ratio in employment (Triplett & Bosworth, 2004; World, 2016). Furthermore, the US's service value-added reached to its peak almost 79% in the year 2009, and about 78% in the year 2014, which accordingly to world bank country databank. For instance, Japan witnessed a

dramatic change following the US in the contribution share of the service sector to economy growth in terms of value-added and size of employment specifically after 1960s (Lörcher & Emi, 1980).

In terms of economic structure transformation, the developed countries witnessed a similar trend of structural change such as a decline in output of the agriculture sector and an increase in income per individual, while the share of the service sector increased with the inverted relationship of U-shape between per capita income and sector shares. On the other side, developing countries sustain a different path of structural change that can be explained by the hump-shape relationship between income and industrialization, where at an early stage of development, the service sector is characterized by a large portion of the growth (Rodrik, 2016; Di Meglio, Gallego, Maroto, & Savona, 2015; Moro, 2015).

The employment share and sector value-added in the secondary sector declined most frequently over decades by raising the share of employment and sector's output in the tertiary sector (Gemmell, 1982). A study examined the contribution of the service sector to GDP growth and the employment share to the sector found that there was a moderate positive correlation co-efficient relationship between the contribution share of the sector to GDP growth (Suvakkin & Gnanasekaran, 2015; Tachiciu, 2012).

In OECD countries, the tertiary sector is considered the largest share of contribution to their economies in terms of employment and value-added accounting for about 70% (Jorgenson & Timmer, 2011; OECD, 2005). According to Uppenberg & Strauss (2010) the tertiary sector is considered the key engine to growth in the countries of the European Union (EU) accounting for 75% compared to the year 2005 with 60%. Ghani & Kharas (2010) started to use the term "service revolution", specifically after India witnessed a rapid growth based on the development of some industries in the service sector without any intervention from the dominance stage of the manufacturing sector. According to Asia Productivity Organization (APO) (2014), in India, the growth is always driven by the tertiary sector of which contribution rose from 51% in the late 1980s to 64% between 2000-2012, while the contribution of the secondary sector was no more than 20%, which on other side, China witnessed same dramatic change contributed by tertiary sector (Storesletten & Zilibotti, 2014). In addition, there is an evidence that some service industries such as real-estate, business activities, and finance push the Asian countries to standard of high income level because of increase of the industries' weights (APO, 2014).

In conclusion, the tertiary sector is a key engine for economic growth throughout its industries contributing significantly to the value-added and employment share.

Productivity.

Issues such as deindustrialization or tertiarisation attracted attention of researchers. According to an early argument highlighted by some researchers the rise of tertiary sector corresponded with a declivity in the secondary sector because the tertiary sector is characterized by lower productivity than a secondary sector, which in returns causes to harm the economy's future (Baumol, 1985; Wolff, 1985; Bjork, 1999). On the other hand, some opposite findings stated that some industries of the tertiary sector indicated effective growth rate of productivity and that productivity does not necessarily go down because of the rising share of the service sector (Castaldi, 2009; Maroto-Sanchez, 2009; Mickiewicz & Zalewska, 2006; Buera & Kaboski, 2012).

The traditional idea of Kaldor's growth law that describes the long-run growth of productivity with the output linked to the growth of the secondary sector seems to exists no more with the appearance of new evidence of shrinking the share of manufacturing to the service sector in terms of employment share and the sector's output (Palma, 2005; Dasgupta, Singh, & others, Manufacturing, services and premature de-industrialisation in developing countries: a Kaldorian empirical analysis, 2006; Rodrik, 2016). Another study reported in reference to the economic structure transition in terms of the contribution share of employment and service sector to GDP that countries in Central Asia and Eastern Europe changed their economy toward the service sector after 1990 and caught up with some Western European countries, where helped to increase the overall productivity (Alam, 2008).

A field in reference to the UAE's productivity indicated that capital productivity played a significant role in transcending the labor productivity, but in terms of industries, the labor productivity showed productive in real-estate, finance, transportation, manufacturing industry, and the oil industry (Istaitieh, Hugo, & Husain, 2007). According to, In a study of the UAE, , Soto and Haouas (2012) stated that between 1975-2010 the average growth rate for the entire period was 5.4% due to the capital accumulation (4% per year), which is considered the highest in the world that moved from a low to high-income level. In the context of the causal factors of growth the study indicated that in the early of the 1980s and 2000s growth in employment was higher than growth with physical capital discarding the business cycles.

In addition, the same study mentioned that the root of growth was from capital and labor accumulations and not from the efficiency allocated to factors of production from 1987-2010. In regards to the TFP, the written study states that the UAE's TFP growth was similar to high income countries of the world with about 1.4% per year after excluding the oil industry from calculation between 1987-1995. Whilst, then from around 1995 to 2009, the growth of TFP started trending downward (Soto & Haouas, 2012). Furthermore, a time-series study by Haouas & Heshmati (2013) indicated that the capital was not used an efficient way between 1974-2007and as a result the productivity declined. The study also demonstrated that labor growth rates closely followed the production growth rates indicating the efficiency of labor use as an outcome of a neo-classical production function employed.
In conclusion, as far as the analysis of this paper is concerned growth accounting is used in sectoral approach regards the overall productivity of the UAE. The productivity in general performed poor specifically after 2000s due to improper management and poorly allocated factors of production.

DATA AND METHODOLOGY

Theoretical Framework

The exercise of growth accounting decomposes the growth into contribution from physical capital, labor, TFP, where this framework started largely for empirical studies after World War II (Denison, 1962; Jorgenson & Griliches, 1967; Feinstein, 1978). A quantitative analysis method used in this study by computing the source of growth follow the simple neo-classical aggregate Cobb-Douglas production function introduced by Solow (1956, 1957), as $Y = f\,(K, L, residual)$, where the framework takes mathematical form:

$$Y_t = A_t K_t^a L_t^{1-a} \qquad (1)$$

Equation (1) represents in time $[t]$, where the Y_t is industry output (the share to GDP), K_t is physical capital, L_t is a number of active workers, A is TFP (technological efficiency), and a and $1 - a$ are the share of capital and labor paid from income, respectively. The thumb-rule employed in terms of the share paid from income were constant based on assumption constant return to scale, in this study, where capital share was 1/3 and labor share was 2/3 (Piketty, 2014).
By illustrating the practice equation for computing the contribution share for three variables (capital, labor, and TFP) to industry's growth as presented in equation (2):

$$\Delta Y_t/Y_t = \alpha.\,\Delta K_t/K_t + (1-\alpha).\,\Delta L_t/L_t + \Delta A_t/A_t \qquad (2)$$

Therefore, equation (2) is expressed in capital as $\Delta K/K$, in labor as $\Delta L/L$, and TFP as $\Delta A/A$, after only the thumb-rules for capital (1/3) and labor (2/3) employed. The growth contribution due to capital was generated as $\left[\frac{\Delta K/K}{\Delta Y/Y}\right]$, due to labor $\left[\frac{\Delta L/L}{\Delta Y/Y}\right]$, and TFP was calculated as residual remained from $\Delta A/A_t = \Delta Y/Y_t - \Delta K/K_t - \Delta L/L_t$, and growth contributed due to TFP calculated from $\left[\frac{\Delta A/A}{\Delta Y/Y}\right]$.

Data Source

The source of data was sourced from The Federal Competitiveness and Statistics Authority (FCSA) of the UAE for the empirical investigation. The data were categorized by sectoral national accounts. The analysis is done with the time series annual panel from 1990-2015. As the purpose of study is to analyze the industries in the tertiary sector national annual data were used including seven industries such as wholesale, retail trade and repairing services symbolized by WRTRS, restaurants and hotels symbolized by RH, transport, storage and communication symbolized by TSC) real estate and business services symbolized by REBS, social and personal services symbolized by (SPS), the financial corporations sector symbolized by FCS, and government services symbolized by GS.
Hence, the data categorized by industries in term of output, capital stock from 1990-2015 was generated from annual national accounts of the UAE. The data for the number of active workers by industry from 1990-2010 was sourced from FCSA, but from 2011-2015, the number of active workers was estimated by research because of the absence of information for this period. Thus, the method employed in order to get the absence data is as follows:

- The contribution growth for each industry in term of active workers is based on year 2010.
- The ratio generated from the first step is implemented in the data for the total population and labor force.
- The data for population and labor force were sourced from the World Bank databank (World, 2016).

EMPIRICAL RESULTS

Table 2 illustrates the results of growth accounting excises of industries of tertiary sector from 1990-2015 however, the 15 years' period id divided into group of period of times like 1990-2000, 2000-2010, and 2010-2015. The industries of service sector with seven economy industries are wholesale, retail trade and repairing services (WRTRS), restaurants and hotels (RH), transport, storage and communication (TSC), real Estate and business services (REBS), social and personal services (SPS), the financial corporations sector

(FCS), and government services (GS). Table 1 describes the annual average growth rate for each economic industry and the share of growth due either to capital, labor, or TFP.

First, the annual growth rate indicated in results as the REBS deserved the highest average growth rate with10.93% followed by TSC, RH, SPS, FCS, and GS, with 10.67%, 10.24%, 10.23%, 10.10%, and 9.31%, respectively. On the other hand, the WRTRS deserved the lowest average annual growth rate with 6.84%between 1990-2015. It is worth mentioning that the GS deserved average growth with 10.65%. Ultimately, all economic services industries deserved roughly close annual average growth rate from 1990-2015.

It can be observed from the annual growth rate of capital accumulation that between 1990-2015 the FCS and SPS show the highest average growth rate with about 6.83% and 6.53% respectively. In the period of 1990-2000 the average growth rate fluctuated between 8.02% and 1.26% with the highest in REBS and the lowest in GS. However, between 2000-2010the highest growth rate was 9.96% in the FCS, and the lowest in the RH with 1.56%. But between 2010-2015 the average growth rate was the highest in the SPS with 6.68% unlike in the GS with a negative value of about -1.37%.

On other side, the annual growth rate for labor from 1990-2015 was between 11.35% in the REBS and 2.63% in the SPS. The growth rate of numbers of workers was the highest in the REBS in all group period of times, unlike from 2010-2015 when the growth rate declined from 10.35% to 1.07%.. Between 1990-2015 the TFP indicated positive growth rate in the TSC, SPS, and GS with 2.90%, 1.06%, and 1.40%, respectively unlike in the WRTRS, REBS, and FCS with a negative value of about -2.69%, -5.77%, and -1.00% respectively. It is worth mentioning that the TSC and the TFP indicated positive figures in all period of times.

Secondly **Table 2** describes the share of growth due to either capital, labor, or TFP. In term of long-term series minimum and maximum figures show that the share due to the capital was between 34% and 68%, due to the labor between 26% and 104%, and due to the TFP between -53% and 27% from 1990-2015. Whereas, the contribution of capital was the highest in the FCS and the lowest in the TSC, the contribution of labor was the highest in the REBS and the lowest in the SPS, and the contribution of TFP was the highest in the TSC and the lowest in the REBS. Moreover, the SPS showed noticeable high figures due to the contribution of capital to sector's output in all group period of times. From 1990-2000, the share of growth in the FCS due to the capital was the highest with 108% indicating the development of the financial industry due to the capital. However, between 2010-2015 the GS, deserved negative contribution due to capital with a growth rate of -13%.

In term of labor the REBS and WRTRS contributed the most in most period of times. And, in term of TFP, the TSC showed the better performance in all group period of times. Specifically, from 2010-2015 the TFP indicated positive performance with 31%, 62%, 29%, 70%, 14%, 56%, and 103% for WRTRS, RH, TSC, REBS, SPS, FCS, and GS, respectively. Whilst, the share of contribution due to the labor declined with 11%, 16%, 13%, 12%, 11%, and 10% for WRTRS, RH, TSC, REBS, SPS, FCS, and GS, respectively. The decrease in the number of labor had a significant positive impact on the TFP trend. Thus, the service sector needs to be managed in term of the number of labor (efficiency allocation of resource),because this process will help to improve the TFP moving trend.

Therefore, it can concluded from the results that in term of average annual growth rate from 1990-2015 the REBS, TSC, RH, SPS, FCS, and GS indicated the highest growth with 10.93%, 10.67%, 10.24%, 10.23%, 10.10%, and 9.31%, respectively. The GS industry continued to grow especially between 2010-2015 with 10.65% average growth rate, while the rest of industries declined compared to the previous group of time indicating the importance of the productivity of the governmental service. Moreover, the FCS and SPS showed the highest average growth rate in capital between 1990-2015. The REBS indicated the highest growth in labor in the log-term, however, it declined specifically between 2010-2015. The TSC, SPS, and GS deserved positive performances in average annual growth rate regards the TFP in long-term. On the other side, the FCS contributed the highest share in capital, the REBS in labor , and the TSC was in TFP. In addition, a decline in the contribution share of labor can be observed, the contribution share of TFP was positive in all industries specifically from 2010-2015. Thus, the rational management of the increasing share of the number of workers had an impact on the performance of the TFP.

DISCUSSION

The economy of the UAE in terms of economic structure change, the importance of the tertiary the sector and its industries in the country's economy, value added and job creation shows a similarity to changes taken place in economics of global nations. To our best knowledge no other study is known with an analysis of the contribution share of growth using the aggregate production function in sectoral approach in the case of the UAE. , This research can be considered as a new contribution to this field in the perspective of the UAE. Hence, the study proposed an empirical analysis summarizing its findings as described in this paper.

CONCLUSIONS

The de-industrialization phenomenon started after World War II by the diminution of the manufacturing sector in many developed nations such as the US and Japan. For instance, the US testified a dramatic alteration in its economic structure system, where the manufacturing sector dropped to almost half, while in the service sector the country witnessed a contribution to output growth about three-forth and increased the employment share in the service sector. Nowadays, in many studies the tertiary service is considered the main key engine moving the country's economy toward a sustained economic development. Furthermore, this sector is no more characterized by low productivity as described in some studies.

Based on the results, all industries in the tertiary sector contributed significantly to the GDP growth as presented in this paper. The financial industry symbolized by the FCS showed the highest growth due to the capital, real estate and the business service (REBS) indicated the highest employment share, and TFP moved in negative trend from 1990 to 2015, specifically in these industries WRTRS, REBS, and FCS, unlike these industries TSC, SPS, and GS, where TFP was positive. In addition, the TFP performed positive figures specifically from 2010-2015 in all industries with the decline of the contribution to growth due to decline in the growth share contributed by labor.

Therefore, the tertiary sector has had a significantly impact on economic growth in term of value added and employment share. The results of this analysis show that the contribution of factors of production varied among all industries in tertiary sector, where observed there was a visa versa relationship between the performance of TFP and the share of labor.

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TABLES

Table 1. Contribution share (%) of the industries to tertiary sector (2015).

	WRTRS	RH	TSC	REBS	SPS	FCS	GS
Production share to sector	22%	5%	17%	23%	5%	17%	11%
Growth change (1990-2015)	453%	1193%	1341%	1436%	1191%	1149%	6835%
Employment to tertiary sector	39%	9%	13%	8%	8%	3%	21%
Capital stock to tertiary sector	8%	4%	27%	26%	9%	4%	21%

Source: (FCSA, 2016) and own calculations.

Table 2. Growth accounting results of the tertiary industries.

	Average Annual Growth Rates				Share of Growth Due to:		
WRTRS industry	**Y**	**K**	**L**	**A**	**K**	**L**	**A**
1990-2015	6.84%	3.29%	6.24%	-2.69%	48%	91%	-39%
1990-2000	7.37%	1.65%	7.67%	-1.96%	22%	104%	-27%
2000-2010	6.62%	5.13%	6.78%	-5.30%	78%	103%	-80%
2010-2015	5.70%	2.83%	1.09%	1.78%	50%	19%	31%
RH industry	**Y**	**K**	**L**	**A**	**K**	**L**	**A**
1990-2015	10.24%	-	-	-	-	-	-
1990-2000	11.67%	-	-	-	-	-	-
2000-2010	8.66%	1.56%	6.64%	0.46%	18%	77%	5%
2010-2015	9.97%	2.66%	1.09%	6.22%	27%	11%	62%
TSC industry	**Y**	**K**	**L**	**A**	**K**	**L**	**A**
1990-2015	10.67%	3.63%	4.13%	2.90%	34%	39%	27%
1990-2000	10.21%	3.26%	2.69%	4.27%	32%	26%	42%
2000-2010	12.58%	3.28%	6.56%	2.74%	26%	52%	22%
2010-2015	6.62%	3.64%	1.09%	1.90%	55%	16%	29%
REBS industry	**Y**	**K**	**L**	**A**	**K**	**L**	**A**
1990-2015	10.93%	5.35%	11.35%	-5.77%	49%	104%	-53%
1990-2000	12.13%	8.02%	16.52%	-12.41%	66%	136%	-102%
2000-2010	9.85%	4.29%	10.35%	-4.79%	44%	105%	-49%
2010-2015	8.33%	1.45%	1.07%	5.82%	17%	13%	70%
SPS industry	**Y**	**K**	**L**	**A**	**K**	**L**	**A**
1990-2015	10.23%	6.53%	2.63%	1.06%	64%	26%	10%
1990-2000	7.36%	4.70%	-0.31%	2.97%	64%	-4%	40%
2000-2010	13.05%	8.47%	6.07%	-1.49%	65%	46%	-11%
2010-2015	9.07%	6.68%	1.11%	1.29%	74%	12%	14%

FCS industry	Y	K	L	A	K	L	A
1990-2015	10.10%	6.83%	4.27%	-1.00%	68%	42%	-10%
1990-2000	5.06%	5.49%	2.53%	-2.96%	108%	50%	-58%
2000-2010	13.81%	9.96%	6.97%	-3.13%	72%	50%	-23%
2010-2015	9.90%	3.30%	1.09%	5.51%	33%	11%	56%
GS industry	**Y**	**K**	**L**	**A**	**K**	**L**	**A**
1990-2015	9.31%	3.57%	4.35%	1.40%	38%	47%	15%
1990-2000	6.79%	1.26%	2.70%	2.83%	19%	40%	42%
2000-2010	12.44%	6.94%	7.11%	-1.61%	56%	57%	-13%
2010-2015	10.65%	-1.37%	1.09%	10.93%	-13%	10%	103%

Source: own calculation sourced from (FCSA, 2016).

FIGURES

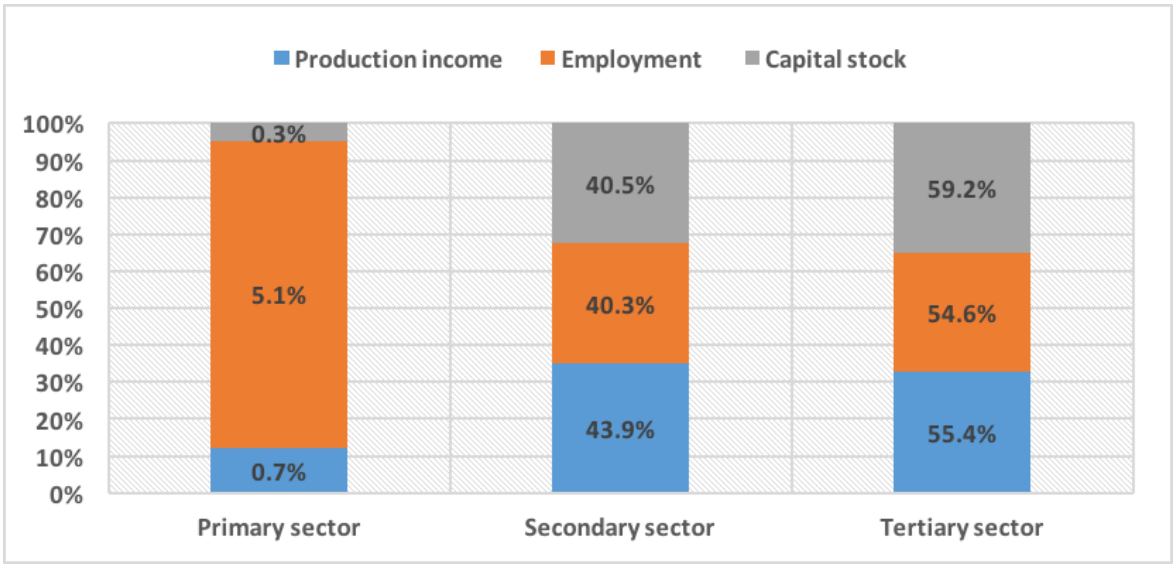

Figure 1. Contribution share (%) of the UAE's major economy sectors to aggregate figures for the year 2015. Source: Own calculations based on FCSA (2016).