THE IMPORTANCE OF THE SERVICE INDUSTRY ON ECONOMIC GROWTH: THE CASE OF SWITZERLAND

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THE IMPORTANCE OF THE SERVICE INDUSTRY ON ECONOMIC GROWTH: THE CASE OF SWITZERLAND

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“Science is the great antidote to the poison of enthusiasm and superstition.”

Adam Smith. The Wealth of Nations, 1776.

I. TABLE OF CONTENTS

II. LIST OF ABBREVIATION

ADF ..... Augmented Dickey Fuller
CH ..... Confederatio Helvetica
CHF ..... Swiss Franc (Currency)
ECT ..... Error Correction Term
EU ..... European Union
GDP ..... Gross Domestic Product
GSMH ..... Gayrisafi Milli Hasıla (Turkish)
IMF ..... International Monetary Fund
LN ..... Logarithm (Math.)
MIO ..... Million
OECD ..... Organization for Economic Co-operation and Development
OLS ..... Ordinary Least Square
P. ..... Page
PP-TEST ..... Philips-Perron Test
TRANS. ..... Translation
U.S ..... United States of America
VAR ..... Vector Autoregression
VECM ..... Vector Error Correction Model
VOL ..... Volume
WWW ..... World Wide Web

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V. ABSTRACT

This paper focuses on the Service Sector and its growing importance in developed and developing countries. The paper empirically analyses the effects of the service industry to the economic growth and macroeconomic indicators in Switzerland using cointegration and Granger causality tests. Quarterly time series data were used covering the period from the last quarter of 1991 to the last quarter of 2012. The main purpose of this project is to empirically determine the relationship between service industry and economic growth and Swiss financial sector by using unit root test, co-integration test and Granger causality test based on the data from 1991 to 2012 of Switzerland. Both long run relationship and short run causality are investigated using quarterly data. Cointegration test and Granger Causality test are used after checking the unit root of each variable. The cointegration tests indicate the existence of a long-run cointegrating relationship between the Swiss service sector and its economic growth. Further there exist also a long-run cointegrating relationship between the Swiss financial sector and economic growth.

Keywords: Service industry, Economic growth, Cointegration test, Switzerland, Granger Causality, Economy,

Bu çalışmada, Hizmet sektörünün gelişmiş ve gelişmekte olan ülkelerdeki artan önemimi inceleniyor. Çalışmada ampirik olarak İsviçre'nin hizmet sektörünün ekonomik büyüme ve makroekonomik değerlere olan etkisini araştırılıyor. Çalışmada İsviçre'nin hizmet sektörünün ekonomik büyümeye olan katkısını birim kök analizi, Johansen eş bütünleşme testi ve Granger nedensellik testleri kullanarak test edilmesi amaçlanmıştır. Veriler 1999:1-2012:4 dönemine ait verilerden faydalanılmıştır. Bu amaçla, önce İsviçre'deki hizmet sektör hacmi ile GSMH, daha sonra finans sektörü ile GSMH değişkenleri arasındaki ilişkiler incelenmiş ve bu aşamada "En Küçük Kareler Yöntemi", "Johansen Juselius" Eş bütünleşme Testi ve "Granger Nedensellik" analizinden faydalanılmıştır. Analiz sonuçları, İsviçre ekonomisinde Hizmet sektörünün ekonomik büyümeyi önemli derecede etkilediğini göstermektedir. Finans sektörü ile GSMH arasında da uzun vadede bir ilişki analizler sonucunda bulunmuştur.

Anahtar Kelimeler: Hizmet Sektörü, Ekonomik Büyüme, Reel Sektör, Eş bütünleşme, Nedensellik.

VI. PROLOGUE

Growing up and have been living in three different countries brings excitement as well as emotions with itself. Such location changes can be count as experience or maybe for some people an adventure. My academic career began in Switzerland where I was also born, went through a one-year layover experience in Germany and continues then again in Turkey. My bachelor thesis and projects in the master degree were analyses about Turkey's economic sectors and its effects. As a completion for my master degree, I planned since the beginning to analyze the economics and its indicators of my other home-country; Switzerland. The main reason for choosing the service sector is because Switzerland enjoyed an economic boom between the years 2009 and 2012, and got out from an unexampled crisis in the financial markets and the global economy as a comparative winner. The growing and potentially effective service sector may have been a major effect on economic growth within these years. Since the service sector has an important impact to the economy and growth, the Swiss service sector may be or become a model for Turkey and a lot of developing countries.

1. INTRODUCTION

1.1 Purpose of the Study

The main motivation of this thesis is to examine the role and impact of the service sector on the overall economic growth in Switzerland. Eichengreen (2009) mentioned the service sector in his study as "a wave of growth". According to Eichengreen (2009), "the service sector share of GDP and per capita income is one of the best-known regularities in all of growth and development economics"[1]. To analyze the effect empirically, a country-specific approach where cointegration and causality techniques are used. The purpose of this study is at first to examine empirically whether a link between the service sector and Switzerland's economic growth can be found during the time period 1991-2012 by applying Augmented Dickey–Fuller test (ADF) and Johansen's co-integration tests. Secondly, this paper analyzes also impacts of the Swiss finance sector to the Swiss GDP. Further Granger Causality-tests are used to calculate estimated causal effects. Finally, the obtained impacts for Swiss economics based on econometric results and other empirical findings are presented in this thesis.

The specific topic "Service Industry" in this study is interesting to analyze for several reasons. First of all, the service sector has become an important determinant for national economic development. Switzerland shifted from an agricultural country to an industrial country with efficient and skilled labor hood in the 20th century. In recent decades, the weight has shifted from traditional industry

[1] Eichengreen, B. & Gupta, P. 2009. The Two Waves of Service-Sector Growth. Indian Council For Research On International Economic Relations. Working Paper No. 23. P.ii

towards a knowledge-based economy. Hence, the importance of the service sector will increase in the forthcoming years.

The change of the weight in the Swiss economy has shifted Switzerland from an agricultural country to a service-based industry country. Even the industry is still a significant employer sector in Switzerland, as currently more than half of the working population in Switzerland is employed in the service industry. The Swiss service sector shows an explicit growing trend in the last decades[2].

1.2 Contribution to Literature

This thesis contributes to the literature on service sector and its impacts to the economic growth. This country-specific study investigates the link between the Swiss service sector and economic growth, specifically for Switzerland econometrically.

From an academic research perspective, this study is relevant as it implements regression techniques for non-stationary time-series by applying co-integration techniques to investigate the relationship between service sector and economic growth. This study has been written with the aim to provide practical relevance from an economic view. While this work analyzes the specific case of Switzerland, the intention is to provide a framework that can be used and applied as a reference for other countries as well.

[2](Swissinfo. 2013. Online)

1.3 Outline

The general structure of the thesis is organized as follows: section one includes a general introduction into the topic. Section two offers an overall review of former studies about service sector and its impact to economic growth and macroeconomic indicators. The third section provides recent economic history, a theoretical framework and a detailed background about the overall service sector in Switzerland and other countries. In section four, the methodology used in this study is described. The data used in the study are explained and listed in the fifth section. Further, section six represents the empirical results. Chapter seven concludes and provides some suggestions for further research and recommendations related to the obtained empirical results in the conclusion part.

2. LITERATURE REVIEW

In most financial and economic papers and views, the service sector is said to be the expanding and leading sector, which actuates the economy in many countries. The linkage between service sector development and economic growth has been investigated extensively in many papers. Several papers analyzed overall impacts of subsectors to the economy.

2.1 Former Studies

There are many papers, which debate about a causal effect of the service sector to economic growth. "The Two Waves of Service-Sector Growth", a famous working paper written by Eichengreen & Gupta in 2009, which identify like the headline of the paper indicates two waves of service sector growth. A first wave occurs in countries with relatively low levels of per capita GDP and a second wave in countries with higher per capita incomes. The first wave consists of traditional services, the second wave of modern (financial, communication, technology) services. According to Eichengreen (2009), the second wave frequently comes true in countries that are open to trade, democratic and relatively close to the major global financial centers. Eichengreen & Gupta (2009) provide their conclusions through empirical analysis.

Eichengreen & Gupta (2011) indicate in another paper about the service sector as India's road to economic growth. According to the paper, growth and rising living standards in India will cause a shift of labor from agriculture to modern services as well as manufacturing.

Wang & Li (2009) analyzed the relationship between the service industry and economic growth in China by applying cointegration analysis. Their results show that a long-term equilibrium relationship exists between the service sector and economic growth. According to Wang & Li (2009), the service industry of China plays an important role in economic growth since "every 1% increase in service sector output will promote 0.97% economic growth"[3].

Katırcıoğlu (2004) investigated the Causality between GDP, agriculture, industry and services growth in Northern Cyprus. The results conclude a unidirectional causation between the service sector and GDP of North Cyprus. According to Katırcıoğlu (2004), the overall region is still agricultural weighted and through political isolation also restricted for rapid development of the service sector[4].

Fukao (2010) analyzed the total factor productivity in Japan and its effects the Japanese economy. Due to most of the service sector is regulated; the area lags behind many other major economies. This prevents Japan from global competition in these areas. According to Fukao, even Japan's service sector lags behind other countries' sectors. Japan may catch up in competition by investing in communication technology and increase the factor productivity in these areas.

Quasenivalu (2008) focus onto the role and impact of air services and the tourism sector. He pointed out, that the air service and the tourism sector are both major determinants of the overall economic growth. Further Quasenivalu declared that a partly of full liberalization of these sectors result not a positive payoff.

[3] Wang, S. & Li, D. 2010. A Empirical Analysis on the Relationship Between Service Industry and Economic Growth. Hebei University of Economics & Business. Working Paper:050061. P.47.

[4] Katırcıoğlu, S. 2004. Co-Integration and Causality Between GDP, Agriculture, Industry and Services Growth in North Cyprus: Evidence from Time Series Data 1977-2002. Eastern Mediterranean University (North Cyprus). Review of Social, Economic & Business Studies. Vol.5/6. P.173 – 187.

Tang, Sharpe & Rao (2004) denote in their paper that the Canadian service sector has succeeded in productivity growth relative to the US case. Labor and factor productivity in the Canadian service sector expand between the periods 1981-1995 and 1995-2000. Service sector gross output grew at an average annual rate of 3,4 per cent between 1981 and 1995 in Canada. Between 1995-2000, this rate rose up to 5,8 per cent per year.

A working paper, drew up in 2005 by the state secretariat for economic affairs of Switzerland, supports the view, that Switzerland will experience increases in growth, welfare, wages, employment and cross-border trade, regardless of the action taken by the EU, if Switzerland reduces its barriers to services provision. The liberalization of services markets achieves according the working paper positive effects for both Switzerland and the EU[5].

G.Ramakrishna (2008) supports in his empirical analysis the view of structural transformation or decline of agriculture and industry and an increase in the share of service sector in India during the period 1990-2002. "Open environment" conditions give rise to more liberalized sectors such as business and communications, financial services and hotels, which grew rapidly during this period. Finally, this sector shift causes a significant increase in the economic growth of India.

Wu (2007; P.18) compared and examined the service sector growth in China and India. According to the paper, both countries' economies have been rising, whereas China started on a lower base. Through specialization of production factors, rising standard of living increased in both countries. Compared with India,

[5] State Secretariat for Economic Affairs. 2005. The Economic Effects of Services Liberalisation in Switzerland - Final Report. Copenhagen Economics. P.8.

China's service sector lags behind. Even compared in international dimension, China's service sector lies below the average. China's service sector may develop and expand in case Chinese companies outsource their communications, legal and accounting services in later years.

Tandrayen-Ragoobur (2010; P.15-17) analyzed long and short run impacts of the services sector on economic growth in Mauritius. Cointegration analysis was used to obtain the impact of different activities in the services sector on the economic growth. The results show that the service sector affects GDP positively and that wholesale retail trade has the strongest impact on the economy followed by other subsectors. Wholesale retail has an effect of 2,19% .The empirical result of the paper showed evidence of causality from the services sector to GDP in the long run.

3. THEORETICAL OUTLOOK

3.1 Introduction

The Swiss economy has been one of the world's most stable economies since years. Long-term monetary security and its reliable political stability have made Switzerland a safe place for local and international investors. Switzerland became a modern market economy, where foreign investments are highly related to economic growth in. Even high labor specializations, the main key sectors of the Swiss economy are industry and trade[6]. Switzerland maintains a high per capita income which is one of the highest compared to other countries' per capita income. Fear of unemployment became also one of the critical topics for Switzerland for several years[7].

3.2 Macroeconomic Review of Switzerland

3.2.1 Overall Review

Switzerland is a politically neutral Non-EU member state where modern market economy conditions are applied[8]. According to the OECD data, Switzerland has the 4th highest per capita GDP, compared to other developed and industrial countries. The labor force of Switzerland is highly skilled and has the privilege of higher social security coverage in comparison with other EU and other countries. The economy of Switzerland contains a highly developed service sector, which includes professional

[6] (Reportlinker. 2013. Online)
[7] Djurdjevic, D. 2013. Unemployment and under-employment: The case of Switzerland. Schweizerische Zeitschrift für Volkswirtschaft und Statistik. P.4-6.
[8] (BBC. 2013. Online)

financial service, high-technology specialized industry and knowledge-based know-know production. Despite haven't become a member of the European Union yet, Switzerland's economy has been highly integrated with the European Union. Switzerland's participation in the European economy improved its international competitiveness, even some trade protectionism continues in the Swiss agriculture sector. Like most EU countries, the global financial crisis in 2009 also caused an economic downturn in Switzerland. The global export demand declined significantly. During this period, The Swiss National Bank practiced decisively "a zero-interest rate policy" to lift up the economy and protect the Swiss Franc (CHF) from a potential appreciation risk. One of the major bank institutions of Switzerland experienced huge losses and accepted "a government rescue deal" at the end of the year 2008. Besides, Switzerland experienced an increasing pressure from neighbor countries, the EU, the US, and international institutions to revise its banking secrecy laws and applying the valid reforms[9]. During the period 1991 and 1997, the Swiss economy registered Europe's weakest annual GDP growth rate average of 0%. After 1997, the economy records an increasing trend until 2000 with about 3% growth rate. After a slowdown till 2003, the economy again grew after 2004 until the last global financial crisis. In 2011, appreciation of the Swiss franc against the euro and the global downturn of demand side affected Swiss exports negatively, thus also

[9] (Reportlinker. 2013. Online)

the overall GDP[10]. However, since 2012 the Swiss economy again recorded positive grow rates[11].

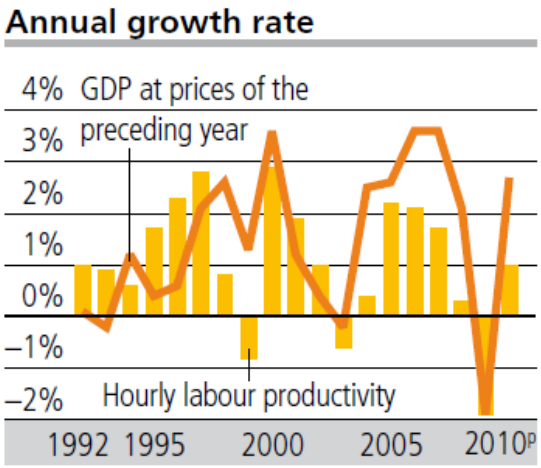
3.2.2 GDP (1991-2012)

Switzerland's economy highly depends on exports for economic growth. In addition, Switzerland is closely integrated to European and United States' economies. As many other countries, Switzerland also experienced slowdowns in its economy related and caused by financial crises which occurred in these economies and affected global markets.

Between the years 1991 and 1997, Switzerland recorded its weakest annual growth rates average of 0%-1%. There was an uptrend after 1997 till 2000, when growth rate rose to 3%. After a stagnant period between 2001-2003, the GDP grew about 2,5%-3% annually until the outbreak of the financial crisis in 2008, when the Swiss economy again recorded negative growth rates[12]

[10] Federal Statistical Office of Switzerland. 2010. Foreign Economic Policy Report 2010: World trade during the financial and economic crisis – the repercussions for Switzerland as a business location. Workin Paper Nr. 21755. P.12-13.
[11] (Globaledge. 2013. Online)
[12] (OECD Data. 2013. Online)

Figure 1: Annual Growth Rate



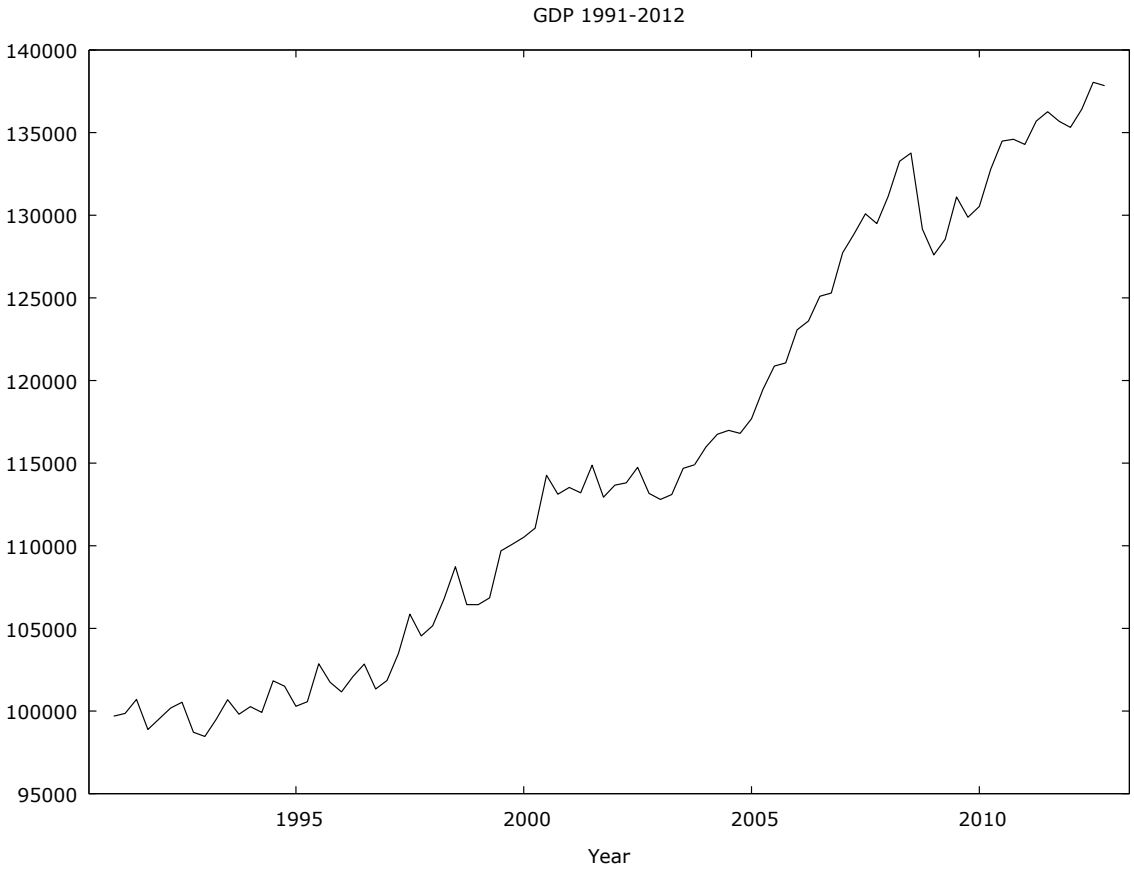
Source: FSO, Statistical Data on Switzerland 2012

The service sector makes up about 70% of the overall GDP and employs around 75% of the active labor force. Within the service sector, the banking sector contributes alone 8% of the Swiss GDP. Transportation, finance and telecommunication sectors have all a positive effect on the overall international trade development, which also has a significant effect to the Swiss GDP growth rate. The tourism sector is a sector which is a balancing tool for the country's trade deficit. Even it has a smaller effect on the macroeconomic aggregate product than other sectors, the tourism sector's impact for the international reputation and promoting issues made the sector indispensable[13].

Specific data about the course of the Swiss GDP are shown in figure 1 and figure 2. There is a bumpy trend in figure 1 until the year 2000. After 2000, the course shows an increasing trend till 2008. After the financial crises, the GDP again shifts to an increasing trend until the end of 2012.

[13] (Banque Libano-Française. 2013. Online)

Figure 2: GDP 1991-2012 (Mio CHF)



Federal Statistical Office, 2013

3.2.3 Employment & Unemployment

In the last decades, unemployment became a global fear factor. The demand for new labor, especially skilled workforce, increases for various sectors. Especially the demand for educated workforce has risen. Therefore, countries commence to invest more in education and human capital[14].

[14] (World Bank: Beyond Economic Growth. 2013. Online) (http://www.worldbank.org/depweb/beyond/beyondco/beg_09.pdf)

In the last two decades, a significant shift from the primary (agriculture) and secondary sectors (industry) to the third (service/tertiary) sector occurred. In 2008, approximately 313.000 companies more counted. These are 11 700 more than in 2005 and 4000 more than in 2001. Since 2001, the number of companies in the industrial sector declined by 400, but grew up in the service sector by 4400. Thus, the proportion of third sector enterprises rose within eight years from 76.2% to 76.6%[15].

According to the Federal Statistical Office of Switzerland**,** most businesses in Switzerland are small or medium-sized. More than 99% of these enterprises are employing fewer than 250 full-time workers (two-thirds of the total work force). About 80% of them are employing less than 10 workers.

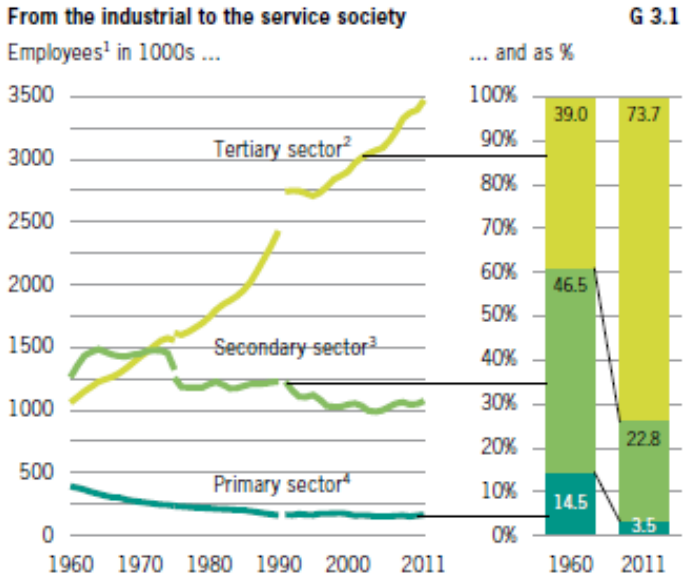
The average size of Swiss companies in Switzerland has not changed between 2001 and 2008 largely. The share of micro-sized companies in the services sector is greater than in the secondary sector (89.5% versus 78.9%). The average size of the companies has changed after 2008. While in the service sector in average 10 employees work in a company, the number of workers in the secondary sector is 15 employees per company. After 2001, big companies employed on average almost two times more employees (1256) in the service sector as in the industrial sector (673).

Two-thirds of the overall workforce is employed in small or medium-sized companies, one third in large companies and almost a quarter are working in micro-enterprises. These are slightly more than one-fifth of

[15] Bundesamt für Statistik. 2013. Panorama: Industrie und Dienstleistungen (Trans.). P.4.

companies where in average 10 to 49 employees are working[16]. In figure 3, a significant growth of the third or tertiary sector can be seen. Whereas the employment in the first and second sectors decline, the employed workforce shifts to the third sector. Compared with 1960, the percentage of people working in the service sector has nearly doubled in 2011. Employment in the second sector has nearly declined two times, whereas in the primary sector declined nearly four times in the period between 1960 and 2011[17].

Figure 3: Employment Changes in Switzerland 1960-2011



Source: Federal Statistical Office of Switzerland

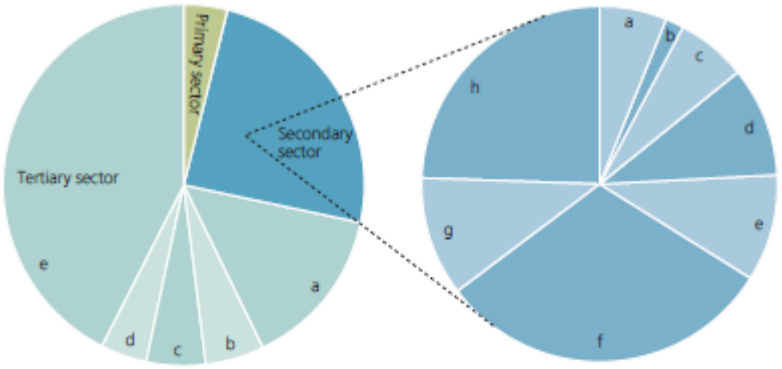
In figure 4, the comparison of the industrial sector to the service sector in year 2012 is illustrated in detail. From the graphic can be observed that about 70% percent of the workforce is employed in the tertiary sector whereas 24% in the industry and 4% are employed in agriculture sector.

[16] Bundesamt für Statistik. 2013. Panorama: Industrie und Dienstleistungen (Trans.). P.1
[17] Bundesamt für Statistik. 2010. Panorama: Employment and Income from Employment. P.1-2.

Trading and banking are according to the graphic, the major subsectors of the tertiary sector. In the forthcoming years, the tertiary sector tends to enhance its importance in the Swiss economy[18]. Even the industry sector is still a significant and important workplace area, through the trend shift to the tertiary sector; this sector will keep on shrinking in the future[19].

Figure 4: Distribution of Jobs per Branch in Switzerland

Jobs per branch of economic activity 2012[8]



Jobs by Sectors

	in 1,000	in %
Primary sector		
Agriculture[12]	**164.1**	**3.9**
Secondary sector		
Industry, crafts	**1,043.4**	**24.5**
Tertiary sector		
Services	**3,046.1**	**71.6**
a) Trade	618.3	14.5
b) Banking, insurance	231.3	5.4
c) Hotel and restaurant business	214.8	5.1
d) Public entities	178.9	4.2
e) Miscellaneous	1,802.8	42.4
Total	**4,253.6**	**100.0**

Jobs Breakdown in the Industrial Sector

a	Food, beverages, tobacco	6.3%
b	Textiles, apparel, shoes	1.5%
c	Chemicals	6.6%
d	Metal processing	9.8%
e	Machinery, equipment, vehicles	9.7%
f	Construction	31.0%
g	Watchmaking, precision instruments	10.7%
h	Miscellaneous	24.4%

Source: Switzerland in Figures, UBS (2013)

[18] Bundesamt für Statistik. 2013. Panorama: Industrie und Dienstleistungen (Trans.). P.3
[19] Brändle, N., Etzensperger, C., Künzi, D. & Vautier, C. Swiss Issues Industries: The Structure of the Swiss Economy 1998–2020. 2010. Credit Suisse Economic Research paper. July 2010. P.7-10

Global financial crises, declining demand, technology-based development or economic recessions may cause the demand for labor negatively. In the last decade, fear of unemployment became also one of the critical topics for Switzerland. In table 1, we can see a summary of unemployment statistics between the years 1991 and 2011 in Switzerland. In the beginning of the 90s, Switzerland has also experienced an economic recession, when the unemployment rate arises to 4%[20]. The situation calmed and the unemployment rate declined until 2000 to 1,8 percent. After 2000, Switzerland undergone like many other developed countries a recession that again decreased the demand-side. The unemployment rate was compared to other OECD countries low in Switzerland. Unemployment rose to 3.9% after the global financial crisis in 2008. After 2010, unemployment rate decreased to 3,0 percent till 2012[21].

Table 1: Unemployment in Switzerland (1991-2011)

Unemployment[1]

	1991	1995	2000	2010	2011
Unemployed	39 222	153 316	71 987	151 986	122 892
Proportion of whom are long term unemployed[2] as %	4.4	28.7	20.1	21.4	20.1
Unemployment rate, %	1.1	4.2	1.8	3.9	3.1
Men	1.0	3.9	1.7	3.8	3.0
Women	1.2	4.8	2.0	3.9	3.3
Swiss	0.8	3.2	1.3	2.8	2.2
Foreigners	2.1	8.0	3.7	7.5	6.1
15–24 years	1.1	3.9	1.8	4.4	3.2

Source: Federal Statistical Office of Switzerland

[20] Federal Statistical Office Switzerland.2013. Employment and income: Labor market indicators for 2013. Research paper Nr. 206-1306-05. P.4-8.
[21] (OECD Data. 2013. Online)

3.2.4 Trade

Switzerland is a wealthy country, which obtains annual budget surplus. Switzerland's strength generally becomes a disadvantage. When the Swiss franc becomes a safe currency for investors, the Swiss francs usually appreciates toward other currencies. This leads to more expensive exports and this again causes a decline in exports of Switzerland, which negatively affects economic growth.

Many Swiss companies extend their competitiveness in global markets. In some sectors, more than 90% of produced goods and services get exported. "The best known export items of Switzerland are watches, chocolate and cheese, but in fact mechanical and electrical engineering and chemicals together account for over half of Swiss export revenues"[22].

Commercial services exports grew by %2 and were about 14.8% of GDP between the years 2005-2011. Net commercial services trade was about 47 Billion $ in 2011. Subsectors grew also in this period. Transportation services exports grew by %8 and was in 2011 6,6 Billion $. Financial service export grew by 3% and rose to 17 Billion $, while insurance service export grew by 9% and was 5,6 Billion $ in 2011[23].

[22] Federal Bureau for Economic Affairs, "Speech of Federal Councillor for Economic Affairs Pascal Couchepin".(2001)
[23] Panorama: Industrie und Dienstleistungen (Trans.). P.4

3.3 Service Sector

The service sector is, compared to the other sectors, more the intangible part of the economy. "People more offer their knowledge and their time to improve productivity, performance, potential, and sustainability"[24]. The production of services instead of end products is certainly the main characteristic of the service sector. Services consist of experience, advice, know-how and counseling. Enormous investments in information technology (IT) made in the service sector during the 1990's, also induce the sector to increasing output and reveal the need of importance to the developing sector[25]. To sum up, the service sector can be defined as information-production sector. People are interacting with people and serving the customer rather than transforming physical goods like in the industry sector.

There are a few opinions about a probable fourth sector, called the quaternary sector. This sector consists of intellectual activities, including government, cultural services, libraries, scientific and academic research, education, and information technology.

The gain of the sector includes provision of services to businesses and consumers. The transport or distribution of a sold good may be subject of services in the wholesaling and retailing sector. Entertainments, providing professional know-how or advice, consulting or providing services like it happens in the gastronomy and tourism sector are all contents of the service sector. There has been an apparent shift from the primary and the secondary sectors to the tertiary

[24] (Princeton University: Tertiary sector of the economy. 2013. Online)
[25] Sharpe, A. 1995. The Productivity Renaissance in the U.S. Service Sector. Centre for the Study of Living Standards. Working Paper. P.8.

sector (service sector) in most industrialized countries. Today, in Europe and U.S.A, the service sector is a large substantial and the fastest-growing sector.

3.4 Service Sector in Switzerland

The economy in Switzerland is divided into three main sectors. The first sector is agriculture also called "Landwirtschaft". Approximately %10 of the Swiss labor force is employed in this sector. Agriculture is supported through subsidies by the government. Another main sector in Switzerland is the industry sector (Industrie). About %40 of the labor hood in Switzerland works in this sector. The industry sector includes important subsectors such as the machine and metal industry ("Maschinen- und Metallindustrie"), watch industry ("Uhrenindustrie") and the textile industry ("Textilindustrie"). Main output products produced in these sectors gets exported to different foreign countries. "A problem" of this sector is the expensive Swiss Franc currency. Additionally, not being a member of the European Union also causes a slow-down of Swiss exportations.

Finally, the most important sector of Switzerland is the service sector, also called "the tertiary sector" (Dienstleistungssektor"). This sector includes subsectors like banking, assurances, tourism, know-how, consultancy etc. Among these subsectors in aggregate, finance is one of the most important sectors in Switzerland[26].

Switzerland has created many large international well-known companies around the world. These small-sized and medium-sized companies play a major

[26] (About.ch. 2013. Online)

role in the development of the Swiss economy. Mainly sophisticated manufacturing industry is operating in Switzerland's economy. Nearly a 25-percent of the working population is employed in the secondary sector (i.e. industry, trade, and crafts). The machine, metal, watch, and textile industries all have an important role, as important as the chemical and pharmaceutical industries. These sectors are strict interconnected to both, import and export. Even though Switzerland is internationally known and associated with its agricultural productions, these sectors are highly dependent on government subsidies. This sector employs only about 3% of the overall workforce. Foreign trade generates an important role in the economic development of Switzerland. The main goods which are imported and exported all around the world are chemicals, machinery, industrial tools, mechanic watches, jewelry, agricultural products, vehicles, textiles, leather, rubber, plastic, and energy. As Switzerland possesses limited natural resources, it is not surprising that the service sector has become a major share in the GDP. During the 1960's, nearly 50% of the workforce was employed by the industrial sector. Through technological development and accelerating globalization, which resulted in outsourcing of manufacturing of low-wage countries, the industry has become more stationary and less dominant. In 2008, about 73% of the workforce was employed by the service sector[27]. The service sector, integrated in the tertiary sector of the overall economy contains subsectors like banking, insurance and tourism etc. These sectors are employing more than 60% of Switzerland's workforce[28].

As a country with a highly qualified labor force, its labor is practicing professional skilled work. The majority of the people working in Switzerland are

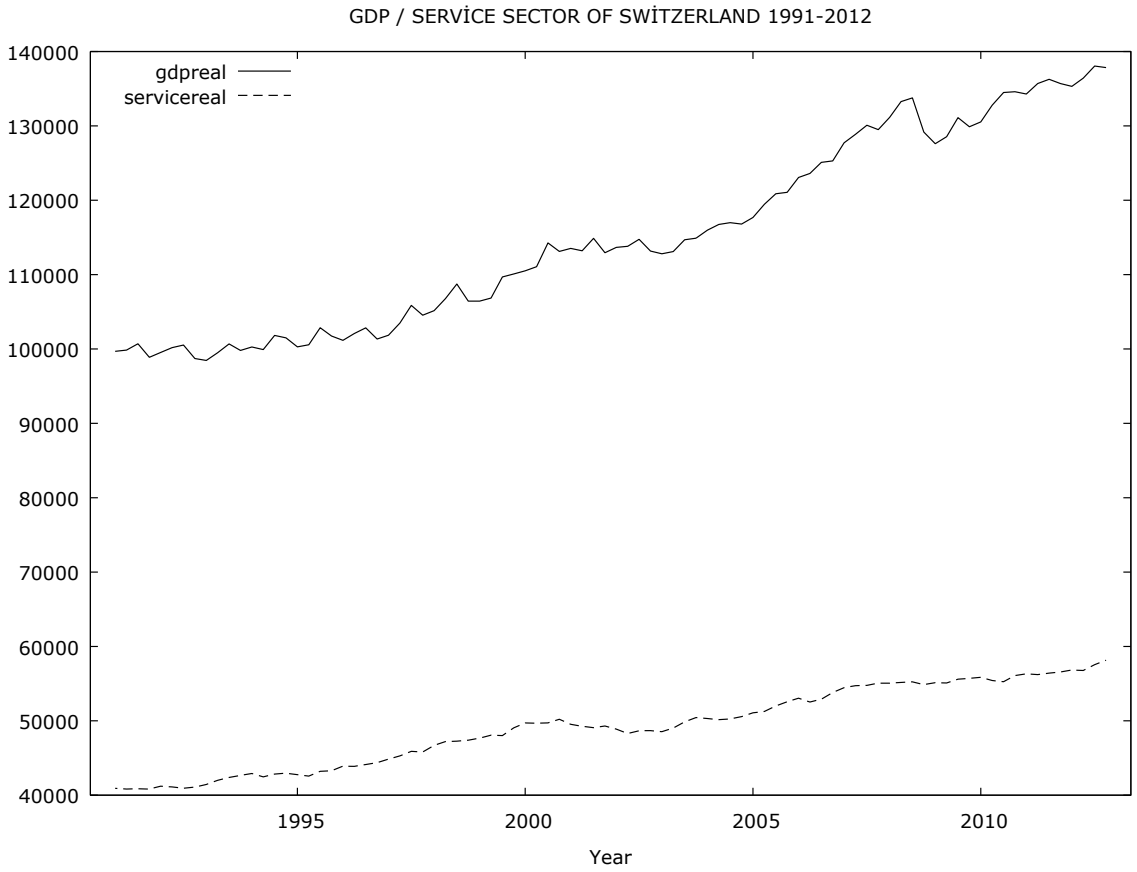
[27] Federal Statistical Office. 2010. Panaroma; Employment and Income from employment. P.1-3.
[28] (İnternations. 2013. Online)

employed by small and medium-sized companies, which play an important role in the overall Swiss economy. Famous as finance center, Switzerland has a stable finance services sector and its' effective subsectors are banking and insurance institutions, in which commercial and private banks have a significant effect and growth potential on the banking sector. Reputation of stability, secrecy, privacy, personalized service, and reliability also has had positive effects for the development of these sectors[29]. A sharp increase in global trade and industrial dealings after the 1940's caused a growth in global operations of commercial banks. Another, just as important as the banking sector, is the insurance industry. There are over 100 insurance companies in Switzerland. Nearly 10 percent of those companies are specialized in the reinsurance business. "Swiss insurance companies have been consistently very strong performers with steadily growing earnings"[30].

The comparison between the Swiss GDP and the total production of the Swiss service sector is shown graphically on figure 5. According to the graphic, the trend of both parameters looks similar. There was a stagnant period during the global financial crisis in 2008. After 2008, the graphic has an upward trend but increases slowly.

[29] (Nationencyclopedia, 2013, Online)
[30] (Nationencyclopedia, 2013, Online)

Figure 5: GDP /Service Sector of Switzerland (1991-2012) [in Mio.CHF]
Source: Federal Statistical Office of Switzerland



Source: Federal Statistical Office of Switzerland

3.5 Financial Sector of Switzerland

The Swiss financial sector, in which the major determinant constitutes the banking sector, has become of great importance for the overall Swiss economy. Swiss financial sector is a leading sector in Switzerland. Furthermore, it has an international importance among the global markets around the World. The Swiss finance sector has an obtainable and significant major effect to the Swiss GDP[31]. Finance accounts for 15% of Switzerland's economic value added, making it one of

[31] Swiss Bankers Association. 2010. The Economic Significance of the Swiss Financial Centre. Swiss Financial Centre Factsheet - SBA, November 2010. P.1.

the most important sectors of the country's economy[32]. A summary can be observed on table 2. We can understand that the influence of insurance companies to added value doubled, while the influence of banks returned to the same level as it was in 2002.

Table 2: Financial Sector of Switzerland (Value Added, CHF mn)

	2002	2007	2012
Financial service activities	32 154	44 746	34 439
Insurance	13 149	22 158	27 822
Total financial intermediaries	**45 302**	**66 903**	**62 261**
Added value as a percentage of GDP	**10,1**	**12,4**	**10,5**
Gross domestic product (GDP) Switzerland	446 786	540 800	591 851

Source: Federal Statistical Office of Switzerland

3.6 Swiss Service Sector compared with other Service Sectors

The trend of developing and enhancing the service sector can be regarded by the overall income level of the countries. As GDP and per capita income rises, agriculture loses its primacy, leaving its place up to the industry sector first and then to a rise in the service sector. Through these periods, people's demand has become less "material" and the needs of agricultural products have declined[33]. People have begun to demand more industrialized goods and more services. In the last decade, the demand for service has risen and the service sector has become more enhanced. Today, as the service sector is growing, almost all developed

[32] Swiss Bankers Association. 2010. Swiss Banking – Roadmap 2015. Financial Centre Factsheet. P.2. The Swiss Banking Sector" Compendium 2010 Swiss Bankers Association 2010
[33] Bundesamt für Statistik. 2013. Panorama: Industrie und Dienstleistungen (Trans.). P.1

countries became less industry-orientated. While the developed countries shift to the service sector, developing and low-income countries still remain industry-oriented or agricultural-dependent. Even in those countries, the service sector enhanced relative to the other sectors[34].

The service sector or tertiary sector, as well as the industry sector, has developed tremendously in the last twenty years. Subsectors of the total service sector like finance, banking, insurance and health rendered more modernized. Upgrades of information technologies, such as modern communication facilities influenced the progress and expansion of the service sector significantly.

The percentage changes of the service sectors of several countries between 1991 and 2011 are listed in table 3. From the table, it can be observed that the expansion of the service sectors in most developed countries were more than fifty percent within twenty years. The United Kingdom experienced a 77% growth of their service sector. The change in Canada's service sector was about 68%, whereas developing countries grew less than 50%.

[34] (World Bank: Beyond Economic Growth. 2013. Online)

Table 3: Change of Service Sectors between 1991-2011

COUNTRY	%Change (1991-2011)
Australia	35,0%
Austria	56,1%
Belgium	53,3%
Brazil	45,0%
Canada	68,5%
China	51,0%
Denmark	57,1%
France	56,1%
Germany	45,0%
India	53,0%
Japan	44,1%
Poland	39,0%
Russia	45,0%
Spain	40,0%
Switzerland	43,5%
Turkey	33,0%
UK	77,0%
USA	62,0%

Source: Central Intelligence Agency Factbook 2012

In table 4, the ratios of the service sector in the GDP and total product of the service sector of some countries are listed. As we can see on table 4, developed countries' service sectors expand in average to more than 60% share of their GDP. The world average lays at about 63%. Some European countries' share of their service sector has exceeded the rate of 70%. Switzerland's service sector stands by 70,6% of the overall GDP. This equals to approximately 260 Billion USD. The highest rate and product of the service sector has the United States. The share of the sector is about 80%, which equals to 12.7 Trillion $, only from the service sector.

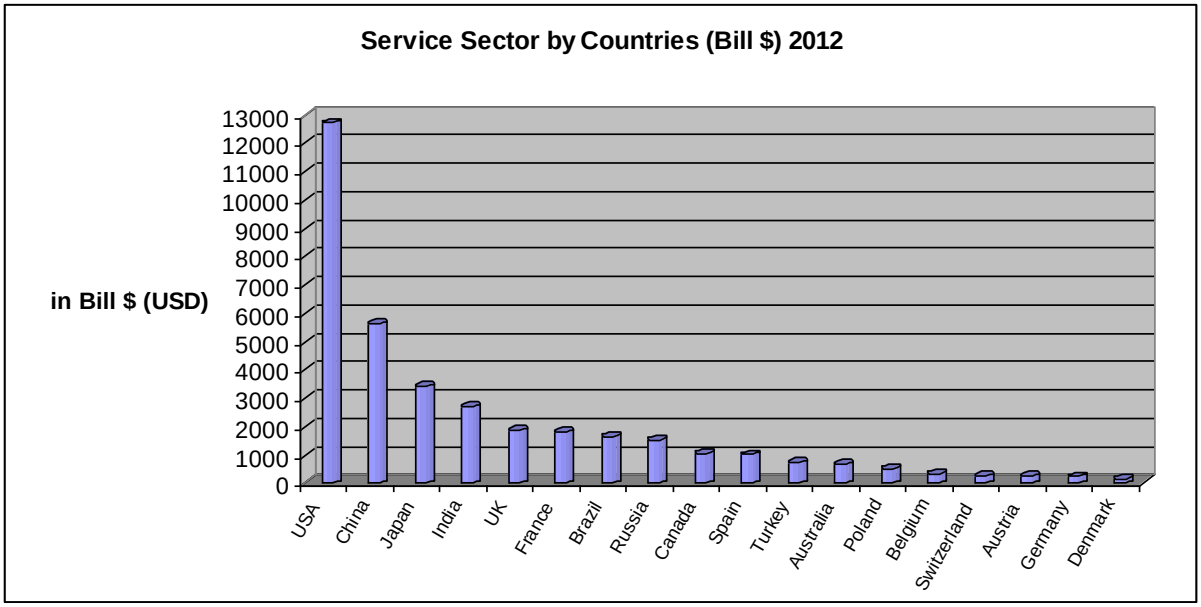
Table 4: Comparison of Service Sectors (2012)

COUNTRY	GDP (PPP) [Bill $ (USD)]	Agriculture (%)	Industry (%)	Service (%)	Service Sector (Bill. $)
World	***84970***	***5,9%***	***30,7%***	***63,4%***	***53871,0***
Australia	986,7	4,0%	27,3%	68,8%	*678,8*
Austria	364,9	1,5%	30,1%	68,4%	*249,6*
Belgium	427,2	0,7%	22,3%	77,0%	*328,9*
Brazil	2394	5,2%	26,3%	68,5%	*1639,9*
Canada	1513	1,7%	25,5%	69,8%	*1056,1*
China	12610	10,1%	45,3%	44,6%	*5624,1*
Denmark	213,6	1,3%	22,1%	76,6%	*163,6*
France	2291	2,0%	18,8%	79,2%	*1814,5*
Germany	325	0,8%	28,0%	71,2%	*231,4*
India	4761	17,4%	26,1%	56,5%	*2690,0*
Japan	4704	1,1%	26,3%	72,5%	*3410,4*
Poland	814	4,0%	32,2%	63,8%	*519,3*
Russia	2555	3,9%	36,0%	60,1%	*1535,6*
Spain	1434	3,3%	26,4%	70,3%	*1008,1*
Switzerland	369,4	1,4%	28,0%	70,6%	*260,8*
Turkey	1142	9,1%	27,0%	63,9%	*729,7*
UK	2375	0,7%	21,0%	78,3%	*1859,6*
USA	15940	1,1%	19,2%	79,7%	*12704,2*

Source: Central Intelligence Agency Factbook 2012

According to the data of the Central Intelligence Agency Factbook 2012, countries' total service sector products are graphically illustrated on figure 6. It can be observed that the United States has the highest level, followed by China, Japan and India. Even these countries' service sectors have lower shares in their GDP than most European countries, their higher national product results in higher service sector production.

Figure 6: Service Sector by Countries



Source: Central Intelligence Agency Factbook 2012

4. EMPIRICAL METHODOLOGY

4.1 Background to Study and Research

In the theoretical part, the increasing impact and expansion of the service sector were demonstrated. Besides the theoretical part, this study tries to investigate whether a short-and long-run relationship exist between the Swiss Gross National Product, the Swiss service sector and the finance sector using country-specific data from the Swiss Federal Statistic Office. Through specific empirical analysis, probable relationships are demonstrated.

4.2 Research Process

In order to reach out the results, the general models were first estimated. Further, stationarity of the individual variables are tested through the Augmented Dickey Fuller (ADF) test and Phillips Perron (PP) test. According to the test results, the number of cointegrating vectors in the system using Johansen's cointegration test is used to calculate the normalized long-run equilibrium equations for Switzerland. Finally the vector error correction model is estimated.

4.3 The Model

The objective of this study is to examine whether a significant relationship between the service sector output, its subsector the financial sector and the Swiss Gross National Product exists. First, a unit root test is applied. If the variables included in the linear regression are non-stationary, then the F test statistic will have non-standard distribution. Any "shock" to a non-stationary series will continue in the system, which will affect the analysis and lead to "spurious" results[35]. On the other hand, the effect of any "shock" will gradually disappear in a stationary series, which makes the results more reliable. For this reason, the stationarity of each variable is required to be examined. To examine the stationarity of each variable, the "Augmented Dickey-Fuller (ADF)" unit root test is applied. This test consists of regressing each series on its own lagged value and lagged difference terms. The ADF test contains the estimation of the following regression:

$$\Delta x(t) = \alpha + \beta t + \delta x(t-1) + \Sigma \Delta x(t-1) + \varepsilon \qquad (1)$$

Where "x" is the test variable, "x(t-1)" is x's own lagged value with coefficient "δ", "Δx(t-1)" is x's lagged difference terms and "ε" is the error term[36].

Variable X is stationary if $\beta=0$ and $|\delta| < 1$; if $\beta=0$ and $\delta = 1$, variable X is I(1) series. Variable X is trend stationary series if $\beta \neq 0$ and $|\delta| < 1$. "The null hypothesis in ADF test is that series contains a unit root against the alternative hypothesis that the series is stationary"[37]. To determine the number of lagged differences, which are required in the regression, the Akaike information criterion

[35] Verbeek, M. 2008. "*A Guide to Modern Econometrics*"; Wiley 3rd ed. RSM Erasmus University, Rotterdam.P.327.
[36] Guan, Z. 2008. The interrelationship between New Zealand stock market and exchange rates. Research paper Auckland University of Technology.P.17.
[37] Gujarati, D. 2003. "*Basic Econometrics*". McGraw Hill 4th edition. P.815.

is used. If the variables have unit root at the level, then their first differences need to be checked. Most financial data are I(1) series and their first differences are usually stationary. After checking the stationarity of variables, the cointegration test and Granger causality test is used to detect the relationship between the Swiss Gross Domestic Product, the Swiss service and finance sector. Engle and Granger developed a concept of cointegration in 1987[38]. Practically, I(1) variables should be differenced to make them to be I(0) ,before including them in linear regression in order to avoid "spurious" results. "Engle and Granger discussed that the regression result of two I(1) variables might not be spurious if these two variables are cointegrated. If y(t) and x(t) are two I(1) variables, a combination of y(t) and x(t), such as $y(t) - \beta x(t)$, is also I(1) for any number β. However there may be a case in which $\beta \neq 0$ and $yt - \beta xt$ is I(0) rather than I(1)" [39]. In such cases, a constant mean, variance and the time distance between any two variables in the series exists, which are the only basis of autocorrelation. If such a β exists, then the series y(t) and x(t) are said to be "cointegrated" and β is the cointegrating parameter. In this case, the result of regression of y(t) on x(t) is not "spurious". "Cointegration indicates long run relationship between two variables. Most financial data are non-stationary and are related to the same influences (e.g. supply demand forces, investors' confidence etc.) which make them move together in time. Therefore, these data are related to each other in the long run"[40].

There are several methods available to run the cointegration tests. Two different methods are used to investigate the interaction between the service sector

[38] Brooks, C. 2002. "*Introductory Econometrics for Finance*". The ICMA Centre, University of Reading. Cambridge University Press 2nd Edition. P.327-329.
[39] Verbeek, M. 2008. P.328.
[40] Gujarati, D. 2003. P.822.

growth and Swiss growth rate. The first method is called "the Engle-Granger test" approach. This method first uses the OLS regression to estimate the parameters of the following model between gross national product and service sector product:

$$y(t) = \beta 1 + \beta 2\ x2(t) + \beta 3\ x3(t) + \ldots.. + u(t) \qquad (2)$$

The second step in this method involves testing the unit root on the residuals of u(t) by estimating the following regression:

$$\Delta u(t) = \psi u(t-1) + \nu(t) \qquad (3)$$

If the results of the unit root test indicate the rejection of the null hypothesis of non- stationarity, we can conclude that the service sector output and growth are cointegrated[41]. In other words, there is a long run relationship between the service sector output and growth. This Residuals-based test is capable of testing at most one cointegrating relationship. If there are several variables in the system, this method will fail to test all the possible cointegrating relationships. For an evidence of cointegration, testing of probable unit roots of the series is a prior condition. Testing for stationarity, the Augmented Dickey-Fuller (1979) test was implemented commonly[42]. A particular problem of unit root tests, such as the Augmented Dickey Fuller and Philipps Perron tests is that they do not allow the possibility of a structural break. Most of the tests are trying to determine whether a structural change is present, which leads to a bias that reduces the ability to reject a false unit root null hypothesis. There is a confusing interaction between unit root and structural changes[43]. To overcome this, Perron (2005) proposed allowing for a

[41] Verbeek, M. 2008. P.329.

[42] Glynn, J., Perera, N. & Verma, R,. 2007. "Unit root tests and structural breaks: a survey with applications". Revista de Métodos Cuantitativos para la Economía y la Empresa = Journal of Quantitative Methods for Economics and Business Administration. Vol:3 No:1. P. 66.

[43] Perron, P. 2005. "Dealing with Structural Breaks". Working Paper. Journal of Appied. Economics Volume. 18. P.1.

known or exogenous structural break in the Augmented Dickey-Fuller (ADF) tests[44]. Glynn, J., Perera, N. & Verma, R. (2007) stressed that "random shocks have permanent effects on the long-run level of macroeconomics". This means that "the fluctuations are not transitory and that the economy returns to deterministic trend after small and frequent shocks"[45]. The Bai-Perron test uses a modified Dickey-Fuller (DF) unit root tests that includes dummy variables to account for one known, or exogenous structural break. To detect structural breaks, the Bai-Perron test is applied. The null hypothesis in this test is "no structural breaks" against the alternative of an unknown number of breaks. Once we get the evidence of a structural break, the Bai-Perron test determines the optimal number of breaks and their time. In addition, a minimum segment interval (in proportion to the total data) is defined. Given this interval, the optimal partition is explored in order to obtain global minimizers of the sum of squared residuals[46]. Another structural break test is the Zivot and Andrews Test (1992). Glynn, Perera and Verma (2007) pointed out that "this test is a sequential test, which utilizes the full sample and uses a different dummy variable for each possible break date. The break date is selected where the t statistic from the ADF test of unit root is at a minimum (most negative). Consequently a break date will be chosen where the evidence is least favorable for the unit root null"[47].

The second method is the Johansen's cointegration test. Guan (2008) indicated that "Johansen's cointegration test uses the maximum likelihood

[44] Perron, P. 2005. "Dealing with Structural Breaks". Working Paper. Journal of Appied. Economics Volume. 18. P.1-2.
[45] Glynn, J., Perera, N. & Verma, R,. 2007. P.75-76.
[46] Bai, J. & Perron., P. 2003. "Computation and Analysis of Multiple Structural Change Models". Journal Of Applied Econometrics Vol: 18. P.2-7.
[47] Glynn, J., Perera, N. & Verma, R,. 2007. P.75-78.

estimation in a VAR model. There are two statistics generated by this method: the trace statistic and maximum Eigenvalue. The trace statistic tests the null hypothesis that there is at most r number of cointegrating vectors against hypothesis of r or more than r number of cointegrating vectors. The maximum Eigenvalue statistics tests for r number of cointegrating vectors against the hypothesis of r + 1 number of cointegrating vectors"[48] The Johansen's cointegration test will show if there exists a long run relationship between the Swiss service sector output and growth. Granger (1969) as cited by Gujarati (2003) stated that "there are two possible situations in the examination of short run relationship. The first situation is that the two variables are cointegrated in long run, and second situation is they are not cointegrated. If two variables are not cointegrated, we can apply the Granger causality test to check the short run relationship between variables"[49]. The Granger causality test checks whether variable Y's current value can be explained by its own past value and whether the explanatory power could be improved by adding the past value of another variable X. If the coefficient of X is statistically significant, X is said to Granger cause Y. The model for Granger causality test is as following:

$$Yt = \alpha 0 + \Sigma \alpha k Y(t-k) + \Sigma \beta t X(t-k) + u \quad (4)$$

$$Xt = \varphi 0 + \Sigma \varphi k X(t-k) + \Sigma \omega t Y(t-k) + v \quad (5)$$

Where α, β, φ and ω are the coefficients of X and Y, u and v are residuals with the mean equals to zero and $\sigma^2 < \infty$. The null hypothesis that X(t) doesn't

[48] Guan, Z. 2008. P.18.
[49] Gujarati, D. 2003. P.823.

Granger-cause Y(t) is rejected if β(t)'s, k>0 in equation (4) are jointly significantly different from zero by using the F-test. The null hypothesis that Y(t) doesn't Granger-cause X(t) is rejected if ω(t)'s, k>0 in equation (5) are jointly significantly different from zero by using F-test. If both β(t)'s, k>0 and ω(t)'s, k>0 are jointly significantly different from zero, then there is bi-directional causality between X and Y[50]. The first difference of log of Swiss GDP, service and finance sector are used to perform Granger causality test. The equation (6), (7) and (8) will be like:

$$\Delta GDP(t) = \alpha(0) + \Sigma\alpha(k)\, \Delta GDP(t-k) + \Sigma\beta t\, \Delta SERVICE(t-k) + u \quad (6)$$

$$\Delta SERVİCE(t) = \varphi(0) + \Sigma\varphi(k)\, \Delta SERVICE(t-k) + \Sigma\omega(t)\, \Delta GDP(t-k) + v \quad (7)$$

$$\Delta GDP(t) = \varphi(0) + \Sigma\varphi(k)\, \Delta FINANCE(t-k) + \Sigma\omega(t)\, \Delta GDP(t-k) + v \quad (8)$$

Another possible situation is that the both variables are cointegrated. "If the two variables are cointegrated, then there must be either uni-directional or bi-directional causality"[51]. An Error Correction Term is required as extra explanatory variable to correctly specify the Granger test. Error Correction Term is the residual generated from the cointegrating regression. The model becomes as following:

$$\Delta GDP(t) = \alpha(0) + \Sigma\alpha(k)\Delta GDP(t-k) + \Sigma\beta t\Delta SERVICE(t-k) + \lambda ECT(t-1) + u \quad (9)$$

$$\Delta SERVICE(t) = \varphi(0) + \Sigma\varphi(k)\, \Delta SERVICE(t-k) + \Sigma\omega(t)\, \Delta GDP(t-k) + \chi ECT(t-1) + v \quad (10)$$

[50] Engle., R. F. R. & Granger., C. W. J. Co-Integration and Error Correction: Representation, Estimation, and Testing. Econometrica, Vol. 55, No. 2. (Mar., 1987), pp. 251-276.
[51] Brooks, C. 2002. P.298.

The ECT(t-1) in equation (9) is the residual from the cointegrating regression, where Gross National Product of Switzerland is the dependent variable and Swiss service sector variable is the independent variable, and the ECT(t-1) in equation (10) is based on the model with service sector as the dependent variable. If λ and χ are statistically significant, then it means that gross national product adjust towards their long-run levels.

5. THE EMPIRICAL OUTLOOK

5.1 Unit Root Test

For empirical testing, we need to know whether a time series is stationary or non-stationary. The 'stationarity' of variables can be tested by unit root tests called (a) the Augmented Dickey-Fuller test (ADF test) and (b) the Phillips-Perron test (PP test). If the variables are found to be stationary, then the standard regression method can be applied to estimate the given relationship. If, however, the variables are found to be non-stationary in their levels, then one has to apply the co-integration tests[52].

5.2 Co-integration Test

If the variables in the model are found to be non-stationary, then we will apply the Johansen co-integration test. This test contains estimating the long-run relationship by the standard regression method and then the residuals are recovered for co-integration tests. These residuals are then tested for stationarity by applying the ADF and the PP unit root tests. If these tests expose that the residuals are stationary in their levels, then the variables in the long-run model are considered as "co-integrated". This would mean that they share a common trend, even though the variables in the model are individually non-stationary. Additionally, structural break tests are investigated through the Bai-Perron and the Zivot and Andrews Test. Perron (1989) investigates the null hypothesis of unit root under the assumption of a known break date (exogenous) in the null and alternative

[52] Verbeek, M. 2008. P.329.

hypothesis. Waheed, Alam and Ghauri (2007) stressed that "Zivot and Andrews propose a variation of Perron's original test in which they assume that the exact time of the break-point is unknown"[53]. If the residuals are found to be "non-stationary", this would mean that the relationship does not hold. The reason for this is explained by Islam and Ahmet (1999) as "any short-run deviation from the relationship will be cumulative and permanent and that the variables will not have a common trending relationship"[54].

5.3 Co-integration Tests: Johansen Test

The Johansen Test allows us to estimate the system containing two or more variables to solve the problems. Further, this method is independent of the choice of the endogenous variable and it allows to estimate and test for the presence of more than one co-integrating vector in the multivariate system. The Johansen Method of Co-integration test also allows researchers to estimate and test for the presence of more than one co-integrating vector(s) in the multivariate system. The test for cointegration is calculated by looking at the rank of the matrix via its eigenvalues. The rank of a matrix is equal to the number of its characteristic roots (eigenvalues) that are different from zero. If the test statistic is greater than the critical value from Johansen's tables, the null hypothesis gets rejected that there are *r* cointegrating vectors in favor of the alternative that there are more than *r*[55].

[53] Waheed, M., Alam, T. & Ghauri, G. 2007. Structural Breaks And Unit Root: Evidence From Pakistani Macroeconomic Time Series. Munich Personal RePEc Archive Paper No. 1797. P. 1-18.
[54] Islam, A. & Ahmed, S. 1999. The Purchasing Power Parity Relationship: Causality and Cointegration Tests Using Korea-U.S. Exchange Rate and Prices. Journal of Economic Development (December 1999) Vol:24 Nr.2. P.11.
[55] Hjalmarsson, E. & Österholm, P. 2007. Testing for Cointegration Using the Johansen Methodology when Variables are Near-Integrated. IMF Working Paper Nr. WP/07/141. P.5-7.

5.4 Error Correction Model

If cointegration has been detected between series, the Vector Error Correction Model (VECM) is used to analyze if disequilibrium state will be adjusted to equilibrium in the short run[56]. The error-correction mechanism (ECM) developed by Engle and Granger in 1987[57]. The equation of VECM in our model is as follows:

$$\Delta \ln GDP_t = \alpha + \beta 1 \Delta \ln SERVICE_t + \beta 2 u_{(t-1)} + \varepsilon t \qquad (11)$$

$$\Delta \ln GDP_t = \alpha + \beta 1 \Delta \ln FINANCE_t + \beta 2 u_{(t-1)} + \varepsilon t \qquad (12)$$

The parameters of the ECM model are estimated by using the residuals from the first-step OLS regression. "A negative and significant coefficient of the ECM indicates that any short-term fluctuations between the independent variables and the dependent variable will give rise to a stable long run relationship between the variables[58]".

[56] Asari, F.F.H., Baharuddin.,N.S., Jusoh.,N., Mohamad. Z., Shamsudin.,N. & Jusoff.,K. 2011. Vector Error Correction Model (VECM) Approach in Explaining the Relationship Between Interest Rate and Inflation Towards Exchange Rate Volatility in Malaysia. World Applied Sciences Journal 12 (Special Issue on Bolstering Economic Sustainability). P.49-56. (ISSN 1818-4952). P.53.
[57] Zivot, E. 2005. Cointegration. Lecture Notes-University of Washington (USA). P.440.
[58] Asari, F.F.H., Baharuddin.,N.S., Jusoh.,N., Mohamad. Z., Shamsudin.,N. & Jusoff.,K. 2011. P.53.

5.5 Granger Causality Test

The Granger causality test examines if past changes in one variable X help to explain current changes in another variable Y. The application of the Granger test requires that the variables X and Y are stationary[59]. Four possible outcomes are possible in the test:

(1) Unidirectional causality: X Granger causes Y , but not vice versa

(2) Unidirectional causality: Y Granger causes X , but not vice versa

(3) Bi-directional causality: X Granger causes Y and Y Granger causes X

(4) Independence: neither variable Granger causes the other

[59] Zia, Q.Z. 2011. The Causality between Stock Market and Foreign Exchange Market of Pakistan. İnterdisciplinary Journal of Contemporary Research in Business September /2011 Vol 3, No 5. P.906-919 (912).

6. DATA, SOURCES, SAMPLES & BASIC FACTS

Three data sets are used in this study. The first one contains gross national product of Switzerland, the second one the income of the Swiss service sector the third contains the financial sector as a subsector of the Swiss service sector is used in the analysis. The annual data of the gross national product of Switzerland in terms of Swiss francs (CHF) and Swiss service sector production (SERVICECH) and finance sector (FINANCECH) are collected from its official sources for the time period from the first quarter of 1991 to the last quarter of 2012. There are 88 observations of each variable used in this study. Table 5 shows the descriptive statistics of "GDPREAL", "SERVICEREAL" and "FINANCECH". According the mean levels, it can be seen that the finance sector makes up approximately 50% of the overall service sector.

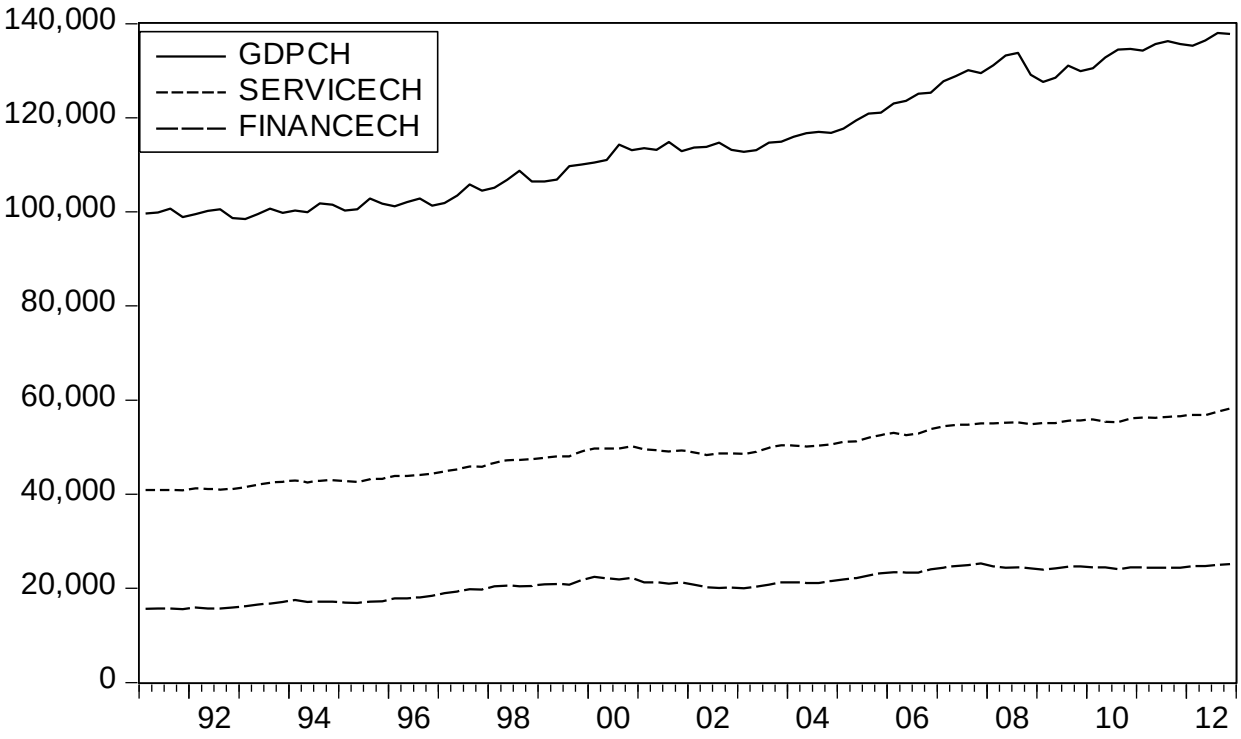
Table 5: Summary statistics,
Using the observations 1999:01 - 2012:04 for the variable "GDPCH" (88 valid observations), "SERVICECH" (88 valid observations) and "FINANCECH (88 valid observations)

	GDPCH (MIO. CHF)	SERVICECH (MIO. CHF)	FINANCECH (MIO. CHF)
Mean	115096.9	49163.57	20914.75
Median	113366.4	49286.44	21110.5
Minimum	98459.50	40827.03	25277,00
Maximum	138047.8	58146.65	15556,00
Standard deviation	12788.73	5.252.765	3050,9702
Skewness	0.332013	-0.075878	-0,2912
Ex. Kurtosis	1,7268	1,7552	1,8289

Source: Federal Statistical Office of Switzerland

The observations used in the analysis are statistical data of Switzerland between 1990-2008. The gross domestic product (GDPREAL) is used to expose the size and growth of the macro-economic aggregate. The service industry (SERVİCEREAL) is used to highlight the growth and development of the Swiss service industry. Finally the subsector variable FINANCE is used to demonstrate the Swiss financial sector as an effective subsector. The GDP and Service sector index of the year 2005 is taken as the basis year. The influence of price changes gets eliminated through this practice. In addition, taking the natural logarithm transformation of data may linearize the trend and eliminate time-series heteroscedasticity. The natural logarithm transformations are generated with LNGDPCH, LNSERVICECH and LNFINANCE. Specific data are shown on figure 7. According the graphic, it can be seen that the finance and service sector follow proportionally a similar trend. All three variables display an upgrading trend except in the year 2009, when Switzerland recorded a downturn in the GDP.

Figure 7: GDPCH, SERVICECH & FINANCECH of Switzerland (1991-2012)



Source: Federal Statistical Office of Switzerland

7. EMPIRICAL RESULTS

7.1 OLS

The first analysis is a simple OLS test. When we regress "LNREALSERVICE" to the dependent variable "LNGDPREAL", we obtain the results listed on table 6. As the parameters are both in terms of logarithms, the coefficients should be interpreted in percentage and elasticity's. As we can see in the table, the parameter "LNREALSERVİCE" is statistically significant. β-value lays by 0,99. That means if the service sector change by one percent, we would expect Swiss GDP to change by 0,99 percent. The R-squared and Adjusted R-squared are both around 95%. So the model explains 95% of all variation in the Gross National Product of Switzerland. The Durbin-Watson statistic in this analysis records a low level. When DW-statistics converges to zero, there is evidence of probability that the two parameters are cointegrated. For this reason, the series are analyzed whether they are stationary or non-stationary by using Augmented Dickey-Fuller test (ADF test) and (b) the Phillips-Perron test (PP test).

Table 6: OLS test

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.935457	0.258864	3.613702	0.0005
LNSERVICECH	0.992116	0.023974	41.38310	0.0000
R-squared	0.952184			
Durbin-Watson stat	0.258202			

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3091.529	2363.252	1.308167	0.1944
TOURISMTRADE	1.554567	0.083848	18.54035	0.0000
OTHERSERVICE	1.573417	0.190619	8.254234	0.0000
FINANCE	1.073509	0.085493	12.55667	0.0000
R-squared 0.995143				
Durbin-Watson stat 1.292574				

Source: Federal Statistical Office of Switzerland

7.2 Unit Root Test (ADF)

To examine the stationarity of each variable, the "Augmented Dickey-Fuller (ADF)" unit root test and the Phillips-Perron test (PP test) tests are applied. Figure 7 shows explicitly an upward trend of the two variables, which are non-stationary time series. Non-stationarity of economic variables might cause "spurious regression" problem for the equations which are estimated. To obtain consistent, confident results, the non-stationary data needs to be transformed into stationary data.

Unit root test for GDPCH, SERVICECH, FINANCECH and their logarithmic forms through ADF and PP-test are applied. The results are shown on table 7. According the results (LN) GDPCH, (LN) SERVICECH and

LN(FINANCECH) are both non-stationary in their levels and trend stationary in their levels. "A trend stationary variable is a variable whose mean grows around a fixed trend. This provides a classical way of describing an economic time series which grows at a constant rate[60]." According the test results, the calculated t-statistic compared with the critical "tau" value at 10%, 5%, 1% significant level, we cannot reject the Ho at 1% significance level, that Ho: $\beta=0$ (Non-Stationary or Unit Root). This means that the LNGDPCH, LNSERVICECH and LNFINANCECH series have a unit root problem and the series are a non-stationary series. This outcome matches with the expectation subjected to the line graph in figure 8.

If the variables have unit root at their level, then their first differences need to be checked. The first-difference results are also shown on table 7. The calculated ADF test-statistic is now smaller than the critical values - "tau", therefore we can reject Ho. This means that the LNGDPCH, LNSERVICECH series don't have a unit root problem and both series are stationary series at 1%, significant level. LNGDPCH, LNSERVICECH and LNFINANCECH series are I(1) series. The same results are obtained through the Phillips-Perron Test, which is an asymptotic similar test like the Augmented Dickey Fuller Test. According the PP-Test results, the series are all stationary at 1% significant level and are all I(1) series. These outcomes matches also with the expectation subjected to the line graph on figure 8.

[60] Beckert.,W. 2011. Non-Stationary Series. Lecture-Notes Birkbeck University of London. P.1.

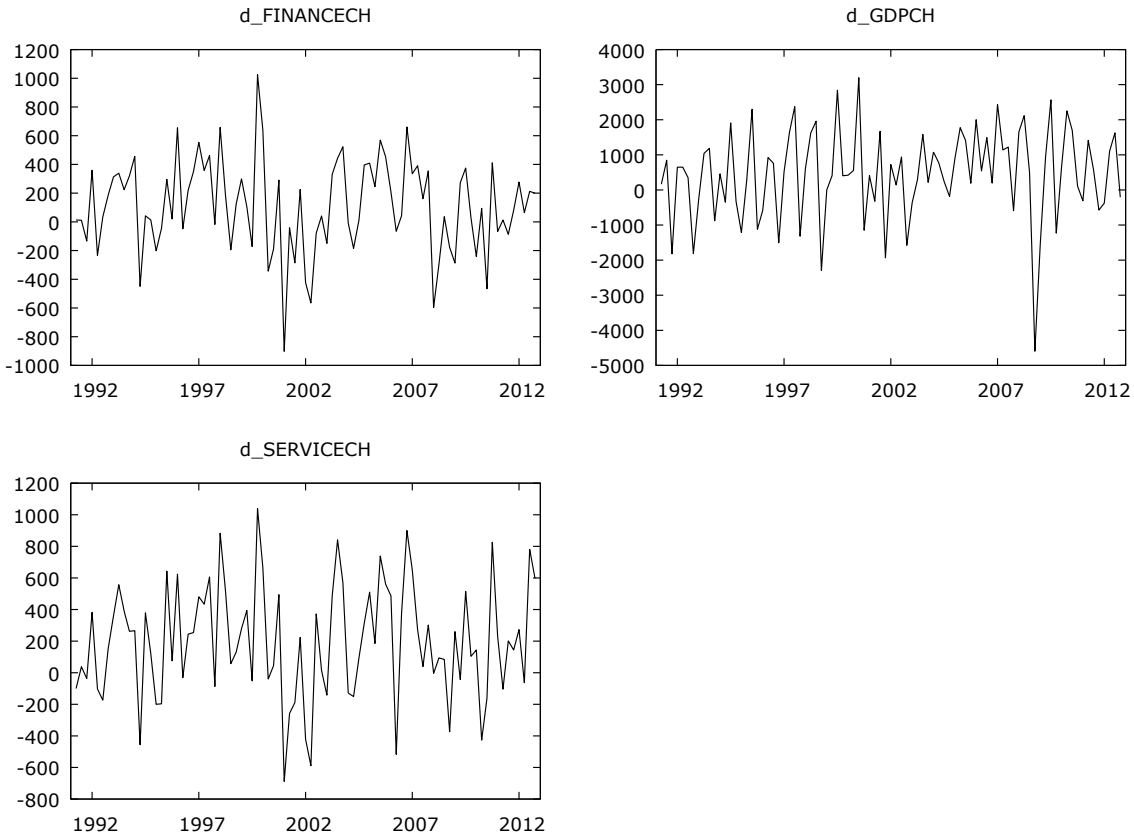
Table 7: Results of Unit Root Tests

	ADF TEST			PP TEST		
VARIABLE	**Level**	**1st-Difference**	**2nd-Difference**	**Level**	**1st-Difference**	**2nd-Difference**
LNGDP_CH	3,71676	-6,12679*	-19,41534	4,20675	-8,83440*	-26,54518
LNSERVICE_CH	3,87132	-3,35763*	-10,10386	4,76423	-6,55404*	-18,78805
LNFINANCE_CH	3,21989	-7,24294*	-9,09207	2,74251	-7,50388*	-19,42344
GDP_CH	3,70764	-5,97100*	-18,83935	4,21287	-8,50134*	-24,95811
SERVICE_CH	3,86242	-3,34366*	-10,11210	4,74222	-6,46449*	-18,43037
FINANCE_CH	2,92846	-7,23818*	-9,15258	2,47168	-7,33455*	-19,01700

* indicate rejection of null hypothesis of non-stationarity at 1%, level of significance.

Source: Federal Statistical Office of Switzerland

Figure 8: First Difference of GDP, Service and Finance Sector of Switzerland (1991-2012)



Source: Federal Statistical Office of Switzerland

7.3 Structural Break Test

To test for unit root, which allows one endogenous determined structural break, the Zivot-Andrews test is used. The series LNGDPCH-LNSERVICECH GDPCH-SERVICECH, GDPCH-FINANCECH and LNGDPCH-LNFINANCECH under the period 1991:1 to 2012:4 are estimated. The results are shown on table 8.

Table 8: Zivot- Andrews Test

Zivot-Andrews test			
Variable	**BREAKPOINT**	**TEST.STAT.**	
LNGDP_CH	2006Q3	-3,8057	
LNSERVİCE_CH	2001Q1	-3,7064	
LNFİNANCECH	2001Q1	-3,3537	
ΔLNGDP_CH	2009Q1	-5,3283	**
ΔLNSERVİCE_CH	2000Q3	-8,6728	*
ΔLNFİNANCECH	2000Q2	-8,6310	*
GDP_CH	2005Q2	-4,6025	
SERVİCE_CH	2001Q1	-3,9533	
FİNANCE_CH	1996Q1	-3,4710	
ΔGDP_CH	2008Q4	-5,5125	**
ΔSERVİCE_CH	2000Q2	-8,5460	*
ΔFİNANCE_CH	2000Q2	-8,4901	*

Significant at the * 0.01 level. ** 0.05 level

Source: Federal Statistical Office of Switzerland

The break date is chosen where the t-statistic is the most significant. This is the level, where the t-statistic from the Augmented Dickey Fuller test of unit root is at a minimum rate. The break date occurs where the strongest evidence against the null hypothesis of unit root is. The null hypothesis of unit root could not be rejected

under the assumption of a structural break by taking the level series. By taking the difference of the series, the null hypothesis of unit root could be rejected under the assumption of a structural break. The results obtained do not implicate a 100 percent verity. The Zivot-Andrews test set the breakpoint date for the Swiss GDP at the end of 2008 and the beginning of 2009. This was the time period, when the global financial crises occur and Switzerland recorded negative growth rate and a slowdown in the economy. The Zivot-Andrews test indicates the breakpoint date for the Swiss service and finance sector in the year 2000. The reason of the different breaking points might be that there exists more than one single break in the series. Through the Bai-Perron test unit root can be tested under the assumption of multiple structural breaks in the series. The test starts by testing for a single structural break. If the test rejects the null hypothesis that there is no structural break, the sample continues with two and the test is repeated. This process continues until the test fails to find evidence of a break[61]. The results are listed on table 9 and 10.

[61] Bai, J. & Perron., P. 2003. P.1-4.

Table 9: Bai-Perron Test

BAI PERRON (MULTIPLE BREAKPOINT) TEST					BREAK DATES		
Variable	**Break Test**	**F-statistic**	**Scaled F-statistic**	**Crit. Value ****	**Break Date**	**Sequential**	**Repartition**
LNGDPCH - LNSERVICECH	0 vs. 1 *	133,0004	266,0008	11,47	1	2000Q3	1997Q2
	1 vs. 2 *	11,7366	23,4732	12,95	2	2004Q1	2000Q3
	2 vs. 3 *	7,8136	15,6271	14,03	3	1997Q2	2004Q1
LNGDPCH - LNFINANCE	0 vs. 1 *	122,2429	244,48580	11,47	1	2001Q1	1996Q4
	1 vs. 2 *	28,3960	56,79200	12,95	2	2008Q2	2001Q1
	2 vs. 3 *	10,4569	20,91383	14,03	3	1996Q4	2008Q2
GDPCH - SERVICECH	0 vs. 1 *	117,6623	235,32460	11,47	1	2000Q3	2000Q3
	1 vs. 2 *	11,6851	23,37016	12,95	2	2004Q1	2004Q1
GDPCH - FINANCE	0 vs. 1 *	95,6462	191,29250	11,47	1	2001Q1	2001Q1
	1 vs. 2 *	34,9902	69,98037	12,95	2	2008Q2	2008Q2

Bai-Perron tests of L+1 vs. L sequentially determined breaks
* Significant at the 0.05 level
** Bai-Perron (Econometric Journal, 2003) critical values

Source: Federal Statistical Office of Switzerland

Another widely implemented procedure for the selection of number of structural breaks of the series is by the information criterion. Bai and Perron (2003) pointed out that "in the test whether there exist a break or not, the the Bayesian Information Criterion (BIC) and a modified Schwarz criterion (LWZ) is used. The LWZ performs better under the null of no break but underestimate the number of breaks when some are present"[62]. The outcomes of the information criterion are illustrated on table 10.

[62] Bai, J. & Perron., P. 2003. P.15.

Table 10: Multiple Breakpoint Test

	Breaks	Estimated Break Dates				
LNGDPCH-LNSERVICECH	1	2000Q3				**
	2	2000Q3	2004Q1			
	3	1997Q2	2000Q3	2004Q1		*
GDPCH-SERVICECH	1	2000Q3				**
	2	2000Q4	2004Q1			*
LNGDPCH-LNFINANCE	1	2001Q1				
	2	2001Q1	2008Q2			
	3	2000Q2	2003Q3	2008Q2		**
	4	1997Q2	2000Q3	2004Q1	2008Q2	*
GDPCH-FINANCE	1	2001Q1				
	2	2001Q1	2008Q4			**
	3	2000Q3	2004Q1	2008Q2		*

Information Criterion * BIC ** LWZ

Source: Federal Statistical Office of Switzerland

According to table 9, the Bai-Perron test obtained three structural breaks in the series LNGDPCH-LNSERVICECH and LNGDPCH-LNFINANCECH, whereas in the series GDPCH-SERVICECH and GDPCH-FINANCECH, two structural breaks were estimated. The estimated break points took place in the period of recessions, when Switzerland registered negative growth rates and a slowdown in their economy. The Bai-Perron test determined three structural breaks in the LN-models and two breaks in the level models. The modified Schwarz criterion (LWZ) obtained one break in the series (LN) GDPCH-(LN) SERVICECH and two breaks in the GDPCH-FINANCECH model. In contrast, the Schwarz criterion estimated two breaks in GDPCH-SERVICECH model and three breaks in the GDPCH-FINANCECH model. According to the results of table 9 and 10, the evidence of more than one structural break is significant in these cases.

7.4 Co-integration Test: Johansen Method

A linear combination between Swiss GDP and the Swiss service sector output might exist. It is possible to have evidence of long-run causality between the series, called a cointegration relationship.

To choose the optimal lag length for the Johansen-test, there are few tests such as the Akaike Information Criterion, Schwarz Bayesian Criterion analysis and Hannan-Quinn information criterion[63]. The model that minimizes one or more information criteria is chosen for the analysis. In our model, the Schwarz Bayesian Criterion indicates lag order selection of five for LNGDPCH-LNSERVICECH, seven for GDP-SERVICE, six for GDP-FINANCE and seven lags for the LNGDP-LNFINANCE model.

Through trace test and the maximum eigenvalue criteria, the number of cointegrating equations is tested. There is a summary of cointegration equations represented on table 11. According to the results, it can be seen that the evidence of "no cointegration" is far more plausible than the evidence of cointegration. The existence of two cointegrating equations in a two-variable model is not significant. There are three cases, where the trace test indicates one cointegrating equation between two variables. Among the series GDPCH-SERVICECH, GDPCH-FINANCECH and LNGDPCH-LNFINANCECH, one cointegrating equation is obtainable in the models with "no deterministic trend" and "without intercept".

[63] Brooks, C. 2002. P.329.

Table 11: Cointegration Equations (Summary)

	Data Trend:	None	None	Linear	Linear	Quadratic
	Test Type	No Intercept	Intercept	Intercept	Intercept	Intercept
		No Trend	No Trend	No Trend	Trend	Trend
LNGDPCH - LNSERVİCECH	Trace	2	2	0	0	0
	Max-Eig	0	0	0	0	0
GDPCH - SERVİCECH	Trace	0	1	0	0	0
	Max-Eig	0	0	0	0	0
LNGDPCH - LNFINANCECH	Trace	2	1	0	0	2
	Max-Eig	2	0	0	0	0
GDPCH - FINANCECH	Trace	2	1	0	0	0
	Max-Eig	2	0	0	0	0

Source: Federal Statistical Office of Switzerland

To compute normalized cointegrating coefficients, the cases with “one cointegrating equation” are tested through the Johansen test. The results of the test are listed in table 12 and 13. Based on table 12, the results indicate two cointegrating equations at the 0.05 level between the variables LNGDPCH-LNSERVICECH and one cointegrating equation at the 0.05 level in the models GDPCH-SERVICECH, GDPCH-FINANCECH and LNGDPCH-LNFINANCECH. In all cases, the "trace statistic" exceeds its critical values at 5%. The trace test rejected the null hypothesis at the 0.05 level that there is no cointegration among the variables.

Table 12: Johansen Test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	Critical Value(0.05)	Prob.**
LNGDPCH LNSERVICECH (INTERCEPT/NO TREND)				
None *	0.106074	17.36542	12.32090	0.0066
At most 1 *	0.099618	8.394856	4.129906	0.0045

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

GDPCH SERVICECH (INTERCEPT/NO TREND)				
None *	0.140580	20.43283	20.26184	0.0474
At most 1	0.098696	8.313002	9.164546	0.0724

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

GDPCH FINANCECH (INTERCEPT/NO TREND)				
None *	0.167840	21.18989	20.26184	0.0372
At most 1	0.074918	6.307713	9.164546	0.1683

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

LNGDPCH LNFINANCECH (INTERCEPT/NO TREND)				
None *	0.168112	22.20149	20.26184	0.0267
At most 1	0.089227	7.476907	9.164546	0.1034

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

Source: Federal Statistical Office of Switzerland

Through the Johansen test, long-run normalized coefficients are obtained. Adjustment coefficients can be interpreted exactly the same way as the error correction term of the error correction model. The normalized coefficient of the service sector comes out with a negative sign. The Coefficient of LNSERVICECH come out -1,086306. This situation also satisfies economic intuition. The adjustment coefficients yield both negative values. According to the results shown on table 13, model indicates that when the Swiss service sector rises by about 1%, the GDP rises then by 1,08%. Further, by an increase of the Swiss finance sector by

1%, the GDP rises by 1,13%. In the level models, it can be interpreted that an increase by one unit of the Swiss sector causes an increase in the Swiss GDP by 3,049 units and an 7,39 unit increase when the Swiss finance sector goes up by one unit.

Table 13 : Normalized Cointegrating & Adjustment Coefficients

NORMALIZED COINTEGRATING COEFFICIENTS (STD.ERROR)		**ADJUSTMENT COEFFICIENTS (STD.ERROR)**	
LNGDPCH	**LNSERVICECH**	**D(LNGDPCH)**	**D(LNSERVICECH)**
1.000000	-1.086.306	-0.043544	-0.042604
	(0.00270)	(0.01882)	(0.01863)
GDPCH	**SERVICECH**	**D(GDPCH)**	**D(SERVICECH)**
1.000000	-3.049.910	-0.094355	0.000205
	(0.23574)	(0.03253)	(0.01421)
GDPCH	**FINANCECH**	**D(GDPCH)**	**D(FINANCECH)**
1.000000	-7.399.048	-0.037057	0.002873
	(1.02657)	(0.01120)	(0.00423)
LNGDPCH	**LNFINANCECH**	**D(LNGDPCH)**	**D(LNFINANCECH)**
1.000000	-1.135.015	-0.051511	0.017875
	(0.14133)	(0.01580)	(0.03394)

Source: Federal Statistical Office of Switzerland

7.5 Error Correction Model

The equation of VECM in our model is as follows:

$$\Delta \ln GDP_t = \alpha + \beta 1 \Delta \ln GDP_{t(-1)} + \beta 2 \Delta \ln SERVICE_{t(-1)} + \beta 3 u_{(t-1)} + \beta 4 \Delta \ln GDP_{t(-2)} + \beta 5 \Delta \ln SERVICE_{t(-2)} + + \beta 6 u_{(t-2)} + \beta 7 \Delta \ln GDP_{t(-3)} + \beta 8 \Delta \ln SERVICE_{t(-3)} + \varepsilon t$$

The residuals in the model are stationary in their levels. The regression is estimated for the Error correction model. The Johansen-test indicates two integrating equations between LNGDPCH and LNSERVICECH. This means that

the rank of the matrix is two. In the other three models the ranks are one. Lag selection is according information criterion again chosen as five for the first model, seven lags for the GDPCH-SERVICE LNGDPCH-LNFINANCECH and lastly six lags for the model LNGDPCH-FINANCECH. The long run relationship results between the Swiss GDP, the Swiss service and finance sector for cointegrating vectors for Switzerland in the period 1991-2012 are displayed on Table 14.

Table 14: Error Correction Mechanism

Variables	EC	Coefficient	Std. Error	t-ratio	p-value	
LNGDPCH - LNSERVICECH	EC1	-0.0819692	0.0466487	-17.572	0.08353	*
	EC2	-0.024113	0.0489361	20.916	0.04033	**
GDPCH - SERVICECH	EC1	-0.0764682	0.0306435	-24.954	0.01505	**
GDPCH - FINANCECH	EC1	-0.0413243	0.0139008	-29.728	0.00404	***
LNGDPCH - LNFINANCECH	EC1	-0.0381046	0.01316	-28.955	0.00511	***

Source: Federal Statistical Office of Switzerland

The estimation of regression coefficient of ut-1 is of correct sign, which is consistent with reverse correction mechanism[64]. We can conclude that there is an evidence of an error correction between the Swiss GDP and the Swiss Service sector in the short run. From the ECM, we can see an evidence of short-term fluctuations in the service sector, which leads to changes in the Swiss GDP. Long term cointegration relationship plays an important role in the adjustment of the non-equilibrium state back to equilibrium[65]. According to the obtained statistics, if the Swiss GDP deviates from long-run equilibrium level, then in the next phase, 8,2%

[64] Lee.,W. 2012. Cointegration and Granger Casuality Tests of Exchange Rate of Euro and Hong Kong Stock Market Index Interactions. International Research Journal of Finance and Economics(ISSN 1450-2887). Nr. 91 (2012). P.121.
[65] Lee.,W. 2012. P.121.

of this deviation will be corrected or removed. The term in the last case, where the finance sector varies, the correction term lies by about 3,8%.

7.6 Granger Causality

To estimate long-run relationship among the variables the Granger Causality tests are applied. The results of this test are listed below on table 15. Lag lengths is in the first case five lags, in the third case six lags and seven in the others. In the first case, the null hypothesis cannot be rejected, as "LNGDPCH does not Granger Cause LNSERVICECH ". The null hypothesis in the second case can be rejected. From this test results, we can only conclude that LNREALSERVICE may Granger Cause LNGDPREAL in the long-run. In other words, a unidirectional causality between the variables exists. The same evidence is also valid for the finance sector.

Table 15: Granger Causality Test

Pairwise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.
DLNSERVICECH does not Granger Cause DLNGDPCH	81	1,91888	0,10210
DLNGDPCH does not Granger Cause DLNSERVICECH		0,91526	0,47630
DSERVICECH does not Granger Cause DGDPCH	80	1,87852	0,08750
DGDPCH does not Granger Cause DSERVICECH		1,21833	0,30560
DFINANCECH does not Granger Cause DGDPCH	81	3,11164	0,00940
DGDPCH does not Granger Cause DFINANCECH		2,17050	0,05650
DLNFINANCECH does not Granger Cause DLNGDPCH	79	3,03769	0,00800
DLNGDPCH does not Granger Cause DLNFINANCECH		1,87191	0,08890

Source: Federal Statistical Office of Switzerland

7.7 Discussion

The purpose of the analyses was to provide a statistical evidence of a long-run relationship between the Swiss GDP and the service sector, or in other words, if there is an evidence of cointegration between the two series. According to figure 7, the trend of the series looks like they move proportionally an upgrading trend. Shocks in the economy may lead to spurious results if the series are non-stationary. Through Augmented Dickey Fuller and Phillips-Perron tests, the series are found to be stationary in their first differences under the assumption that any structural break does not exist. Through applied tests such as Zivot-Andrews and Bai-Perron test, unit root of series under the assumption of structural breaks are tested. According to the results of these tests, structural breaks in the years 2001, 2004 and 2008 can be obtained from the tables 9 and 10. The null hypothesis about a unit root could not be rejected in their levels. The test statistics exceed by taking the first difference of the series. Through the Johansen test, the evidence of cointegration is tested. Based on the results on tables 11, 12 and 13 the evidence of "no cointegration" is more dominant than the evidence of cointegration. Through taking the level series rather than the logarithm series, three cases occur where one cointegrating equation exists between the series of the Swiss GDP and the Swiss service sector income. Econometric intuition in the first case is "a 1% increase of the Swiss service sector causes a 1,08 percent increase in the Swiss GDP". In addition, when the subsector finance rises by 1%, the Swiss GDP increases by 1,13%. Finally, an error correction model is estimated to obtain an extra explanatory variable. The coefficient of that variable gives the estimated speed of adjustment to the equilibrium of the dependent variable after a change in the independent variable of

the model. The results of the error correction model are illustrated on table 15. Intuitively, if the Swiss GDP deviates from the long-run equilibrium level by one unit, in the next period 0.076 units of the deviation will be “corrected”. According to the results of the econometric analyze, we can conclude that there is not a strong evidence of a long-run relationship between the Swiss GDP and the Swiss service sector. Whether we can say that there is no relation, nor we can claim that there is a significant interaction. A probable reason for this may be a decreasing importance of the Swiss service sector to the Swiss GDP.

8. CONCLUSION

The service sector has been showing a globally increasing trend in the last decades. Service sectors in developed countries have enhanced their impacts and proportions in the economies. More than 60% of the economy insists on the service sector, whereas the agriculture and industry sector more and more slow down. The Swiss economy has been one of the world's most stable economies since many decades. Long-term monetary security and political stability made Switzerland a secure place for local and international investors. Even though Switzerland experienced like many other countries slowdowns in its economy, the high per capita GDP makes Switzerland still a premium place to live. As the economy shifts from industry to knowledge-based service sector, the demand for educated workforce has risen in the last decades. In Switzerland, the service sector makes up about 70% of the overall GDP and employs around 75% of the active labor force. The unemployment rate goes up between the years 1991-1995 and 2000-2010. In contrast, unemployment decreases between 1995-2000 and 2010-2011.

For many investors, the Swiss franc (CHF) is a stable currency, which usually appreciates towards other currencies. This fact leads the Swiss exports to become more expensive, which may cause a decline in overall export. Commercial services exports grew by %2 and were about 14.8% of GDP between the years 2005-2011. Net commercial services trade was about 47 Billion $ in 2011. Many subsectors grew in this period. Transportation services exports grew by %8 (2011: 6,6 Billions $), financial service export grew by 3% (2011: 17 billions $) and insurance service export grew by 9% (2011: 5,6 Billion $).

According to the data, it can be confirmed that the service sector has an important positive effect on the Swiss economy. The upgrading trend of demand for services will continue as far global conjunctures will not change.

This study also analyzed the importance of the Swiss service sector and its subsector finance in the GDP of Switzerland empirically. The period which was investigated covered quarterly time series data from the last quarter of 1991 to the last quarter of 2012. Augmented-Dickey Fuller, Phillips-Perron, Bai-Perron, Zivot-Andrews Johansen and Granger Causality tests were implemented. These tests were applied in order to investigate whether there is an existence of cointegration or further about a short and long-run relationship between the two parameters.

The results provided weak evidence of cointegration between GDP of Switzerland and Swiss services sector. There is also a weak evidence of cointegration between Swiss GDP and the Swiss finance sector. The variables GDPCH, SERVICECH and FINANCECH shared a common stochastic trend and moved proportionally only in specific cases. It can't be said exactly that the series move together in the long-run or they have a strong long-run relationship. The evidence of "no cointegration" is stronger than the evidence of cointegration among the series. As a consequence, the series do not move together explicitly. Comparing the trends of the series, we can guess an eventual decreasing importance of the Swiss service sector to the Swiss GDP as a probable reason for this result.

From this point of view, we can conclude that the Swiss service sector is an important indicator for Swiss economic growth and development, but there isn't an evidence of strong interaction or relation among the series. There are several areas in which further research is necessary. Further research implications may be to analyze several subsectors in detail and evidence of cointegration between several series.

The Swiss service sector in terms of growth is a success story both relative to other Swiss sectors and relative to other service sectors globally. However, to further economic growth, Swiss service industries are obliged to make significant progress in their international competition circumstances.

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VIII. APPENDIX

Appendix A)

LNGDPCH (Without Constant & Trend)

ADF Test Statistic	3.716762	1%	Critical Value*	-2.5902
		5%	Critical Value	-1.9440
		10%	Critical Value	-1.6177

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNGDPCH)
Method: Least Squares
Date: 10/05/13 Time: 21:22
Sample(adjusted): 1991:4 2012:4
Included observations: 85 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNGDPCH(-1)	0.000428	0.000115	3.716762	0.0004
D(LNGDPCH (-1))	-0.079339	0.106534	-0.744725	0.4586
D(LNGDPCH (-2))	-0.265718	0.106827	-2.487363	0.0149

R-squared	0.074017	Mean dependent var	0.003693
Adjusted R-squared	0.051432	S.D. dependent var	0.011421
S.E. of regression	0.011123	Akaike info criterion	-6.124881
Sum squared resid	0.010146	Schwarz criterion	-6.038669
Log likelihood	263.3074	Durbin-Watson stat	2.078713

LNGDPCH (With Constant & Trend)

ADF Test Statistic	-3.133022	1%	Critical Value*	-4.0686
		5%	Critical Value	-3.4626
		10%	Critical Value	-3.1574

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNGDPCH)
Method: Least Squares
Date: 10/05/13 Time: 21:26
Sample(adjusted): 1991:4 2012:4
Included observations: 85 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNGDPCH(-1)	-0.199116	0.063554	-3.133022	0.0024
D(LNGDPCH(-1))	-0.006806	0.104963	-0.064842	0.9485
D(LNGDPCH(-2))	-0.205524	0.104119	-1.973926	0.0518
C	2.282959	0.727912	3.136312	0.0024
@TREND(1991:1)	0.000910	0.000276	3.301277	0.0014

R-squared	0.188963	Mean dependent var	0.003693
Adjusted R-squared	0.148411	S.D. dependent var	0.011421
S.E. of regression	0.010539	Akaike info criterion	-6.210364
Sum squared resid	0.008886	Schwarz criterion	-6.066678
Log likelihood	268.9405	F-statistic	4.659786
Durbin-Watson stat	2.066955	Prob(F-statistic)	0.001968

LNSERVICECH (Without Constant & Trend)

ADF Test Statistic	3.871324	1%	Critical Value*	-2.5902
		5%	Critical Value	-1.9440
		10%	Critical Value	-1.6177

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNSERVICECH)
Method: Least Squares
Date: 10/05/13 Time: 21:35
Sample(adjusted): 1991:4 2012:4
Included observations: 85 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNSERVICECH(-1)	0.000357	9.23E-05	3.871324	0.0002
D(LNSERVICECH(-1))	0.122827	0.110546	1.111094	0.2698
D(LNSERVICECH(-2))	-0.055312	0.111197	-0.497429	0.6202

R-squared	0.015720	Mean dependent var	0.004149
Adjusted R-squared	-0.008287	S.D. dependent var	0.007423
S.E. of regression	0.007454	Akaike info criterion	-6.925603
Sum squared resid	0.004556	Schwarz criterion	-6.839391
Log likelihood	297.3381	Durbin-Watson stat	1.992105

LNSERVICECH (With Constant & Trend)

ADF Test Statistic	-2.088215	1%	Critical Value*	-4.0686
		5%	Critical Value	-3.4626
		10%	Critical Value	-3.1574

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNSERVICECH)
Method: Least Squares
Date: 10/05/13 Time: 21:42
Sample(adjusted): 1991:4 2012:4
Included observations: 85 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNSERVICECH (-1)	-0.097534	0.046707	-2.088215	0.0400
D(LNSERVICECH (-1))	0.165544	0.111053	1.490674	0.1400
D(LNSERVICECH (-2))	0.003409	0.113499	0.030039	0.9761
C	1.038833	0.495382	2.097035	0.0391
@TREND(1991:1)	0.000399	0.000199	2.004960	0.0483

R-squared	0.068570	Mean dependent var	0.004149
Adjusted R-squared	0.021998	S.D. dependent var	0.007423
S.E. of regression	0.007341	Akaike info criterion	-6.933734
Sum squared resid	0.004311	Schwarz criterion	-6.790048
Log likelihood	299.6837	F-statistic	1.472359
Durbin-Watson stat	1.997735	Prob(F-statistic)	0.218376

LNFINANCECH (Without Constant & Trend)

Null Hypothesis: LNFINANCECH has a unit root
Exogenous: None
Lag Length: 0 (Automatic based on SIC, MAXLAG=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		3.219888	0.9996
Test critical values:	1% level	-2.591813	
	5% level	-1.944574	
	10% level	-1.614315	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNFINANCECH)
Method: Least Squares
Date: 11/21/13 Time: 13:25
Sample (adjusted): 1991Q2 2012Q4
Included observations: 87 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNFINANCECH(-1)	0.000543	0.000169	3.219888	0.0018

R-squared	-0.001610	Mean dependent var	0.005428
Adjusted R-squared	-0.001610	S.D. dependent var	0.015608
S.E. of regression	0.015621	Akaike info criterion	-5.469031
Sum squared resid	0.020984	Schwarz criterion	-5.440687
Log likelihood	238.9029	Hannan-Quinn criter.	-5.457618
Durbin-Watson stat	1.712889		

LNFINANCECH (With Constant & Trend)

Null Hypothesis: LNFINANCECH has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic based on SIC, MAXLAG=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.415214	0.8498
Test critical values:	1% level	-4.066981	
	5% level	-3.462292	
	10% level	-3.157475	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNFINANCECH)
Method: Least Squares
Date: 11/21/13 Time: 13:28
Sample (adjusted): 1991Q2 2012Q4
Included observations: 87 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNFINANCECH(-1)	-0.050293	0.035537	-1.415214	0.1607
C	0.495490	0.344213	1.439486	0.1537
@TREND(1991Q1)	0.000218	0.000212	1.028367	0.3067

R-squared	0.034783	Mean dependent var	0.005428
Adjusted R-squared	0.011801	S.D. dependent var	0.015608
S.E. of regression	0.015516	Akaike info criterion	-5.460065
Sum squared resid	0.020222	Schwarz criterion	-5.375034
Log likelihood	240.5128	Hannan-Quinn criter.	-5.425825
F-statistic	1.513517	Durbin-Watson stat	1.689798
Prob(F-statistic)	0.226076		

LNGDPCH (-1) (Without Constant & Trend)

ADF Test Statistic	-6.126792	1% Critical Value*	-2.5906
		5% Critical Value	-1.9440
		10% Critical Value	-1.6178

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNGDPCH,2)
Method: Least Squares
Date: 10/05/13 Time: 21:48
Sample(adjusted): 1992:1 2012:4
Included observations: 84 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNGDPCH(-1))	-1.175600	0.191879	-6.126792	0.0000
D(LNGDPCH(-1),2)	0.224074	0.150797	1.485935	0.1412
D(LNGDPCH(-2),2)	0.088600	0.109642	0.808082	0.4214

R-squared	0.493879	Mean dependent var	0.000199
Adjusted R-squared	0.481382	S.D. dependent var	0.016490
S.E. of regression	0.011875	Akaike info criterion	-5.993708
Sum squared resid	0.011422	Schwarz criterion	-5.906893
Log likelihood	254.7357	Durbin-Watson stat	1.844384

LNGDPCH (-1) (With Constant & Trend)

ADF Test Statistic	-8.494327	1%	Critical Value*	-4.0700
		5%	Critical Value	-3.4632
		10%	Critical Value	-3.1578

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNGDPCH,2)
Method: Least Squares
Date: 10/05/13 Time: 21:53
Sample(adjusted): 1992:1 2012:4
Included observations: 84 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNGDPCH(-1))	-1.753870	0.206475	-8.494327	0.0000
D(LNGDPCH(-1),2)	0.594522	0.153162	3.881648	0.0002
D(LNGDPCH(-2),2)	0.291870	0.105437	2.768192	0.0070
C	0.004127	0.002466	1.673495	0.0982
@TREND(1991:1)	5.74E-05	4.81E-05	1.193262	0.2363

R-squared	0.613331	Mean dependent var	0.000199
Adjusted R-squared	0.593753	S.D. dependent var	0.016490
S.E. of regression	0.010510	Akaike info criterion	-6.215296
Sum squared resid	0.008726	Schwarz criterion	-6.070605
Log likelihood	266.0424	F-statistic	31.32727
Durbin-Watson stat	1.638229	Prob(F-statistic)	0.000000

LNSERVICECH (-1) (Without Constant & Trend)

ADF Test Statistic	-3.357634	1%	Critical Value*	-2.5906
		5%	Critical Value	-1.9440
		10%	Critical Value	-1.6178

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNSERVICECH,2)
Method: Least Squares
Date: 10/12/13 Time: 20:35
Sample(adjusted): 1992:1 2012:4
Included observations: 84 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNSERVICECH(-1))	-0.490884	0.146199	-3.357634	0.0012
D(LNSERVICECH(-1),2)	-0.233788	0.137025	-1.706171	0.0918
D(LNSERVICECH(-2),2)	-0.174899	0.111873	-1.563367	0.1219

R-squared	0.358584	Mean dependent var	0.000134
Adjusted R-squared	0.342747	S.D. dependent var	0.009911
S.E. of regression	0.008035	Akaike info criterion	-6.774952
Sum squared resid	0.005229	Schwarz criterion	-6.688137
Log likelihood	287.5480	Durbin-Watson stat	2.061853

LNSERVICECH (-1) (With Constant & Trend)

ADF Test Statistic	-5.025497	1% Critical Value*	-4.0700
		5% Critical Value	-3.4632
		10% Critical Value	-3.1578

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNSERVICECH,2)
Method: Least Squares
Date: 10/12/13 Time: 20:36
Sample(adjusted): 1992:1 2012:4
Included observations: 84 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNSERVICECH(-1))	-0.926383	0.184337	-5.025497	0.0000
D(LNSERVICECH(-1),2)	0.044688	0.150904	0.296135	0.7679
D(LNSERVICECH(-2),2)	-0.024649	0.113424	-0.217315	0.8285
C	0.004616	0.001962	2.352664	0.0211
@TREND(1991:1)	-1.57E-05	3.42E-05	-0.458761	0.6477

R-squared	0.446711	Mean dependent var	0.000134
Adjusted R-squared	0.418696	S.D. dependent var	0.009911
S.E. of regression	0.007557	Akaike info criterion	-6.875130
Sum squared resid	0.004511	Schwarz criterion	-6.730439
Log likelihood	293.7555	F-statistic	15.94562
Durbin-Watson stat	1.983478	Prob(F-statistic)	0.000000

LNFINANCECH (-1) (Without Constant & Trend)

Null Hypothesis: D(LNFINANCECH) has a unit root
Exogenous: None
Lag Length: 0 (Automatic based on SIC, MAXLAG=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.242944	0.0000
Test critical values:	1% level	-2.592129	
	5% level	-1.944619	
	10% level	-1.614288	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNFINANCECH,2)
Method: Least Squares
Date: 11/21/13 Time: 13:37
Sample (adjusted): 1991Q3 2012Q4
Included observations: 86 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNFINANCECH(-1))	-0.764624	0.105568	-7.242944	0.0000

R-squared	0.381629	Mean dependent var	8.33E-05
Adjusted R-squared	0.381629	S.D. dependent var	0.020558
S.E. of regression	0.016166	Akaike info criterion	-5.400247
Sum squared resid	0.022214	Schwarz criterion	-5.371708
Log likelihood	233.2106	Hannan-Quinn criter.	-5.388761
Durbin-Watson stat	2.066456		

LNFINANCECH (-1) (With Constant & Trend)

Null Hypothesis: D(LNFINANCECH) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic based on SIC, MAXLAG=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.995442	0.0000
Test critical values:	1% level	-4.068290	
	5% level	-3.462912	
	10% level	-3.157836	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNFINANCECH,2)
Method: Least Squares
Date: 11/21/13 Time: 13:43
Sample (adjusted): 1991Q3 2012Q4
Included observations: 86 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNFINANCECH(-1))	-0.869521	0.108752	-7.995442	0.0000
C	0.007618	0.003585	2.125315	0.0365
@TREND(1991Q1)	-6.38E-05	6.84E-05	-0.933885	0.3531

R-squared	0.435096	Mean dependent var	8.33E-05
Adjusted R-squared	0.421484	S.D. dependent var	0.020558
S.E. of regression	0.015636	Akaike info criterion	-5.444168
Sum squared resid	0.020293	Schwarz criterion	-5.358552
Log likelihood	237.0992	Hannan-Quinn criter.	-5.409712
F-statistic	31.96385	Durbin-Watson stat	2.018695
Prob(F-statistic)	0.000000		

LNGDPCH (-2) (Without Constant & Trend)

ADF Test Statistic	-19.41534	1% Critical Value*	-2.5909
		5% Critical Value	-1.9441
		10% Critical Value	-1.6178

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNGDPCH,3)
Method: Least Squares
Date: 10/05/13 Time: 22:03
Sample(adjusted): 1992:2 2012:4
Included observations: 83 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNGDPCH(-1),2)	-3.292852	0.169601	-19.41534	0.0000
D(LNGDPCH(-1),3)	1.514944	0.124583	12.16014	0.0000
D(LNGDPCH(-2),3)	0.768284	0.068944	11.14356	0.0000

R-squared	0.894685	Mean dependent var	-0.000459
Adjusted R-squared	0.892052	S.D. dependent var	0.027401
S.E. of regression	0.009003	Akaike info criterion	-6.547073
Sum squared resid	0.006484	Schwarz criterion	-6.459645
Log likelihood	274.7035	Durbin-Watson stat	1.686325

LNGDPCH (-2) (With Constant & Trend)

ADF Test Statistic	-19.18501	1%	Critical Value*	-4.0713
		5%	Critical Value	-3.4639
		10%	Critical Value	-3.1581

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNGDPCH,3)
Method: Least Squares
Date: 10/05/13 Time: 22:07
Sample(adjusted): 1992:2 2012:4
Included observations: 83 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNGDPCH(-1),2)	-3.293873	0.171690	-19.18501	0.0000
D(LNGDPCH(-1),3)	1.515375	0.126099	12.01738	0.0000
D(LNGDPCH(-2),3)	0.768563	0.069784	11.01346	0.0000
C	0.000681	0.002166	0.314485	0.7540
@TREND(1991:1)	-1.17E-05	4.18E-05	-0.280859	0.7796

R-squared	0.894818	Mean dependent var	-0.000459
Adjusted R-squared	0.889424	S.D. dependent var	0.027401
S.E. of regression	0.009112	Akaike info criterion	-6.500148
Sum squared resid	0.006476	Schwarz criterion	-6.354434
Log likelihood	274.7561	F-statistic	165.8930
Durbin-Watson stat	1.687115	Prob(F-statistic)	0.000000

LNSERVICECH (-2) (Without Constant & Trend)

ADF Test Statistic	-10.10386	1% Critical Value*	-2.5909
		5% Critical Value	-1.9441
		10% Critical Value	-1.6178

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNSERVICECH,3)
Method: Least Squares
Date: 10/05/13 Time: 22:09
Sample(adjusted): 1992:2 2012:4
Included observations: 83 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNSERVICECH(-1),2)	-2.598172	0.257146	-10.10386	0.0000
D(LNLSERVICECH(-1),3)	0.918582	0.189742	4.841202	0.0000
D(LNSERVICECH(-2),3)	0.364145	0.104651	3.479610	0.0008

R-squared	0.778061	Mean dependent var	-0.000164
Adjusted R-squared	0.772513	S.D. dependent var	0.016708
S.E. of regression	0.007969	Akaike info criterion	-6.791099
Sum squared resid	0.005080	Schwarz criterion	-6.703671
Log likelihood	284.8306	Durbin-Watson stat	1.996677

LNSERVICECH (-2) (With Constant & Trend)

ADF Test Statistic	-9.976177	1%	Critical Value*	-4.0713
		5%	Critical Value	-3.4639
		10%	Critical Value	-3.1581

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNSERVICECH,3)
Method: Least Squares
Date: 10/05/13 Time: 22:29
Sample(adjusted): 1992:2 2012:4
Included observations: 83 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNSERVICECH(-1),2)	-2.598090	0.260429	-9.976177	0.0000
D(LNSERVICECH(-1),3)	0.918187	0.192169	4.778017	0.0000
D(LNSERVICECH(-2),3)	0.364011	0.105978	3.434789	0.0010
C	-0.000172	0.001918	-0.089787	0.9287
@TREND(1991:1)	6.99E-06	3.70E-05	0.189187	0.8504

R-squared	0.778244	Mean dependent var	-0.000164
Adjusted R-squared	0.766872	S.D. dependent var	0.016708
S.E. of regression	0.008067	Akaike info criterion	-6.743731
Sum squared resid	0.005076	Schwarz criterion	-6.598017
Log likelihood	284.8648	F-statistic	68.43457
Durbin-Watson stat	1.997658	Prob(F-statistic)	0.000000

LNFINANCECH(-2) (Without Constant & Trend)

Null Hypothesis: D(LNFINANCECH,2) has a unit root
Exogenous: None
Lag Length: 2 (Automatic based on SIC, MAXLAG=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-9.092065	0.0000
Test critical values:	1% level	-2.593121	
	5% level	-1.944762	
	10% level	-1.614204	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNFINANCECH,3)
Method: Least Squares
Date: 11/21/13 Time: 13:44
Sample (adjusted): 1992Q2 2012Q4
Included observations: 83 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNFINANCECH(-1),2)	-2.480498	0.272820	-9.092065	0.0000
D(LNFINANCECH(-1),3)	0.760813	0.201158	3.782170	0.0003
D(LNFINANCECH(-2),3)	0.251211	0.106619	2.356163	0.0209

R-squared	0.787076	Mean dependent var	-0.000385
Adjusted R-squared	0.781753	S.D. dependent var	0.035621
S.E. of regression	0.016641	Akaike info criterion	-5.318444
Sum squared resid	0.022153	Schwarz criterion	-5.231017
Log likelihood	223.7154	Hannan-Quinn criter.	-5.283321
Durbin-Watson stat	1.903446		

LNFINANCECH(-2) (With Constant & Trend)

Null Hypothesis: D(LNFINANCECH,2) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 2 (Automatic based on SIC, MAXLAG=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.973826	0.0000
Test critical values:	1% level	-4.072415	
	5% level	-3.464865	
	10% level	-3.158974	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNFINANCECH,3)
Method: Least Squares
Date: 11/21/13 Time: 13:47
Sample (adjusted): 1992Q2 2012Q4
Included observations: 83 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNFINANCECH(-1),2)	-2.480064	0.276366	-8.973826	0.0000
D(LNFINANCECH(-1),3)	0.760552	0.203753	3.732711	0.0004
D(LNFINANCECH(-2),3)	0.251131	0.107984	2.325634	0.0226
C	-0.000309	0.004006	-0.077142	0.9387
@TREND(1991Q1)	7.00E-06	7.72E-05	0.090684	0.9280

R-squared	0.787099	Mean dependent var	-0.000385
Adjusted R-squared	0.776181	S.D. dependent var	0.035621
S.E. of regression	0.016852	Akaike info criterion	-5.270358
Sum squared resid	0.022151	Schwarz criterion	-5.124644
Log likelihood	223.7198	Hannan-Quinn criter.	-5.211818
F-statistic	72.09182	Durbin-Watson stat	1.903985
Prob(F-statistic)	0.000000		

PP TEST

LNGDPCH (Without Constant & Trend)

PP Test Statistic	4.206754	1%	Critical Value*	-2.5897
		5%	Critical Value	-1.9439
		10%	Critical Value	-1.6177

*MacKinnon critical values for rejection of hypothesis of a unit root.

Lag truncation for Bartlett kernel: 3	(Newey-West suggests: 3)	
Residual variance with no correction		0.000126
Residual variance with correction		6.76E-05

Phillips-Perron Test Equation
Dependent Variable: D(LNGDPCH)
Method: Least Squares
Date: 10/06/13 Time: 11:28
Sample(adjusted): 1991:2 2012:4
Included observations: 87 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNGDPCH(-1)	0.000320	0.000104	3.076133	0.0028

R-squared	0.000135	Mean dependent var	0.003724
Adjusted R-squared	0.000135	S.D. dependent var	0.011301
S.E. of regression	0.011300	Akaike info criterion	-6.116553
Sum squared resid	0.010982	Schwarz criterion	-6.088209
Log likelihood	267.0700	Durbin-Watson stat	2.124968

LNGDPCH (With Constant & Trend)

PP Test Statistic	-3.028192	1%	Critical Value*	-4.0661
		5%	Critical Value	-3.4614
		10%	Critical Value	-3.1567

*MacKinnon critical values for rejection of hypothesis of a unit root.

Lag truncation for Bartlett kernel: 3	(Newey-West suggests: 3)	
Residual variance with no correction		0.000111
Residual variance with correction		7.74E-05

Phillips-Perron Test Equation
Dependent Variable: D(LNGDPCH)
Method: Least Squares
Date: 10/06/13 Time: 12:00
Sample(adjusted): 1991:2 2012:4
Included observations: 87 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNGDPCH(-1)	-0.187370	0.057293	-3.270390	0.0016
C	2.149142	0.656542	3.273428	0.0015
@TREND(1991:1)	0.000831	0.000247	3.371701	0.0011

R-squared	0.119691	Mean dependent var	0.003724
Adjusted R-squared	0.098731	S.D. dependent var	0.011301
S.E. of regression	0.010729	Akaike info criterion	-6.197922
Sum squared resid	0.009669	Schwarz criterion	-6.112891
Log likelihood	272.6096	F-statistic	5.710498
Durbin-Watson stat	2.001152	Prob(F-statistic)	0.004728

LNSERVICECH (Without Constant & Trend)

PP Test Statistic	4.764234	1%	Critical Value*	-2.5897
		5%	Critical Value	-1.9439
		10%	Critical Value	-1.6177

*MacKinnon critical values for rejection of hypothesis of a unit root.

Lag truncation for Bartlett kernel: 3	(Newey-West suggests: 3)	
Residual variance with no correction		5.38E-05
Residual variance with correction		6.16E-05

Phillips-Perron Test Equation
Dependent Variable: D(LNSERVICECH)
Method: Least Squares
Date: 10/06/13 Time: 11:56
Sample(adjusted): 1991:2 2012:4
Included observations: 87 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNSERVICECH(-1)	0.000374	7.33E-05	5.097218	0.0000

R-squared	-0.000519	Mean dependent var	0.004036
Adjusted R-squared	-0.000519	S.D. dependent var	0.007378
S.E. of regression	0.007380	Akaike info criterion	-6.968723
Sum squared resid	0.004684	Schwarz criterion	-6.940379
Log likelihood	304.1395	Durbin-Watson stat	1.744901

LNSERVICECH (With Constant & Trend)

PP Test Statistic	-2.123048	1%	Critical Value*	-4.0661
		5%	Critical Value	-3.4614
		10%	Critical Value	-3.1567

*MacKinnon critical values for rejection of hypothesis of a unit root.

Lag truncation for Bartlett kernel: 3	(Newey-West suggests: 3)	
Residual variance with no correction		5.16E-05
Residual variance with correction		6.46E-05

Phillips-Perron Test Equation
Dependent Variable: D(LNSERVICECH)
Method: Least Squares
Date: 10/06/13 Time: 11:58
Sample(adjusted): 1991:2 2012:4
Included observations: 87 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNSERVICECH(-1)	-0.083451	0.043885	-1.901603	0.0607
C	0.889704	0.465675	1.910568	0.0595
@TREND(1991:1)	0.000346	0.000186	1.857135	0.0668

R-squared	0.041392	Mean dependent var	0.004036
Adjusted R-squared	0.018568	S.D. dependent var	0.007378
S.E. of regression	0.007309	Akaike info criterion	-6.965537
Sum squared resid	0.004487	Schwarz criterion	-6.880506
Log likelihood	306.0009	F-statistic	1.813517
Durbin-Watson stat	1.675698	Prob(F-statistic)	0.169406

LNFINANCECH (Without Constant & Trend)

PP Test Statistic	2.742514	1% Critical Value*	-2.5897
		5% Critical Value	-1.9439
		10% Critical Value	-1.6177

*MacKinnon critical values for rejection of hypothesis of a unit root.

Lag truncation for Bartlett kernel: 3	(Newey-West suggests: 3)	
Residual variance with no correction		0.000241
Residual variance with correction		0.000332

Phillips-Perron Test Equation
Dependent Variable: D(LNFINANCECH)
Method: Least Squares
Date: 11/25/13 Time: 20:13
Sample(adjusted): 1991:2 2012:4
Included observations: 87 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNFINANCECH(-1)	0.000543	0.000169	3.219888	0.0018

R-squared	-0.001610	Mean dependent var	0.005428
Adjusted R-squared	-0.001610	S.D. dependent var	0.015608
S.E. of regression	0.015621	Akaike info criterion	-5.469031
Sum squared resid	0.020984	Schwarz criterion	-5.440687
Log likelihood	238.9029	Durbin-Watson stat	1.712889

LNGDPCH (-1) (Without Constant & Trend)

PP Test Statistic	-8.834403	1% Critical Value*	-2.5899
		5% Critical Value	-1.9439
		10% Critical Value	-1.6177

*MacKinnon critical values for rejection of hypothesis of a unit root.

Lag truncation for Bartlett kernel: 3	(Newey-West suggests: 3)	
Residual variance with no correction		0.000141
Residual variance with correction		0.000115

Phillips-Perron Test Equation
Dependent Variable: D(LNGDPCH,2)
Method: Least Squares
Date: 10/06/13 Time: 12:16
Sample(adjusted): 1991:3 2012:4
Included observations: 86 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNGDPCH(-1))	-0.957058	0.108363	-8.831969	0.0000

R-squared	0.478537	Mean dependent var	-3.67E-05
Adjusted R-squared	0.478537	S.D. dependent var	0.016567
S.E. of regression	0.011963	Akaike info criterion	-6.002409
Sum squared resid	0.012165	Schwarz criterion	-5.973870
Log likelihood	259.1036	Durbin-Watson stat	1.984203

LNGDPCH (-1) (With Constant & Trend)

PP Test Statistic	-10.29210	1%	Critical Value*	-4.0673
		5%	Critical Value	-3.4620
		10%	Critical Value	-3.1570

*MacKinnon critical values for rejection of hypothesis of a unit root.

Lag truncation for Bartlett kernel: 3	(Newey-West suggests: 3)	
Residual variance with no correction		0.000126
Residual variance with correction		7.26E-05

Phillips-Perron Test Equation
Dependent Variable: D(LNGDPCH,2)
Method: Least Squares
Date: 10/06/13 Time: 12:17
Sample(adjusted): 1991:3 2012:4
Included observations: 86 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNGDPCH(-1))	-1.072674	0.109726	-9.775934	0.0000
C	0.002157	0.002537	0.850096	0.3977
@TREND(1991:1)	4.19E-05	4.99E-05	0.840737	0.4029

R-squared	0.535231	Mean dependent var	-3.67E-05
Adjusted R-squared	0.524032	S.D. dependent var	0.016567
S.E. of regression	0.011429	Akaike info criterion	-6.070996
Sum squared resid	0.010842	Schwarz criterion	-5.985379
Log likelihood	264.0528	F-statistic	47.79170
Durbin-Watson stat	2.031944	Prob(F-statistic)	0.000000

LNSERVICECH (-1) (Without Constant & Trend)

PP Test Statistic	-6.554042	1%	Critical Value*	-2.5899
		5%	Critical Value	-1.9439
		10%	Critical Value	-1.6177

*MacKinnon critical values for rejection of hypothesis of a unit root.

Lag truncation for Bartlett kernel: 3	(Newey-West suggests: 3)	
Residual variance with no correction		6.34E-05
Residual variance with correction		6.59E-05

Phillips-Perron Test Equation
Dependent Variable: D(LNSERVICECH,2)
Method: Least Squares
Date: 10/06/13 Time: 12:19
Sample(adjusted): 1991:3 2012:4
Included observations: 86 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNREALSERVICE(-1))	-0.673304	0.103471	-6.507162	0.0000

R-squared	0.332357	Mean dependent var	0.000149
Adjusted R-squared	0.332357	S.D. dependent var	0.009803
S.E. of regression	0.008010	Akaike info criterion	-6.804800
Sum squared resid	0.005453	Schwarz criterion	-6.776261
Log likelihood	293.6064	Durbin-Watson stat	2.060061

LNSERVICECH (-1) (With Constant & Trend)

PP Test Statistic	-8.054866	1% Critical Value*	-4.0673
		5% Critical Value	-3.4620
		10% Critical Value	-3.1570

*MacKinnon critical values for rejection of hypothesis of a unit root.

Lag truncation for Bartlett kernel: 3	(Newey-West suggests: 3)	
Residual variance with no correction		5.31E-05
Residual variance with correction		4.99E-05

Phillips-Perron Test Equation
Dependent Variable: D(LNSERVICECH,2)
Method: Least Squares
Date: 10/06/13 Time: 12:20
Sample(adjusted): 1991:3 2012:4
Included observations: 86 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNSERVICECH(-1))	-0.880936	0.108949	-8.085796	0.0000
C	0.003983	0.001709	2.330306	0.0222
@TREND(1991:1)	-7.70E-06	3.22E-05	-0.238713	0.8119

R-squared	0.440626	Mean dependent var	0.000149
Adjusted R-squared	0.427147	S.D. dependent var	0.009803
S.E. of regression	0.007419	Akaike info criterion	-6.935224
Sum squared resid	0.004569	Schwarz criterion	-6.849607
Log likelihood	301.2146	F-statistic	32.69006
Durbin-Watson stat	1.986829	Prob(F-statistic)	0.000000

LNFINANCE(-1) (Without Constant & Trend)

PP Test Statistic	-7.503877	1% Critical Value*	-2.5899
		5% Critical Value	-1.9439
		10% Critical Value	-1.6177

*MacKinnon critical values for rejection of hypothesis of a unit root.

Lag truncation for Bartlett kernel: 4	(Newey-West suggests: 3)	
Residual variance with no correction		0.000258
Residual variance with correction		0.000327

Phillips-Perron Test Equation
Dependent Variable: D(LNFINANCECH,2)
Method: Least Squares
Date: 11/25/13 Time: 20:21
Sample(adjusted): 1991:3 2012:4
Included observations: 86 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNFINANCECH(-1))	-0.764624	0.105568	-7.242944	0.0000

R-squared	0.381629	Mean dependent var	8.33E-05
Adjusted R-squared	0.381629	S.D. dependent var	0.020558
S.E. of regression	0.016166	Akaike info criterion	-5.400247
Sum squared resid	0.022214	Schwarz criterion	-5.371708
Log likelihood	233.2106	Durbin-Watson stat	2.066456

LNFINANCE(-1) (With Constant & Trend)

PP Test Statistic	-8.109265	1% Critical Value*	-4.0673
		5% Critical Value	-3.4620
		10% Critical Value	-3.1570

*MacKinnon critical values for rejection of hypothesis of a unit root.

Lag truncation for Bartlett kernel: 4	(Newey-West suggests: 3)	
Residual variance with no correction		0.000236
Residual variance with correction		0.000275

Phillips-Perron Test Equation
Dependent Variable: D(LNFINANCECH,2)
Method: Least Squares
Date: 11/25/13 Time: 20:23
Sample(adjusted): 1991:3 2012:4
Included observations: 86 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNFINANCECH(-1))	-0.869521	0.108752	-7.995442	0.0000
C	0.007618	0.003585	2.125315	0.0365
@TREND(1991:1)	-6.38E-05	6.84E-05	-0.933885	0.3531

R-squared	0.435096	Mean dependent var	8.33E-05
Adjusted R-squared	0.421484	S.D. dependent var	0.020558
S.E. of regression	0.015636	Akaike info criterion	-5.444168
Sum squared resid	0.020293	Schwarz criterion	-5.358552
Log likelihood	237.0992	F-statistic	31.96385
Durbin-Watson stat	2.018695	Prob(F-statistic)	0.000000

LNGDPCH(-2) (Without Constant & Trend)

PP Test Statistic	-26.54518	1%	Critical Value*	-2.5902
		5%	Critical Value	-1.9440
		10%	Critical Value	-1.6177

*MacKinnon critical values for rejection of hypothesis of a unit root.

Lag truncation for Bartlett kernel: 3	(Newey-West suggests: 3)	
Residual variance with no correction		0.000228
Residual variance with correction		3.60E-05

Phillips-Perron Test Equation
Dependent Variable: D(LNGDPCH,3)
Method: Least Squares
Date: 10/06/13 Time: 12:22
Sample(adjusted): 1991:4 2012:4
Included observations: 85 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNGDPCH(-1),2)	-1.408587	0.099928	-14.09606	0.0000

R-squared	0.702842	Mean dependent var	-0.000237
Adjusted R-squared	0.702842	S.D. dependent var	0.027891
S.E. of regression	0.015204	Akaike info criterion	-5.522801
Sum squared resid	0.019418	Schwarz criterion	-5.494064
Log likelihood	235.7190	Durbin-Watson stat	2.219311

LNGDPCH (-2) (With Constant & Trend)

PP Test Statistic	-26.10236	1%	Critical Value*	-4.0686
		5%	Critical Value	-3.4626
		10%	Critical Value	-3.1574

*MacKinnon critical values for rejection of hypothesis of a unit root.

Lag truncation for Bartlett kernel: 3	(Newey-West suggests: 3)	
Residual variance with no correction		0.000228
Residual variance with correction		3.61E-05

Phillips-Perron Test Equation
Dependent Variable: D(LNGDPCH,3)
Method: Least Squares
Date: 10/06/13 Time: 12:23
Sample(adjusted): 1991:4 2012:4
Included observations: 85 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNGDPCH(-1),2)	-1.408574	0.101143	-13.92655	0.0000
C	-0.000139	0.003487	-0.039759	0.9684
@TREND(1991:1)	1.57E-06	6.80E-05	0.023116	0.9816

R-squared	0.702850	Mean dependent var	-0.000237
Adjusted R-squared	0.695603	S.D. dependent var	0.027891
S.E. of regression	0.015388	Akaike info criterion	-5.475769
Sum squared resid	0.019417	Schwarz criterion	-5.389558
Log likelihood	235.7202	F-statistic	96.97762
Durbin-Watson stat	2.219385	Prob(F-statistic)	0.000000

LNSERVICECH(-2) (Without Constant & Trend)

PP Test Statistic	-18.78805	1%	Critical Value*	-2.5902
		5%	Critical Value	-1.9440
		10%	Critical Value	-1.6177

*MacKinnon critical values for rejection of hypothesis of a unit root.

Lag truncation for Bartlett kernel: 3	(Newey-West suggests: 3)	
Residual variance with no correction		7.96E-05
Residual variance with correction		3.06E-05

Phillips-Perron Test Equation
Dependent Variable: D(LNSERVICECH,3)
Method: Least Squares
Date: 10/06/13 Time: 12:24
Sample(adjusted): 1991:4 2012:4
Included observations: 85 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNSERVICECH(-1),2)	-1.413633	0.099335	-14.23093	0.0000

R-squared	0.706819	Mean dependent var	-7.94E-05
Adjusted R-squared	0.706819	S.D. dependent var	0.016570
S.E. of regression	0.008972	Akaike info criterion	-6.577663
Sum squared resid	0.006762	Schwarz criterion	-6.548926
Log likelihood	280.5507	Durbin-Watson stat	2.280021

LNSERVICECH(-2) (With Constant & Trend)

PP Test Statistic	-18.53210	1%	Critical Value*	-4.0686
		5%	Critical Value	-3.4626
		10%	Critical Value	-3.1574

*MacKinnon critical values for rejection of hypothesis of a unit root.

Lag truncation for Bartlett kernel: 3	(Newey-West suggests: 3)	
Residual variance with no correction		7.95E-05
Residual variance with correction		3.05E-05

Phillips-Perron Test Equation
Dependent Variable: D(LNSERVICECH,3)
Method: Least Squares
Date: 10/06/13 Time: 12:25
Sample(adjusted): 1991:4 2012:4
Included observations: 85 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNSERVICECH(-1),2)	-1.414071	0.100533	-14.06575	0.0000
C	2.30E-05	0.002057	0.011191	0.9911
@TREND(1991:1)	3.69E-06	4.01E-05	0.091917	0.9270

R-squared	0.706981	Mean dependent var	-7.94E-05
Adjusted R-squared	0.699834	S.D. dependent var	0.016570
S.E. of regression	0.009079	Akaike info criterion	-6.531156
Sum squared resid	0.006758	Schwarz criterion	-6.444945
Log likelihood	280.5741	F-statistic	98.92266
Durbin-Watson stat	2.280694	Prob(F-statistic)	0.000000

LNFINANCECH(-2) (Without Constant & Trend)

PP Test Statistic	-19.42344	1% Critical Value*	-2.5902
		5% Critical Value	-1.9440
		10% Critical Value	-1.6177

*MacKinnon critical values for rejection of hypothesis of a unit root.

Lag truncation for Bartlett kernel: 4	(Newey-West suggests: 3)	
Residual variance with no correction		0.000328
Residual variance with correction		0.000149

Phillips-Perron Test Equation
Dependent Variable: D(LNFINANCECH,3)
Method: Least Squares
Date: 11/25/13 Time: 20:31
Sample(adjusted): 1991:4 2012:4
Included observations: 85 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNFINANCECH(-1),2)	-1.472469	0.096163	-15.31216	0.0000

R-squared	0.736233	Mean dependent var	-4.96E-06
Adjusted R-squared	0.736233	S.D. dependent var	0.035489
S.E. of regression	0.018226	Akaike info criterion	-5.160199
Sum squared resid	0.027905	Schwarz criterion	-5.131462
Log likelihood	220.3085	Durbin-Watson stat	2.330219

Results of Unit Root Tests										
	ADF TEST					ADF TEST (WITH C &TREND)				
VARIABLE	Level	1%	5%	10%	Conclusion	Level	1%	5%	10%	Conclusion
LNGDP_CH	3,71676	-2,59020	-1,94398	-1,61770	Non-Stationary	-3,13302	-4,06860	-3,46260	-3,15740	Non-Stationary
LNSERVICE_CH	3,87132	-2,59020	-1,94400	-1,61770	Non-Stationary	-2,08822	-4,06860	-3,46260	-3,15740	Non-Stationary
LNFINANCE_CH	3,21989	-2,59181	-1,94457	-1,61432	Non-Stationary	-1,41521	-4,06698	-3,46229	-3,15748	Non-Stationary
ΔLNGDP_CH	-6,12679	-2,59060	-1,94400	-1,61780	Stationary	-8,49433	-4,07000	-3,46320	-3,15780	Stationary
ΔLNSERVICE_CH	-3,35763	-2,59060	-1,94400	-1,61780	Stationary	-5,02550	-4,07000	-3,46320	-3,15780	Stationary
ΔLNFINANCE_CH	-7,24294	-2,59213	-1,94462	-1,61429	Stationary	-7,99544	-4,06829	-3,46291	-3,15784	Stationary
Δ²LNGDP_CH	-19,41534	-2,59090	-1,94410	-1,61780	Stationary	-19,18501	-4,07130	-3,46390	-3,15810	Stationary
Δ²LNSERVICE_CH	-10,10386	-2,59090	-1,94410	-1,61780	Stationary	-9,97618	-4,07130	-3,46390	-3,15810	Stationary
Δ²LNFINANCE_CH	-9,09207	-2,59312	-1,94476	-1,61420	Stationary	-8,97383	-4,07242	-3,46487	-3,15897	Stationary

GDP_CH	3,70764	-2,59020	-1,94400	-1,61770	Non-Stationary	-2,85526	-4,06860	-3,46260	-3,15740	Non-Stationary
SERVICE_CH	3,86242	-2,59020	-1,94400	-1,61770	Non-Stationary	-2,33296	-4,06860	-3,46260	-3,15740	Non-Stationary
FINANCE_CH	2,92846	-2,59181	-1,39446	-1,61432	Non-Stationary	-1,59278	-4,06698	-3,46229	-3,15748	Non-Stationary
ΔGDP_CH	-5,97100	-2,59060	-1,94400	-1,61780	Stationary	-8,27458	-4,07000	-3,46320	-3,15780	Stationary
ΔSERVICE_CH	-3,34366	-2,59060	-1,94400	-1,61780	Stationary	-5,01261	-4,07000	-3,46320	-3,15780	Stationary
ΔFINANCE_CH	-7,23818	-2,59213	-1,94462	-1,61429	Stationary	-7,87918	-4,06829	-3,46291	-3,15784	Stationary
Δ²GDP_CH	-18,83935	-2,59090	-1,94410	-1,61780	Stationary	-18,61311	-4,07130	-3,46390	-3,15810	Stationary
Δ²SERVICE_CH	-10,11210	-2,59090	-1,94410	-1,61780	Stationary	-9,99056	-4,07130	-3,46390	-3,15810	Stationary
Δ²FINANCE_CH	-9,15258	-2,59312	-1,94476	-1,61420	Stationary	-9,03612	-4,07242	-3,46487	-3,15897	Stationary

Table 2: Results of Unit Root Tests									
	ADF TEST								
Variable	**Level**	**1%**	**5%**	**10%**	**Level**	**1%**	**5%**	**10%**	**Conclusion**
LNGDP_CH	**3,71676**	-2,59020	-1,94398	-1,61770	**-3,13302**	-4,06860	-3,46260	-3,15740	**Non-Stationary**
LNSERVİCE_CH	**3,87132**	-2,59020	-1,94400	-1,61770	**-2,08822**	-4,06860	-3,46260	-3,15740	**Non-Stationary**
LNFİNANCE_CH	**3,21989**	-2,59181	-1,94457	-1,61432	**-1,41521**	-4,06698	-3,46229	-3,15748	**Non-Stationary**
ΔLNGDP_CH	**-6,12679**	-2,59060	-1,94400	-1,61780	**-8,49433**	-4,07000	-3,46320	-3,15780	**Stationary**
ΔLNSERVİCE_CH	**-3,35763**	-2,59060	-1,94400	-1,61780	**-5,02550**	-4,07000	-3,46320	-3,15780	**Stationary**
ΔLNFİNANCE_CH	**-7,24294**	-2,59213	-1,94462	-1,61429	**-7,99544**	-4,06829	-3,46291	-3,15784	**Stationary**
Δ²LNGDP_CH	**-19,41534**	-2,59090	-1,94410	-1,61780	**-19,18501**	-4,07130	-3,46390	-3,15810	**Stationary**
Δ²LNSERVİCE_CH	**-10,10386**	-2,59090	-1,94410	-1,61780	**-9,97618**	-4,07130	-3,46390	-3,15810	**Stationary**
Δ²LNFİNANCE_CH	**-9,09207**	-2,59312	-1,94476	-1,61420	**-8,97383**	-4,07242	-3,46487	-3,15897	**Stationary**
GDP_CH	**3,70764**	-2,59020	-1,94400	-1,61770	**-2,85526**	-4,06860	-3,46260	-3,15740	**Non-Stationary**
SERVİCE_CH	**3,86242**	-2,59020	-1,94400	-1,61770	**-2,33296**	-4,06860	-3,46260	-3,15740	**Non-Stationary**
FİNANCE_CH	**2,92846**	-2,59181	-1,39446	-1,61432	**-1,59278**	-4,06698	-3,46229	-3,15748	**Non-Stationary**
ΔGDP_CH	**-5,97100**	-2,59060	-1,94400	-1,61780	**-8,27458**	-4,07000	-3,46320	-3,15780	**Stationary**
ΔSERVİCE_CH	**-3,34366**	-2,59060	-1,94400	-1,61780	**-5,01261**	-4,07000	-3,46320	-3,15780	**Stationary**
ΔFİNANCE_CH	**-7,23818**	-2,59213	-1,94462	-1,61429	**-7,87918**	-4,06829	-3,46291	-3,15784	**Stationary**
Δ²GDP_CH	**-18,83935**	-2,59090	-1,94410	-1,61780	**-18,61311**	-4,07130	-3,46390	-3,15810	**Stationary**
Δ²SERVİCE_CH	**-10,11210**	-2,59090	-1,94410	-1,61780	**-9,99056**	-4,07130	-3,46390	-3,15810	**Stationary**
Δ²FİNANCE_CH	**-9,15258**	-2,59312	-1,94476	-1,61420	**-9,03612**	-4,07242	-3,46487	-3,15897	**Stationary**

Results of Unit Root Tests								
	PP TEST				PP TEST (WİTH C &TREND)			
Variable	**Level**	**1%**	**5%**	**10%**	**Level**	**1%**	**5%**	**10%**
LNGDP_CH	**4,20675**	-2,58970	-1,94390	-1,61770	**-3,02819**	-4,06610	-3,46140	-3,15670
LNSERVİCE_CH	**4,76423**	-2,58970	-1,94390	-1,61770	**-2,12305**	-4,06610	-3,46140	-3,15670
LNFİNANCECH	**2,74251**	-2,58970	-1,94390	-1,61770	**-1,70870**	-4,06610	-3,46140	-3,15670
ΔLNGDP_CH	**-8,83440**	-2,58990	-1,94390	-1,61770	**-10,29210**	-4,06730	-3,46200	-3,15700
ΔLNSERVİCE_CH	**-6,55404**	-2,58990	-1,94390	-1,61770	**-8,05487**	-4,06730	-3,46200	-3,15700
ΔLNFİNANCECH	**-7,50388**	-2,58990	-1,94390	-1,61770	**-8,10927**	-4,06730	-3,46200	-3,15700
Δ²LNGDP_CH	**-26,54518**	-2,59020	-1,94400	-1,61770	**-26,10236**	-4,06860	-3,46260	-3,15740
Δ²LNSERVİCE_CH	**-18,78805**	-2,59020	-1,94400	-1,61770	**-18,53210**	-4,06860	-3,46260	-3,15740
Δ²LNFİNANCECH	**-19,42344**	-2,59020	-1,94400	-1,61770	**-19,15651**	-4,06860	-3,46260	-3,15740
GDP_CH	**4,21287**	-2,58970	-1,94390	-1,61770	**-2,72681**	-4,06610	-3,46140	-3,15670
SERVİCE_CH	**4,74222**	-2,58970	-1,94390	-1,61770	**-2,43583**	-4,06610	-3,46140	-3,15670
FİNANCE_CH	**2,47168**	-2,58970	-1,94390	-1,61770	**-1,92491**	-4,06610	-3,46140	-3,15670
ΔGDP_CH	**-8,50134**	-2,58990	-1,94390	-1,61770	**-9,87951**	-4,06730	-3,46200	-3,15700
ΔSERVİCE_CH	**-6,46449**	-2,58990	-1,94390	-1,61770	**-7,94280**	-4,06730	-3,46200	-3,15700
ΔFİNANCE_CH	**-7,33455**	-2,58990	-1,94390	-1,61770	**-7,92117**	-4,06730	-3,46200	-3,15700
Δ²GDP_CH	**-24,95811**	-2,59020	-1,94400	-1,61770	**-24,54381**	-4,06860	-3,46260	-3,15740
Δ²SERVİCE_CH	**-18,43037**	-2,59020	-1,94400	-1,61770	**-18,19066**	-4,06860	-3,46260	-3,15740
Δ²FİNANCE_CH	**-19,01700**	-2,59020	-1,94400	-1,61770	**-18,75301**	-4,06860	-3,46260	-3,15740

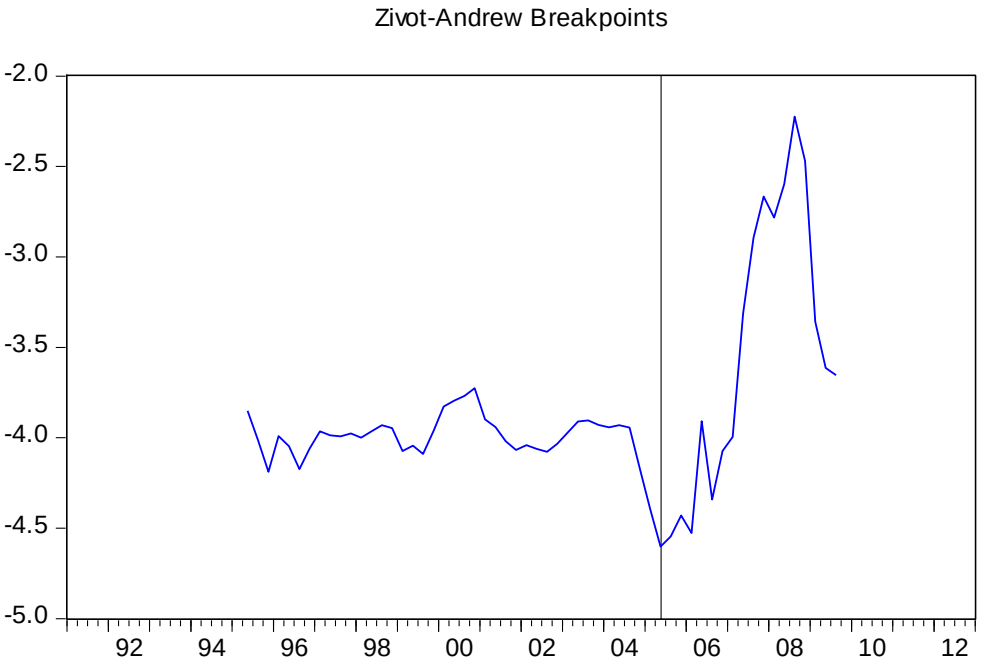
ZIVOT-ANDREWS UNIT ROOT TEST

GDPCH

Zivot-Andrews Unit Root Test
Date: 12/28/13 Time: 18:12
Sample: 1991Q1 2012Q4
Included observations: 88
Null Hypothesis: GDPCH has a unit root with a structural break in both the intercept and trend
Chosen lag length: 4 (maximum lags: 4)
Chosen break point: 2005Q2

	t-Statistic	Prob. *
Zivot-Andrews test statistic	-4.602523	0.010652
1% critical value:	-5.57	
5% critical value:	-5.08	
10% critical value:	-4.82	

* Probability values are calculated from a standard t-distribution and do not take into account the breakpoint selection process



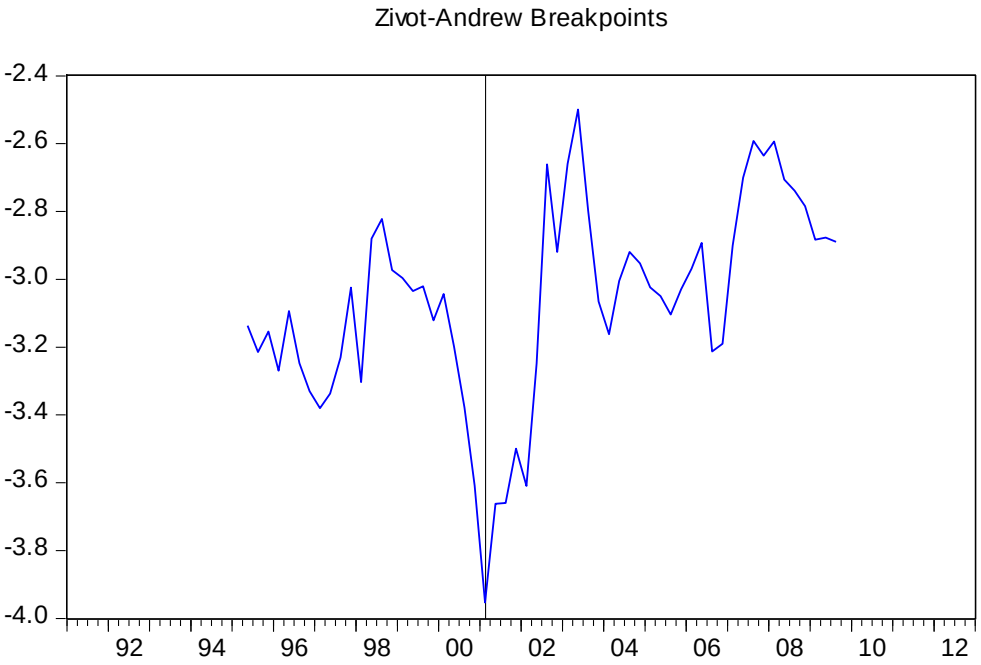
GDPCH

SERVICECH

Zivot-Andrews Unit Root Test
Date: 12/28/13 Time: 18:12
Sample: 1991Q1 2012Q4
Included observations: 88
Null Hypothesis: SERVICECH has a unit root with a structural break in both the intercept and trend
Chosen lag length: 4 (maximum lags: 5)
Chosen break point: 2001Q1

	t-Statistic	Prob. *
Zivot-Andrews test statistic	-3.953258	0.000940
1% critical value:	-5.57	
5% critical value:	-5.08	
10% critical value:	-4.82	

* Probability values are calculated from a standard t-distribution and do not take into account the breakpoint selection process



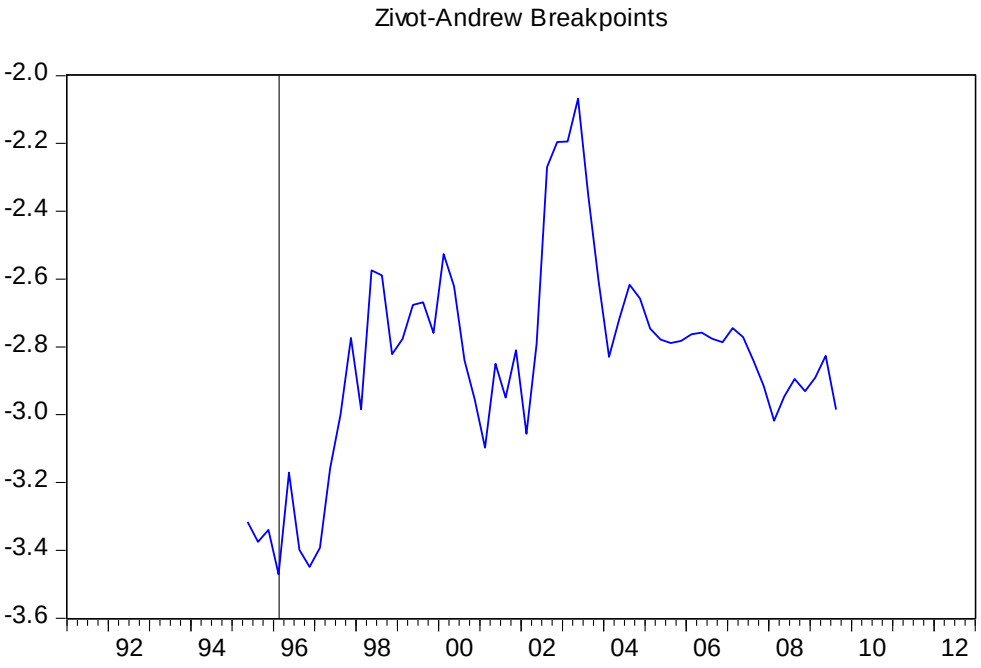
SERVICECH

FINANCECH

Zivot-Andrews Unit Root Test
Date: 12/28/13 Time: 18:12
Sample: 1991Q1 2012Q4
Included observations: 88
Null Hypothesis: FINANCECH has a unit root with a structural break in the intercept
Chosen lag length: 4 (maximum lags: 4)
Chosen break point: 1996Q1

	t-Statistic	Prob. *
Zivot-Andrews test statistic	-3.471026	0.364770
1% critical value:	-5.34	
5% critical value:	-4.93	
10% critical value:	-4.58	

* Probability values are calculated from a standard t-distribution and do not take into account the breakpoint selection process



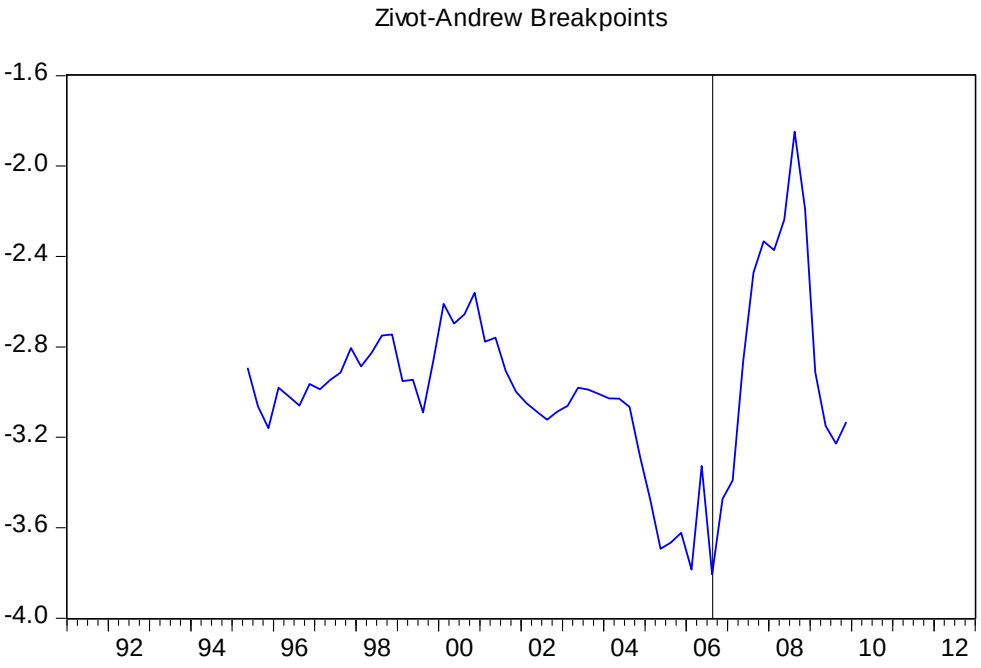
FINANCECH

LNGDPCH

Zivot-Andrews Unit Root Test
Date: 12/28/13 Time: 18:12
Sample: 1991Q1 2012Q4
Included observations: 88
Null Hypothesis: LNGDPCH has a unit root with a structural break in both the intercept and trend
Chosen lag length: 5 (maximum lags: 5)
Chosen break point: 2006Q3

	t-Statistic	Prob. *
Zivot-Andrews test statistic	-3.805726	0.009600
1% critical value:	-5.57	
5% critical value:	-5.08	
10% critical value:	-4.82	

* Probability values are calculated from a standard t-distribution and do not take into account the breakpoint selection process



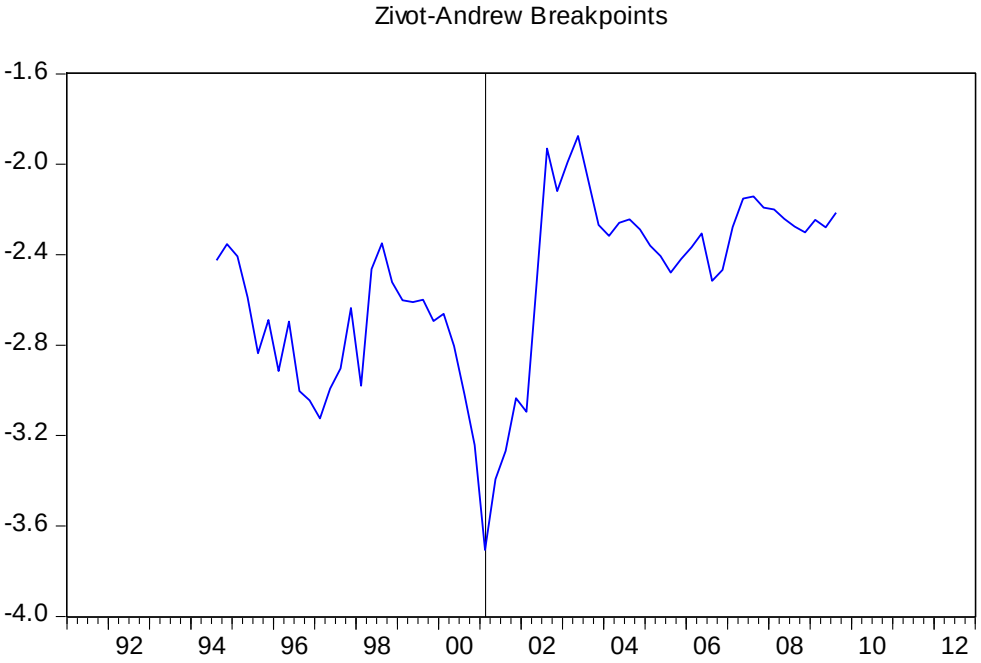
LNGDPCH

LNSERVICECH

Zivot-Andrews Unit Root Test
Date: 12/28/13 Time: 18:12
Sample: 1991Q1 2012Q4
Included observations: 88
Null Hypothesis: LNSERVICECH has a unit root with a structural break in both the intercept and trend
Chosen lag length: 1 (maximum lags: 5)
Chosen break point: 2001Q1

	t-Statistic	Prob. *
Zivot-Andrews test statistic	-3.706412	0.000244
1% critical value:	-5.57	
5% critical value:	-5.08	
10% critical value:	-4.82	

* Probability values are calculated from a standard t-distribution and do not take into account the breakpoint selection process



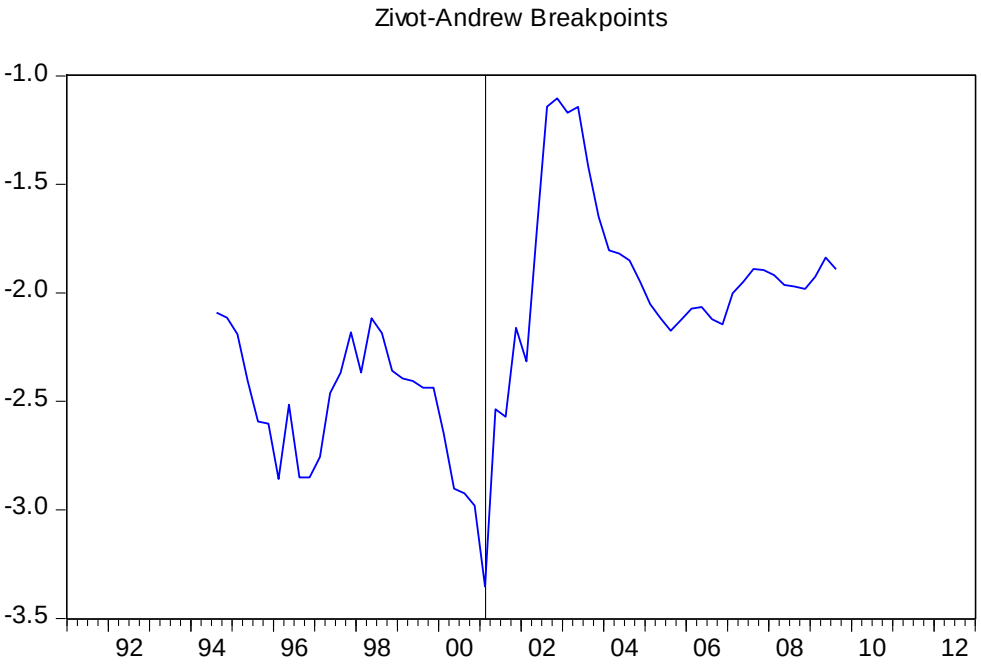
LNSERVICE

LNFINANCECH

Zivot-Andrews Unit Root Test
Date: 12/28/13 Time: 18:12
Sample: 1991Q1 2012Q4
Included observations: 88
Null Hypothesis: LNFINANCECH has a unit root with a structural break in both the intercept and trend
Chosen lag length: 1 (maximum lags: 5)
Chosen break point: 2001Q1

	t-Statistic	Prob. *
Zivot-Andrews test statistic	-3.353710	0.003463
1% critical value:	-5.57	
5% critical value:	-5.08	
10% critical value:	-4.82	

* Probability values are calculated from a standard t-distribution and do not take into account the breakpoint selection process



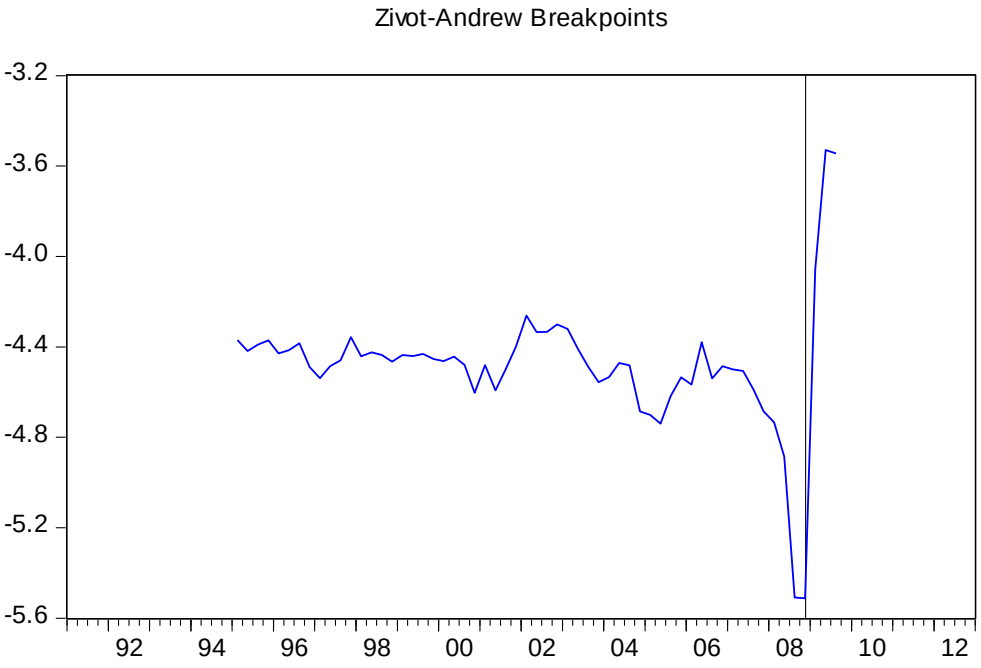
LNFINANCE

DGDPCH

Zivot-Andrews Unit Root Test
Date: 12/28/13 Time: 21:12
Sample: 1991Q1 2012Q4
Included observations: 88
Null Hypothesis: DGDPCH has a unit root with a structural break in both the intercept and trend
Chosen lag length: 4 (maximum lags: 5)
Chosen break point: 2008Q4

	t-Statistic	Prob. *
Zivot-Andrews test statistic	-5.512518	0.004298
1% critical value:	-5.57	
5% critical value:	-5.08	
10% critical value:	-4.82	

* Probability values are calculated from a standard t-distribution and do not take into account the breakpoint selection process



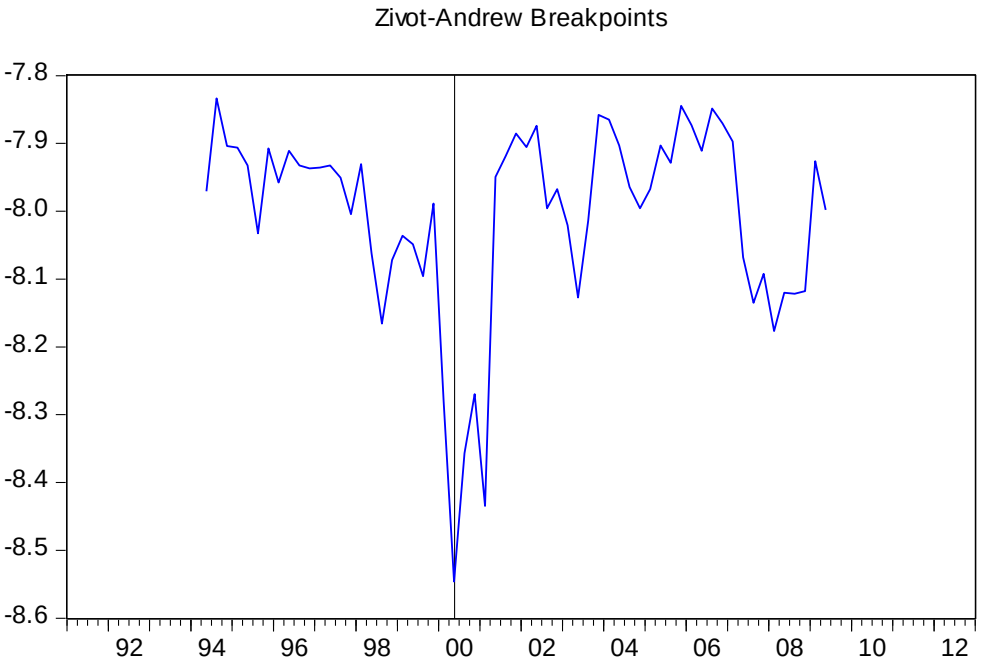
DGDPCH

DSERVICECH

Zivot-Andrews Unit Root Test
Date: 12/28/13 Time: 21:12
Sample: 1991Q1 2012Q4
Included observations: 88
Null Hypothesis: DSERVICECH has a unit root with a structural break in both the intercept and trend
Chosen lag length: 0 (maximum lags: 5)
Chosen break point: 2000Q2

	t-Statistic	Prob. *
Zivot-Andrews test statistic	-8.546015	0.009466
1% critical value:	-5.57	
5% critical value:	-5.08	
10% critical value:	-4.82	

* Probability values are calculated from a standard t-distribution and do not take into account the breakpoint selection process



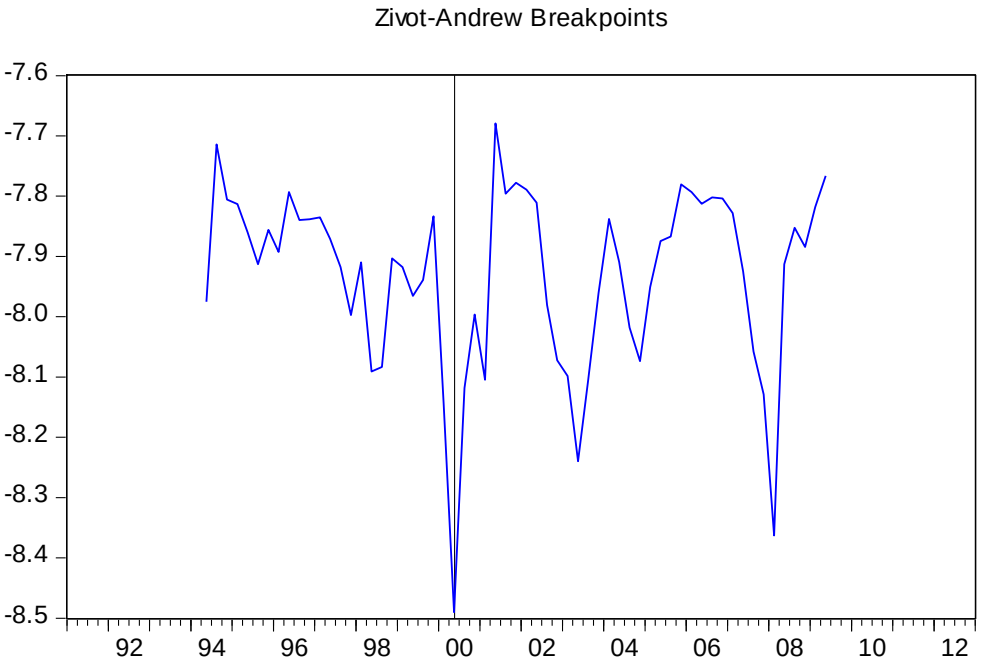
DSERVICECH

DFINANCECH

Zivot-Andrews Unit Root Test
Date: 12/28/13 Time: 21:12
Sample: 1991Q1 2012Q4
Included observations: 88
Null Hypothesis: DFINANCECH has a unit root with a structural break in both the intercept and trend
Chosen lag length: 0 (maximum lags: 5)
Chosen break point: 2000Q2

	t-Statistic	Prob. *
Zivot-Andrews test statistic	-8.490106	0.005993
1% critical value:	-5.57	
5% critical value:	-5.08	
10% critical value:	-4.82	

* Probability values are calculated from a standard t-distribution and do not take into account the breakpoint selection process



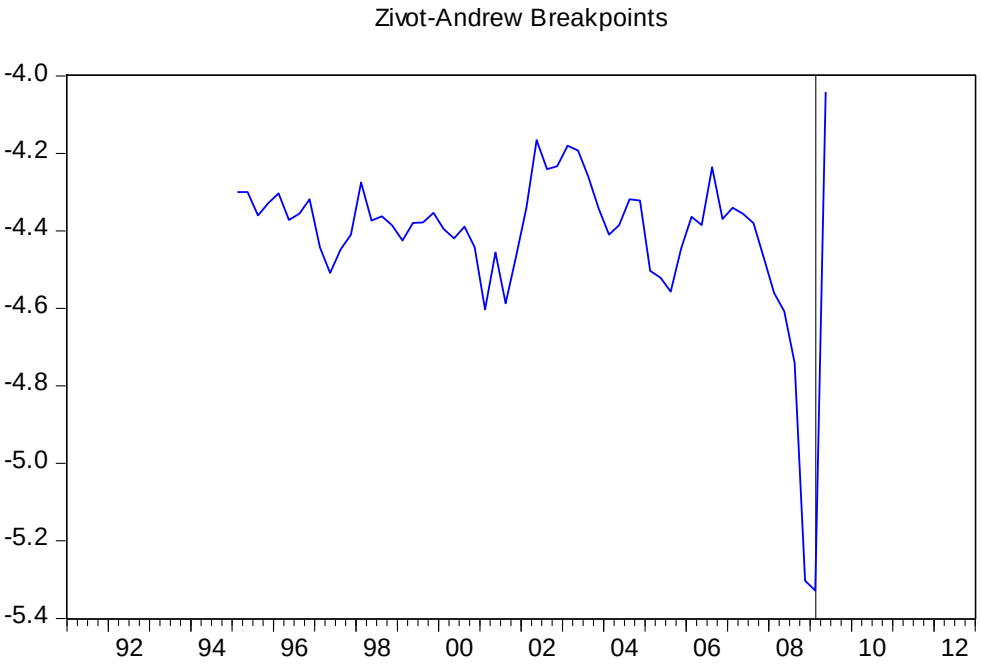
DFINANCECH

DLNGDPCH

Zivot-Andrews Unit Root Test
Date: 12/28/13 Time: 21:12
Sample: 1991Q1 2012Q4
Included observations: 88
Null Hypothesis: DLNGDPCH has a unit root with a structural break in both the intercept and trend
Chosen lag length: 4 (maximum lags: 5)
Chosen break point: 2009Q1

	t-Statistic	Prob. *
Zivot-Andrews test statistic	-5.328304	0.004258
1% critical value:	-5.57	
5% critical value:	-5.08	
10% critical value:	-4.82	

* Probability values are calculated from a standard t-distribution and do not take into account the breakpoint selection process



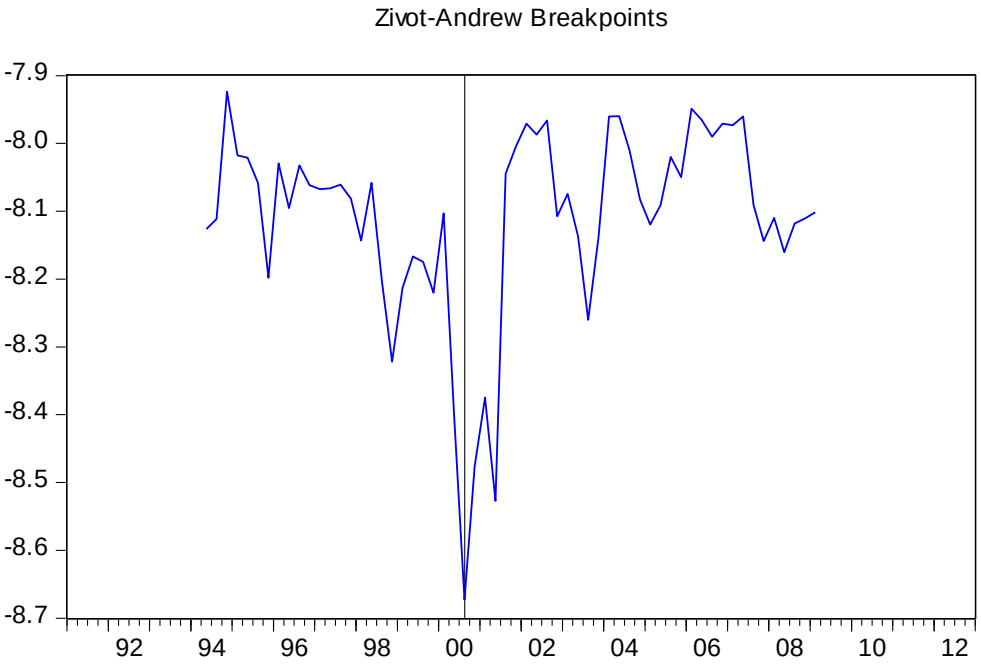
DLNGDPCH

DLNSERVICECH

Zivot-Andrews Unit Root Test
Date: 12/28/13 Time: 21:12
Sample: 1991Q1 2012Q4
Included observations: 88
Null Hypothesis: DLNSERVICECH has a unit root with a structural break in both the intercept and trend
Chosen lag length: 0 (maximum lags: 5)
Chosen break point: 2000Q3

	t-Statistic	Prob. *
Zivot-Andrews test statistic	-8.672833	0.008538
1% critical value:	-5.57	
5% critical value:	-5.08	
10% critical value:	-4.82	

* Probability values are calculated from a standard t-distribution and do not take into account the breakpoint selection process



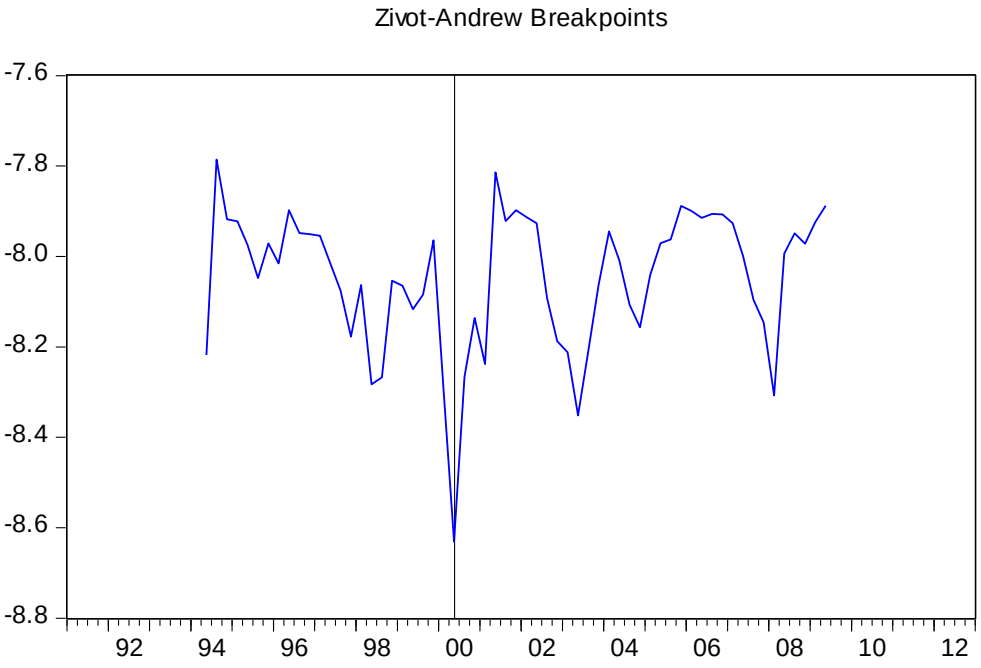
DLNSERVICECH

DLNFINANCECH

Zivot-Andrews Unit Root Test
Date: 12/28/13 Time: 21:12
Sample: 1991Q1 2012Q4
Included observations: 88
Null Hypothesis: DLNFINANCECH has a unit root with a structural break in both the intercept and trend
Chosen lag length: 0 (maximum lags: 5)
Chosen break point: 2000Q2

	t-Statistic	Prob. *
Zivot-Andrews test statistic	-8.630997	0.004051
1% critical value:	-5.57	
5% critical value:	-5.08	
10% critical value:	-4.82	

* Probability values are calculated from a standard t-distribution and do not take into account the breakpoint selection process



DLNFINANCECH

MULTIPLE BREAKPOINT TESTS

LNGDPCH - LNSERVICECH

Dependent Variable: LNGDPCH
Method: Least Squares
Date: 12/28/13 Time: 18:55
Sample: 1991Q1 2012Q4
Included observations: 88

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNSERVICECH	0.992122	0.023974	41.38366	0.0000
C	0.935401	0.258862	3.613516	0.0005

R-squared	0.952185	Mean dependent var	11.64751
Adjusted R-squared	0.951629	S.D. dependent var	0.109922
S.E. of regression	0.024176	Akaike info criterion	-4.584486
Sum squared resid	0.050263	Schwarz criterion	-4.528183
Log likelihood	203.7174	Hannan-Quinn criter.	-4.561803
F-statistic	1712.607	Durbin-Watson stat	0.258140
Prob(F-statistic)	0.000000		

Multiple breakpoint tests
Bai-Perron tests of L+1 vs. L sequentially determined breaks
Date: 12/28/13 Time: 18:55
Sample: 1991Q1 2012Q4
Included observations: 88
Breakpoint variables: LNSERVICECH C
Break test options: Trimming 0.15, Max. breaks 5, Sig. level 0.05

Sequential F-statistic determined breaks:	3

Break Test	F-statistic	Scaled F-statistic	Critical Value**
0 vs. 1 *	133.0004	266.0008	11.47
1 vs. 2 *	11.73661	23.47322	12.95
2 vs. 3 *	7.813571	15.62714	14.03
3 vs. 4	2.050296	4.100591	14.85

* Significant at the 0.05 level.
** Bai-Perron (Econometric Journal, 2003) critical values.

Break dates:

	Sequential	Repartition
1	2000Q3	1997Q2
2	2004Q1	2000Q3
3	1997Q2	2004Q1

GDPCH - SERVICECH

Dependent Variable: GDPCH
Method: Least Squares
Date: 12/28/13 Time: 18:59
Sample: 1991Q1 2012Q4
Included observations: 88

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SERVICECH	2.379905	0.055383	42.97164	0.0000
C	-1906.994	2738.126	-0.696460	0.4880

R-squared	0.955499	Mean dependent var	115096.4
Adjusted R-squared	0.954982	S.D. dependent var	12788.72
S.E. of regression	2713.438	Akaike info criterion	18.67229
Sum squared resid	6.33E+08	Schwarz criterion	18.72859
Log likelihood	-819.5806	Hannan-Quinn criter.	18.69497
F-statistic	1846.562	Durbin-Watson stat	0.279856
Prob(F-statistic)	0.000000		

Multiple breakpoint tests
Bai-Perron tests of L+1 vs. L sequentially determined breaks
Date: 12/28/13 Time: 18:59
Sample: 1991Q1 2012Q4
Included observations: 88
Breakpoint variables: SERVICECH C
Break test options: Trimming 0.15, Max. breaks 5, Sig. level 0.05

Sequential F-statistic determined breaks:	2

Break Test	F-statistic	Scaled F-statistic	Critical Value**
0 vs. 1 *	117.6623	235.3246	11.47
1 vs. 2 *	11.68508	23.37016	12.95
2 vs. 3	4.966305	9.932610	14.03

* Significant at the 0.05 level.
** Bai-Perron (Econometric Journal, 2003) critical values.

Break dates:

	Sequential	Repartition
1	2000Q3	2000Q3
2	2004Q1	2004Q1

LNGDPCH - LNFINANCECH

Dependent Variable: LNGDPCH
Method: Least Squares
Date: 12/28/13 Time: 18:59
Sample: 1991Q1 2012Q4
Included observations: 88

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNFINANCECH	0.678796	0.027869	24.35626	0.0000
C	4.902201	0.276975	17.69906	0.0000

R-squared	0.873386	Mean dependent var	11.64751
Adjusted R-squared	0.871913	S.D. dependent var	0.109922
S.E. of regression	0.039340	Akaike info criterion	-3.610675
Sum squared resid	0.133098	Schwarz criterion	-3.554372
Log likelihood	160.8697	Hannan-Quinn criter.	-3.587992
F-statistic	593.2276	Durbin-Watson stat	0.151336
Prob(F-statistic)	0.000000		

Multiple breakpoint tests
Bai-Perron tests of L+1 vs. L sequentially determined breaks
Date: 12/28/13 Time: 19:00
Sample: 1991Q1 2012Q4
Included observations: 88
Breakpoint variables: LNFINANCECH C
Break test options: Trimming 0.15, Max. breaks 5, Sig. level 0.05

Sequential F-statistic determined breaks:	3

Break Test	F-statistic	Scaled F-statistic	Critical Value**
0 vs. 1 *	122.2429	244.4858	11.47
1 vs. 2 *	28.39600	56.79200	12.95
2 vs. 3 *	10.45691	20.91383	14.03
3 vs. 4	6.552945	13.10589	14.85

* Significant at the 0.05 level.
** Bai-Perron (Econometric Journal, 2003) critical values.

Break dates:

	Sequential	Repartition
1	2001Q1	1996Q4
2	2008Q2	2001Q1
3	1996Q4	2008Q2

GDPCH - FINANCECH

Dependent Variable: GDPCH
Method: Least Squares
Date: 12/28/13 Time: 19:01
Sample: 1991Q1 2012Q4
Included observations: 88

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FINANCECH	3.944226	0.153006	25.77823	0.0000
C	32603.88	3233.571	10.08293	0.0000

R-squared	0.885412	Mean dependent var	115096.4
Adjusted R-squared	0.884080	S.D. dependent var	12788.72
S.E. of regression	4354.180	Akaike info criterion	19.61813
Sum squared resid	1.63E+09	Schwarz criterion	19.67443
Log likelihood	-861.1975	Hannan-Quinn criter.	19.64081
F-statistic	664.5170	Durbin-Watson stat	0.172677
Prob(F-statistic)	0.000000		

Multiple breakpoint tests
Bai-Perron tests of L+1 vs. L sequentially determined breaks
Date: 12/28/13 Time: 19:02
Sample: 1991Q1 2012Q4
Included observations: 88
Breakpoint variables: FINANCECH C
Break test options: Trimming 0.15, Max. breaks 5, Sig. level 0.05

Sequential F-statistic determined breaks:	2

Break Test	F-statistic	Scaled F-statistic	Critical Value**
0 vs. 1 *	95.64624	191.2925	11.47
1 vs. 2 *	34.99019	69.98037	12.95
2 vs. 3	6.240332	12.48066	14.03

* Significant at the 0.05 level.
** Bai-Perron (Econometric Journal, 2003) critical values.

Break dates:

	Sequential	Repartition
1	2001Q1	2001Q1
2	2008Q2	2008Q2

BREAK VS. NON-BREAK

LNGDPCH-LNSERVICECH

Multiple breakpoint tests
Compare information criteria for 0 to M globally determined breaks
Date: 12/29/13 Time: 17:10
Sample: 1991Q1 2012Q4
Included observations: 88
Breakpoint variables: LNSERVICECH C
Break test options: Trimming 0.15, Max. breaks 5

Schwarz criterion selected breaks:	3
LWZ criterion selected breaks:	1

Breaks	# of Coefs.	Sum of Sq. Resids.	Log-L	Schwarz* Criterion	LWZ* Criterion
0	2	0.050263	203.7174	-7.366060	-7.286573
1	5	0.012063	266.5106	-8.640542	-8.440800
2	8	0.009378	277.5871	-8.739644	-8.418340
3	11	0.007846	285.4380	-8.765437	-8.321165
4	14	0.007454	287.6924	-8.664037	-8.095278
5	17	0.007976	284.7146	-8.443723	-7.748831

* Minimum information criterion values displayed with shading

Estimated break dates:
1: 2000Q3
2: 2000Q3, 2004Q1
3: 1997Q2, 2000Q3, 2004Q1
4: 1997Q2, 2000Q3, 2004Q1, 2009Q4
5: 1994Q2, 1997Q3, 2000Q4, 2004Q1, 2009Q4

GDPCH-SERVICECH

Multiple breakpoint tests
Compare information criteria for 0 to M globally determined breaks
Date: 01/01/14 Time: 20:00
Sample: 1991Q1 2012Q4
Included observations: 88
Breakpoint variables: SERVICECH C
Break test options: Trimming 0.15, Max. breaks 5

Schwarz criterion selected breaks:	2
LWZ criterion selected breaks:	1

Breaks	# of Coefs.	Sum of Sq. Resids.	Log-L	Schwarz* Criterion	LWZ* Criterion
0	2	6.33E+08	-819.5806	15.89071	15.97020
1	5	1.67E+08	-760.8234	14.70796	14.90770
2	8	1.30E+08	-749.7899	14.60983	14.93114
3	11	1.15E+08	-744.6404	14.64544	15.08971
4	14	1.08E+08	-741.9284	14.73644	15.30520
5	17	1.15E+08	-744.7022	14.95211	15.64700

* Minimum information criterion values displayed with shading

Estimated break dates:
1: 2000Q3
2: 2000Q3, 2004Q1
3: 1997Q2, 2000Q3, 2004Q1
4: 1997Q2, 2000Q3, 2004Q1, 2009Q4
5: 1994Q2, 1997Q3, 2000Q4, 2004Q1, 2009Q4

LNGDPCH-LNFINANCECH

Multiple breakpoint tests
Compare information criteria for 0 to M globally determined breaks
Date: 01/01/14 Time: 20:02
Sample: 1991Q1 2012Q4
Included observations: 88
Breakpoint variables: LNFINANCECH C
Break test options: Trimming 0.15, Max. breaks 5

Schwarz criterion selected breaks:	4
LWZ criterion selected breaks:	3

Breaks	# of Coefs.	Sum of Sq. Resids.	Log-L	Schwarz* Criterion	LWZ* Criterion
0	2	0.133098	160.8697	-6.392249	-6.312761
1	5	0.034036	220.8715	-7.603289	-7.403547
2	8	0.020109	244.0268	-7.976910	-7.655606
3	11	0.014538	258.2984	-8.148628	-7.704356
4	14	0.012155	266.1752	-8.175009	-7.606249
5	17	0.011788	267.5265	-8.053085	-7.358193

* Minimum information criterion values displayed with shading

Estimated break dates:
1: 2001Q1
2: 2001Q1, 2008Q2
3: 2000Q2, 2003Q3, 2008Q2
4: 1997Q2, 2000Q3, 2004Q1, 2008Q2
5: 1996Q4, 2000Q1, 2003Q2, 2006Q3, 2009Q4

GDPCH-FINANCECH

Multiple breakpoint tests
Compare information criteria for 0 to M globally determined breaks
Date: 01/01/14 Time: 20:01
Sample: 1991Q1 2012Q4
Included observations: 88
Breakpoint variables: FINANCECH C
Break test options: Trimming 0.15, Max. breaks 5

Schwarz criterion selected breaks:	3
LWZ criterion selected breaks:	2

Breaks	# of Coefs.	Sum of Sq. Resids.	Log-L	Schwarz* Criterion	LWZ* Criterion
0	2	1.63E+09	-861.1975	16.83655	16.91604
1	5	4.98E+08	-808.9688	15.80217	16.00191
2	8	2.68E+08	-781.8193	15.33777	15.65908
3	11	2.05E+08	-769.9423	15.22048	15.66475
4	14	1.85E+08	-765.5138	15.27247	15.84123
5	17	1.77E+08	-763.4354	15.37787	16.07276

* Minimum information criterion values displayed with shading

Estimated break dates:
1: 2001Q1
2: 2001Q1, 2008Q2
3: 2000Q3, 2004Q1, 2008Q2
4: 1997Q2, 2000Q3, 2004Q1, 2008Q2
5: 1996Q4, 2000Q1, 2003Q2, 2006Q3, 2009Q4

OLS

Dependent Variable: LNGDPREAL
Method: Least Squares
Date: 10/13/13 Time: 13:01
Sample: 1991:1 2012:4
Included observations: 88

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.935457	0.258864	3.613702	0.0005
LNSERVICECH	0.992116	0.023974	41.38310	0.0000

R-squared	0.952184	Mean dependent var	11.64751
Adjusted R-squared	0.951628	S.D. dependent var	0.109922
S.E. of regression	0.024176	Akaike info criterion	-4.584468
Sum squared resid	0.050264	Schwarz criterion	-4.528165
Log likelihood	203.7166	F-statistic	1712.561
Durbin-Watson stat	0.258202	Prob(F-statistic)	0.000000

OLS (Sector-Based)

Dependent Variable: GDPCH
Method: Least Squares
Date: 10/06/13 Time: 13:11
Sample: 1991:1 2012:4
Included observations: 88

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3091.529	2363.252	1.308167	0.1944
TOURISMTRADE	1.554567	0.083848	18.54035	0.0000
OTHERSERVICE	1.573417	0.190619	8.254234	0.0000
FINANCE	1.073509	0.085493	12.55667	0.0000

R-squared	0.995143	Mean dependent var	115096.9
Adjusted R-squared	0.994970	S.D. dependent var	12788.73
S.E. of regression	907.0049	Akaike info criterion	16.50256
Sum squared resid	69103264	Schwarz criterion	16.61517
Log likelihood	-722.1127	F-statistic	5737.459
Durbin-Watson stat	1.292574	Prob(F-statistic)	0.000000

CO-INTEGRATION: JOHANSEN TEST

VAR Lag Order Selection Criteria
Endogenous variables: LNGDPCH LNSERVICECH
Exogenous variables: C
Date: 11/25/13 Time: 22:00
Sample: 1991Q1 2012Q4
Included observations: 78

Lag	LogL	LR	FPE	AIC	SC	HQ
0	270.1031	NA	3.54e-06	-6.874439	-6.814010	-6.850248
1	518.0026	476.7298	6.82e-09	-13.12827	-12.94699	-13.05570
2	519.3781	2.574655	7.29e-09	-13.06098	-12.75883	-12.94002
3	525.3426	10.85841	6.94e-09	-13.11135	-12.68835	-12.94201
4	534.9206	16.94580	6.02e-09	-13.25438	-12.71052	-13.03666
5	553.6089	32.10554*	4.14e-09	-13.63100	-12.96629*	-13.36490*
6	558.8299	8.701595	4.02e-09	-13.66230	-12.87674	-13.34783
7	563.6850	7.842870	3.95e-09*	-13.68423*	-12.77780	-13.32137
8	566.5517	4.483796	4.08e-09	-13.65517	-12.62789	-13.24393
9	568.3295	2.689551	4.35e-09	-13.59819	-12.45005	-13.13857
10	570.2221	2.766108	4.62e-09	-13.54416	-12.27516	-13.03615

* 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

VAR Lag Order Selection Criteria
Endogenous variables: GDPCH SERVICECH
Exogenous variables: C
Date: 11/25/13 Time: 22:01
Sample: 1991Q1 2012Q4
Included observations: 78

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1482.291	NA	1.16e+14	38.05874	38.11917	38.08293
1	-1235.686	474.2410	2.30e+11	31.83809	32.01938*	31.91066
2	-1234.111	2.947687	2.45e+11	31.90028	32.20242	32.02123
3	-1228.302	10.57474	2.34e+11	31.85390	32.27690	32.02324
4	-1219.982	14.71956	2.10e+11	31.74314	32.28699	31.96085
5	-1201.150	32.35245	1.44e+11	31.36283	32.02754	31.62893
6	-1194.901	10.41641*	1.36e+11	31.30514	32.09071	31.61962*
7	-1190.401	7.268680	1.35e+11*	31.29233*	32.19876	31.65519
8	-1187.539	4.476905	1.39e+11	31.32150	32.34879	31.73274
9	-1185.293	3.396472	1.47e+11	31.36650	32.51464	31.82612
10	-1183.389	2.783655	1.56e+11	31.42023	32.68922	31.92823

* 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

VAR Lag Order Selection Criteria
Endogenous variables: GDPCH FINANCECH
Exogenous variables: C
Date: 11/25/13 Time: 22:03
Sample: 1991Q1 2012Q4
Included observations: 80

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1522.404	NA	1.22e+14	38.11011	38.16966	38.13399
1	-1259.705	505.6954	1.89e+11	31.64264	31.82129	31.71426
2	-1256.511	5.989055	1.93e+11	31.66278	31.96054	31.78216
3	-1250.129	11.64739	1.82e+11	31.60323	32.02008	31.77036
4	-1234.622	27.52453	1.37e+11	31.31556	31.85152	31.53044
5	-1218.000	28.67378	9.99e+10	31.00000	31.65505*	31.26263
6	-1211.477	10.92568*	9.40e+10*	30.93693*	31.71109	31.24731*
7	-1207.804	5.969398	9.51e+10	30.94509	31.83835	31.30322
8	-1204.779	4.763815	9.79e+10	30.96947	31.98184	31.37536

* 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

VAR Lag Order Selection Criteria
Endogenous variables: LNGDPCH LNFINANCECH
Exogenous variables: C
Date: 11/27/13 Time: 14:39
Sample: 1991Q1 2012Q4
Included observations: 80

Lag	LogL	LR	FPE	AIC	SC	HQ
0	203.9738	NA	2.20e-05	-5.049345	-4.989795	-5.025470
1	470.2895	512.6578	3.12e-08	-11.60724	-11.42859	-11.53561
2	472.9052	4.904313	3.23e-08	-11.57263	-11.27488	-11.45325
3	479.9219	12.80543	3.00e-08	-11.64805	-11.23119	-11.48092
4	495.7350	28.06841	2.23e-08	-11.94338	-11.40742	-11.72850
5	512.7267	29.31062*	1.62e-08	-12.26817	-11.61311*	-12.00554*
6	518.3682	9.449570	1.56e-08	-12.30921	-11.53505	-11.99882
7	522.5689	6.826048	1.55e-08*	-12.31422*	-11.42096	-11.95609
8	524.7430	3.424298	1.63e-08	-12.26858	-11.25621	-11.86269

* 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

LNGDPCH LNSERVICECH (Summary Table)

Date: 01/04/14 Time: 16:30
Sample: 1991Q1 2012Q4
Included observations: 82
Series: LNGDPCH LNSERVICECH
Lags interval: 1 to 5

Selected (0.05 level*) Number of Cointegrating Relations by Model

Data Trend:	None	None	Linear	Linear	Quadratic
Test Type	No Intercept No Trend	Intercept No Trend	Intercept No Trend	Intercept Trend	Intercept Trend
Trace	2	2	0	0	0
Max-Eig	0	0	0	0	0

*Critical values based on MacKinnon-Haug-Michelis (1999)

Information Criteria by Rank and Model

Data Trend:	None	None	Linear	Linear	Quadratic
Rank or No. of CEs	No Intercept No Trend	Intercept No Trend	Intercept No Trend	Intercept Trend	Intercept Trend
	Log Likelihood by Rank (rows) and Model (columns)				
0	578.8940	578.8940	583.7992	583.7992	585.4822
1	584.0079	584.4524	589.3124	589.6604	590.2022
2	588.3876	589.3415	589.3415	593.8706	593.8706
	Akaike Information Criteria by Rank (rows) and Model (columns)				
0	-13.63156	-13.63156	-13.70242	-13.70242	-13.69469
1	-13.65873	-13.64518	-13.73933*	-13.72342	-13.71225
2	-13.66799	-13.64248	-13.64248	-13.70416	-13.70416
	Schwarz Criteria by Rank (rows) and Model (columns)				
0	-13.04456	-13.04456	-13.05671*	-13.05671*	-12.99028
1	-12.95432	-12.91143	-12.97622	-12.93097	-12.89044
2	-12.84618	-12.76197	-12.76197	-12.76495	-12.76495

LNGDPCH LNSERVICECH (Johansen Test)

Date: 11/25/13 Time: 22:16
Sample (adjusted): 1993Q1 2012Q4
Included observations: 80 after adjustments
Trend assumption: No deterministic trend
Series: LNGDPCH LNSERVICECH
Lags interval (in first differences): 1 to 5

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.106074	17.36542	12.32090	0.0066
At most 1 *	0.099618	8.394856	4.129906	0.0045

Trace 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

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.106074	8.970561	11.22480	0.1214
At most 1 *	0.099618	8.394856	4.129906	0.0045

Max-eigenvalue test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

LNGDPCH	LNSERVICECH
21.83724	-23.72193
52.08934	-56.16186

Unrestricted Adjustment Coefficients (alpha):

D(LNGDPCH)	-0.001994	-0.001213
D(LNSERVICECH)	-0.001951	0.001232

1 Cointegrating Equation(s): Log likelihood 574.8256

Normalized cointegrating coefficients (standard error in parentheses)

LNGDPCH	LNSERVICECH
1.000000	-1.086306
	(0.00270)

Adjustment coefficients (standard error in parentheses)

D(LNGDPCH)	-0.043544
	(0.01882)
D(LNSERVICECH)	-0.042604
	(0.01863)

GDPCH SERVICECH (Summary Table)

Date: 11/25/13 Time: 22:19
Sample: 1991Q1 2012Q4
Included observations: 80
Series: GDPCH SERVICECH
Lags interval: 1 to 7

Selected (0.05 level*) Number of Cointegrating Relations by Model

Data Trend:	None	None	Linear	Linear	Quadratic
Test Type	No Intercept No Trend	Intercept No Trend	Intercept No Trend	Intercept Trend	Intercept Trend
Trace	0	1	0	0	0
Max-Eig	0	0	0	0	0

*Critical values based on MacKinnon-Haug-Michelis (1999)

Information Criteria by Rank and Model

Data Trend:	None	None	Linear	Linear	Quadratic
Rank or No. of CEs	No Intercept No Trend	Intercept No Trend	Intercept No Trend	Intercept Trend	Intercept Trend
	Log Likelihood by Rank (rows) and Model (columns)				
0	-1227.129	-1227.129	-1223.062	-1223.062	-1219.990
1	-1222.897	-1221.069	-1217.030	-1216.963	-1214.218
2	-1221.561	-1216.912	-1216.912	-1211.426	-1211.426
	Akaike Information Criteria by Rank (rows) and Model (columns)				
0	31.37822	31.37822	31.32654	31.32654	31.29974
1	31.37242	31.35172	31.27574	31.29907	**31.25545***
2	31.43904	31.37281	31.37281	31.28566	31.28566
	Schwarz Criteria by Rank (rows) and Model (columns)				
0	32.21193*	32.21193*	32.21980	32.21980	32.25255
1	32.32523	32.33431	32.28810	32.34121	32.32736
2	32.51095	32.50427	32.50427	32.47667	32.47667

GDPCH SERVICECH (Johansen Test)

Date: 11/25/13 Time: 22:22
Sample (adjusted): 1993Q1 2012Q4
Included observations: 80 after adjustments
Trend assumption: No deterministic trend (restricted constant)
Series: GDPCH SERVICECH
Lags interval (in first differences): 1 to 7

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.140580	20.43283	20.26184	0.0474
At most 1	0.098696	8.313002	9.164546	0.0724

Trace test indicates 1 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	0.140580	12.11983	15.89210	0.1791
At most 1	0.098696	8.313002	9.164546	0.0724

Max-eigenvalue test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

GDPCH	SERVICECH	C
-0.000328	0.001000	-10.85647
-0.000102	0.000248	-2.082896

Unrestricted Adjustment Coefficients (alpha):

D(GDPCH)	287.7354	-114.7356
D(SERVICECH)	-0.625379	-109.7361

1 Cointegrating Equation(s): Log likelihood -1221.069

Normalized cointegrating coefficients (standard error in parentheses)

GDPCH	SERVICECH	C
1.000000	-3.049910	33106.94
	(0.23574)	(11508.8)

Adjustment coefficients (standard error in parentheses)

D(GDPCH)	-0.094355
	(0.03253)
D(SERVICECH)	0.000205
	(0.01421)

GDPCH FINANCECH (Summary Table)

Date: 11/25/13 Time: 22:24
Sample: 1991Q1 2012Q4
Included observations: 81
Series: GDPCH FINANCECH
Lags interval: 1 to 6

Selected (0.05 level*) Number of Cointegrating Relations by Model

Data Trend:	None	None	Linear	Linear	Quadratic
Test Type	No Intercept No Trend	Intercept No Trend	Intercept No Trend	Intercept Trend	Intercept Trend
Trace	2	1	0	0	0
Max-Eig	2	0	0	0	0

*Critical values based on MacKinnon-Haug-Michelis (1999)

Information Criteria by Rank and Model

Data Trend:	None	None	Linear	Linear	Quadratic
Rank or No. of CEs	No Intercept No Trend	Intercept No Trend	Intercept No Trend	Intercept Trend	Intercept Trend
	Log Likelihood by Rank (rows) and Model (columns)				
0	-1232.709	-1232.709	-1229.178	-1229.178	-1225.065
1	-1225.957	-1225.268	-1222.186	-1222.071	-1219.693
2	-1222.834	-1222.114	-1222.114	-1216.713	-1216.713
	Akaike Information Criteria by Rank (rows) and Model (columns)				
0	31.02986	31.02986	30.99206	30.99206	30.93989
1	30.96190	30.96959	30.91818	30.94003	**30.90601***
2	30.98356	31.01517	31.01517	30.93120	30.93120
	Schwarz Criteria by Rank (rows) and Model (columns)				
0	31.73933*	31.73933*	31.76064	31.76064	31.76760
1	31.78962	31.82686	31.80502	31.85643	31.85196
2	31.92952	32.02025	32.02025	31.99540	31.99540

GDPCH FINANCECH (JOHANSEN TEST)

Date: 11/25/13 Time: 22:25
Sample (adjusted): 1992Q4 2012Q4
Included observations: 81 after adjustments
Trend assumption: No deterministic trend (restricted constant)
Series: GDPCH FINANCECH
Lags interval (in first differences): 1 to 6

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.167840	21.18989	20.26184	0.0372
At most 1	0.074918	6.307713	9.164546	0.1683

Trace test indicates 1 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	0.167840	14.88217	15.89210	0.0715
At most 1	0.074918	6.307713	9.164546	0.1683

Max-eigenvalue test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

GDPCH	FINANCECH	C
-0.000119	0.000883	-3.671317
-8.20E-05	0.000445	-1.120211

Unrestricted Adjustment Coefficients (alpha):

D(GDPCH)	310.5301	-95.14304
D(FINANCECH)	-24.07425	-78.63058

1 Cointegrating Equation(s): Log likelihood -1225.268

Normalized cointegrating coefficients (standard error in parentheses)

GDPCH	FINANCECH	C
1.000000	-7.399048	30764.93
	(1.02657)	(20566.3)

Adjustment coefficients (standard error in parentheses)

D(GDPCH)	-0.037057
	(0.01120)
D(FINANCECH)	0.002873
	(0.00423)

LNGDPCH LNFINANCECH (Summary Table)

Date: 11/27/13 Time: 16:07
Sample: 1991Q1 2012Q4
Included observations: 80
Series: LNGDPCH LNFINANCECH
Lags interval: 1 to 7

Selected (0.05 level*) Number of Cointegrating Relations by Model

Data Trend:	None	None	Linear	Linear	Quadratic
Test Type	No Intercept No Trend	Intercept No Trend	Intercept No Trend	Intercept Trend	Intercept Trend
Trace	2	1	0	0	2
Max-Eig	2	0	0	0	0

*Critical values based on MacKinnon-Haug-Michelis (1999)

Information Criteria by Rank and Model

Data Trend:	None	None	Linear	Linear	Quadratic
Rank or No. of CEs	No Intercept No Trend	Intercept No Trend	Intercept No Trend	Intercept Trend	Intercept Trend
	Log Likelihood by Rank (rows) and Model (columns)				
0	513.6423	513.6423	517.6932	517.6932	519.9709
1	520.9866	521.0046	524.7285	524.8183	526.0348
2	524.7070	524.7430	524.7430	530.1139	530.1139
	Akaike Information Criteria by Rank (rows) and Model (columns)				
0	-12.14106	-12.14106	-12.19233	-12.19233	-12.19927
1	-12.22466	-12.20011	-12.26821*	-12.24546	-12.25087
2	-12.21768	-12.16858	-12.16858	-12.25285	-12.25285
	Schwarz Criteria by Rank (rows) and Model (columns)				
0	-11.30735*	**-11.30735***	-11.29907	-11.29907	-11.24646
1	-11.27185	-11.21753	-11.25585	-11.20332	-11.17896
2	-11.14576	-11.03711	-11.03711	-11.06183	-11.06183

LNGDPCH LNFINANCECH (JOHANSEN TEST)

Date: 11/27/13 Time: 16:09
Sample (adjusted): 1993Q1 2012Q4
Included observations: 80 after adjustments
Trend assumption: No deterministic trend (restricted constant)
Series: LNGDPCH LNFINANCECH
Lags interval (in first differences): 1 to 7

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.168112	22.20149	20.26184	0.0267
At most 1	0.089227	7.476907	9.164546	0.1034

Trace test indicates 1 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	0.168112	14.72459	15.89210	0.0755
At most 1	0.089227	7.476907	9.164546	0.1034

Max-eigenvalue test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

LNGDPCH	LNFINANCECH	C
19.55186	-22.19166	-8.342690
7.986755	-8.023946	-11.91103

Unrestricted Adjustment Coefficients (alpha):

D(LNGDPCH)	-0.002635	0.000849
D(LNFINANCECH)	0.000914	0.004136

1 Cointegrating Equation(s): Log likelihood 521.0046

Normalized cointegrating coefficients (standard error in parentheses)

LNGDPCH	LNFINANCECH	C
1.000000	-1.135015	-0.426695
	(0.14133)	(1.39700)

Adjustment coefficients (standard error in parentheses)

D(LNGDPCH)	-0.051511
	(0.01580)
D(LNFINANCECH)	0.017875
	(0.03394)

ERROR CORRECTION MODEL

STATIONARITY TEST OF RESIDUALS

Null Hypothesis: D(RESIDUAL) has a unit root

Exogenous: None

Lag Length: 3 (Automatic based on SIC, MAXLAG=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.397093	0.0000
Test critical values:	1% level	-2.593824	
	5% level	-1.944862	
	10% level	-1.614145	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(RESIDUAL,2)

Method: Least Squares

Date: 10/19/13 Time: 23:27

Sample (adjusted): 1992Q4 2012Q4

Included observations: 81 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(RESIDUAL(-1))	-2.619051	0.409413	-6.397093	0.0000
D(RESIDUAL(-1),2)	0.988951	0.310051	3.189637	0.0021
D(RESIDUAL(-2),2)	0.381975	0.210549	1.814185	0.0735
D(RESIDUAL(-3),2)	-0.228630	0.109162	-2.094415	0.0395

R-squared	0.914330	Mean dependent var	-4.94E-05
Adjusted R-squared	0.910992	S.D. dependent var	0.027409
S.E. of regression	0.008177	Akaike info criterion	-6.726765
Sum squared resid	0.005149	Schwarz criterion	-6.608520
Log likelihood	276.4340	Hannan-Quinn criter.	-6.679323
Durbin-Watson stat	1.921558		

OLS

DLNGDP = C + B2*DLNSERVICECH + ECT(-1) + RESİD

Dependent Variable: DLNGDPCH
Method: Least Squares
Date: 10/19/13 Time: 23:10
Sample (adjusted): 1991Q4 2012Q4
Included observations: 85 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLNSERVICECH	0.298751	0.166945	1.789517	0.0772
RESIDUAL(-1)	-0.086893	0.110320	-0.787638	0.4332
C	0.002598	0.001400	1.856472	0.0670

R-squared	0.042972	Mean dependent var	0.003810
Adjusted R-squared	0.019630	S.D. dependent var	0.011418
S.E. of regression	0.011306	Akaike info criterion	-6.092343
Sum squared resid	0.010481	Schwarz criterion	-6.006132
Log likelihood	261.9246	Hannan-Quinn criter.	-6.057666
F-statistic	1.840971	Durbin-Watson stat	2.052167
Prob(F-statistic)	0.165161		

ERROR CORRECTION MODEL
LNGDPCH LNSERVICECH

VECM system, lag order 7
Maximum likelihood estimates, observations 1992:4-2012:4 (T = 81)
Cointegration rank = 2
Case 3: Unrestricted constant
beta (cointegrating vectors)

l_GDPCH	1.0000	0.00000
l_SERVICECH	0.00000	1.0000

alpha (adjustment vectors)

l_GDPCH	-0.081969	0.10235
l_SERVICECH	0.016061	-0.024113

Log-likelihood = 586.99689
Determinant of covariance matrix = 1.7397845e-009
AIC = -13.7530
BIC = -12.8662
HQC = -13.3972
Portmanteau test: LB(20) = 73.6565, df = 52 [0.0257]

Equation 1: d_l_GDPCH

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	-0.147848	0.108435	-1.3635	0.17737	
d_l_GDPCH_1	0.0615398	0.127351	0.4832	0.63053	
d_l_GDPCH_2	-0.211153	0.121222	-1.7419	0.08619	*
d_l_GDPCH_3	-0.404802	0.102162	-3.9623	0.00018	***
d_l_GDPCH_4	0.411151	0.10224	4.0214	0.00015	***
d_l_GDPCH_5	-0.301209	0.117971	-2.5532	0.01299	**
d_l_GDPCH_6	-0.117497	0.123406	-0.9521	0.34451	
d_l_SERVICECH_1	0.120127	0.135231	0.8883	0.37760	
d_l_SERVICECH_2	0.167207	0.134982	1.2387	0.21983	
d_l_SERVICECH_3	0.176271	0.130688	1.3488	0.18201	
d_l_SERVICECH_4	-0.0479442	0.131826	-0.3637	0.71725	
d_l_SERVICECH_5	0.0811589	0.13537	0.5995	0.55087	
d_l_SERVICECH_6	0.281231	0.137167	2.0503	0.04431	**
EC1	-0.0819692	0.0466487	-1.7572	0.08353	*
EC2	0.102353	0.0489361	2.0916	0.04033	**

Mean dependent var	0.003897	S.D. dependent var	0.011433
Sum squared resid	0.003767	S.E. of regression	0.007555
R-squared	0.639796	Adjusted R-squared	0.563389
rho	-0.017038	Durbin-Watson	2.031117

Equation 2: d_l_SERVICECH

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	0.0768973	0.10874	0.7072	0.48195	
d_l_GDPCH_1	-0.0229152	0.12771	-0.1794	0.85815	
d_l_GDPCH_2	-0.133784	0.121564	-1.1005	0.27510	
d_l_GDPCH_3	-0.0883298	0.10245	-0.8622	0.39171	
d_l_GDPCH_4	-0.0794583	0.102528	-0.7750	0.44111	
d_l_GDPCH_5	0.0414234	0.118304	0.3501	0.72735	
d_l_GDPCH_6	0.15415	0.123754	1.2456	0.21731	
d_l_SERVICECH_1	0.129463	0.135612	0.9547	0.34324	
d_l_SERVICECH_2	0.0626188	0.135362	0.4626	0.64517	
d_l_SERVICECH_3	0.0643207	0.131057	0.4908	0.62521	
d_l_SERVICECH_4	0.230483	0.132198	1.7435	0.08591	*
d_l_SERVICECH_5	-0.0994979	0.135751	-0.7329	0.46619	
d_l_SERVICECH_6	-0.0566968	0.137554	-0.4122	0.68154	
EC1	0.0160613	0.0467802	0.3433	0.73244	
EC2	-0.0241131	0.0490741	-0.4914	0.62480	

Mean dependent var	0.004334	S.D. dependent var	0.007465
Sum squared resid	0.003788	S.E. of regression	0.007576
R-squared	0.150412	Adjusted R-squared	-0.029804
rho	0.014940	Durbin-Watson	1.963906

Cross-equation covariance matrix:

	l_GDPCH	l_SERVICECH
l_GDPCH	4.6503e-005	2.0855e-005
l_SERVICECH	2.0855e-005	4.6765e-005

determinant = 1.73978e-009

ERROR CORRECTION MODEL
GDPCH SERVICECH

VECM system, lag order 7
Maximum likelihood estimates, observations 1992:4-2012:4 (T = 81)
Cointegration rank = 1
Case 3: Unrestricted constant
beta (cointegrating vectors, standard errors in parentheses)

GDPCH	1.0000
	(0.00000)
SERVICECH	-3.0354
	(0.23854)

alpha (adjustment vectors)

GDPCH	-0.076468
SERVICECH	0.0083215

Log-likelihood = -1234.1084
Determinant of covariance matrix = 5.8720721e+010
AIC = 31.2126
BIC = 32.0994
HQC = 31.5684

Equation 1: d_GDPCH

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	-2315.22	1023.13	-2.2629	0.02689	**
d_GDPCH_1	0.104753	0.12417	0.8436	0.40188	
d_GDPCH_2	-0.190085	0.118507	-1.6040	0.11342	
d_GDPCH_3	-0.414357	0.0963563	-4.3003	0.00006	***
d_GDPCH_4	0.427557	0.0985318	4.3393	0.00005	***
d_GDPCH_5	-0.314439	0.116379	-2.7019	0.00873	***
d_GDPCH_6	-0.137821	0.122778	-1.1225	0.26565	
d_SERVICECH_1	0.270632	0.31351	0.8632	0.39109	
d_SERVICECH_2	0.42164	0.313133	1.3465	0.18267	
d_SERVICECH_3	0.346816	0.304232	1.1400	0.25836	
d_SERVICECH_4	-0.0932944	0.305593	-0.3053	0.76109	
d_SERVICECH_5	0.290815	0.313923	0.9264	0.35757	
d_SERVICECH_6	0.60969	0.319289	1.9095	0.06048	*
EC1	-0.0764682	0.0306435	-2.4954	0.01505	**

Mean dependent var	460.6173	S.D. dependent var	1326.136
Sum squared resid	52129639	S.E. of regression	882.0739
R-squared	0.629474	Adjusted R-squared	0.557581
rho	-0.018296	Durbin-Watson	2.032291

Equation 2: d_SERVICECH

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	453.849	430.264	1.0548	0.29530	
d_GDPCH_1	-0.00388096	0.0522179	-0.0743	0.94098	
d_GDPCH_2	-0.0500238	0.0498363	-1.0038	0.31910	
d_GDPCH_3	-0.0332976	0.0405212	-0.8217	0.41414	
d_GDPCH_4	-0.0323609	0.0414361	-0.7810	0.43756	
d_GDPCH_5	0.0212663	0.0489414	0.4345	0.66530	
d_GDPCH_6	0.0664718	0.0516326	1.2874	0.20238	
d_SERVICECH_1	0.138536	0.131842	1.0508	0.29714	
d_SERVICECH_2	0.0495921	0.131684	0.3766	0.70766	
d_SERVICECH_3	0.0555757	0.12794	0.4344	0.66540	
d_SERVICECH_4	0.224628	0.128512	1.7479	0.08506	*
d_SERVICECH_5	-0.0893879	0.132016	-0.6771	0.50067	
d_SERVICECH_6	-0.0653834	0.134272	-0.4869	0.62789	
EC1	0.00832147	0.0128867	0.6457	0.52065	

Mean dependent var	212.5062	S.D. dependent var	368.2528
Sum squared resid	9219115	S.E. of regression	370.9430
R-squared	0.150219	Adjusted R-squared	-0.014664
rho	0.018831	Durbin-Watson	1.955042

Cross-equation covariance matrix:

	GDPCH	SERVICECH
GDPCH	6.4358e+005	1.2053e+005
SERVICECH	1.2053e+005	1.1382e+005

determinant = 5.87207e+010

ERROR CORRECTION MODEL
GDPCH FINANCECH

VECM system, lag order 6
Maximum likelihood estimates, observations 1992:3-2012:4 (T = 82)
Cointegration rank = 1
Case 3: Unrestricted constant
beta (cointegrating vectors, standard errors in parentheses)

GDPCH	1.0000
	(0.00000)
FINANCECH	-6.5194
	(0.81992)

alpha (adjustment vectors)

GDPCH	-0.041324
FINANCECH	0.0049603

Log-likelihood = -1240.2472
Determinant of covariance matrix = 4.7035976e+010
AIC = 30.8841
BIC = 31.6472
HQC = 31.1905

Equation 1: d_GDPCH

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	-456.412	285.289	-1.5998	0.11414	
d_GDPCH_1	0.0598263	0.111893	0.5347	0.59457	
d_GDPCH_2	-0.288669	0.0939102	-3.0739	0.00301	***
d_GDPCH_3	-0.373693	0.0881441	-4.2396	0.00007	***
d_GDPCH_4	0.438025	0.0901872	4.8568	<0.00001	***
d_GDPCH_5	-0.286353	0.107603	-2.6612	0.00965	***
d_FINANCECH_1	0.0931119	0.321578	0.2895	0.77302	
d_FINANCECH_2	0.924174	0.297782	3.1035	0.00276	***
d_FINANCECH_3	0.702783	0.31415	2.2371	0.02847	**
d_FINANCECH_4	-0.060983	0.326922	-0.1865	0.85256	
d_FINANCECH_5	0.0679668	0.330382	0.2057	0.83761	
EC1	-0.0413243	0.0139008	-2.9728	0.00404	***

Mean dependent var	459.2805	S.D. dependent var	1317.980
Sum squared resid	49712873	S.E. of regression	842.7241
R-squared	0.646682	Adjusted R-squared	0.591160
rho	0.002656	Durbin-Watson	1.986680

Equation 2: d_FINANCECH

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	216.72	105.307	2.0580	0.04332	**
d_GDPCH_1	-0.0319079	0.0413025	-0.7725	0.44239	
d_GDPCH_2	-0.0216297	0.0346646	-0.6240	0.53468	
d_GDPCH_3	-0.00464026	0.0325362	-0.1426	0.88700	
d_GDPCH_4	-0.0773808	0.0332903	-2.3244	0.02301	**
d_GDPCH_5	0.0486341	0.039719	1.2245	0.22489	
d_FINANCECH_1	0.212485	0.118702	1.7901	0.07777	*
d_FINANCECH_2	0.0638448	0.109919	0.5808	0.56322	
d_FINANCECH_3	0.185847	0.115961	1.6027	0.11351	
d_FINANCECH_4	0.150408	0.120675	1.2464	0.21678	
d_FINANCECH_5	-0.176279	0.121952	-1.4455	0.15279	
EC1	0.00496026	0.00513111	0.9667	0.33702	

Mean dependent var	115.1341	S.D. dependent var	329.0540
Sum squared resid	6773528	S.E. of regression	311.0702
R-squared	0.227683	Adjusted R-squared	0.106319
rho	-0.024451	Durbin-Watson	2.048635

Cross-equation covariance matrix:

	GDPCH	FINANCECH
GDPCH	6.0625e+005	55164.
FINANCECH	55164.	82604.

determinant = 4.7036e+010

ERROR CORRECTION MODEL
LNGDPCH LNFINANCECH

VECM system, lag order 7
Maximum likelihood estimates, observations 1992:4-2012:4 (T = 81)
Cointegration rank = 1
Case 3: Unrestricted constant
beta (cointegrating vectors, standard errors in parentheses)

l_GDPCH	1.0000
	(0.00000)
l_FINANCECH	-1.2162
	(0.15108)

alpha (adjustment vectors)

l_GDPCH	-0.038105
l_FINANCECH	0.039524

Log-likelihood = 529.94617
Determinant of covariance matrix = 7.1165357e-009
AIC = -12.3443
BIC = -11.4575
HQC = -11.9885

Equation 1: d_l_GDPCH

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	-0.012977	0.00546351	-2.3752	0.02041	**
d_l_GDPCH_1	0.0148639	0.118771	0.1251	0.90078	
d_l_GDPCH_2	-0.285599	0.113046	-2.5264	0.01389	**
d_l_GDPCH_3	-0.419363	0.101001	-4.1521	0.00010	***
d_l_GDPCH_4	0.37505	0.0999442	3.7526	0.00037	***
d_l_GDPCH_5	-0.30309	0.110677	-2.7385	0.00790	***
d_l_GDPCH_6	-0.0290104	0.114625	-0.2531	0.80097	
d_l_FINANCECH_1	0.0367585	0.0588452	0.6247	0.53431	
d_l_FINANCECH_2	0.143633	0.0583527	2.4615	0.01642	**
d_l_FINANCECH_3	0.127665	0.0557244	2.2910	0.02512	**
d_l_FINANCECH_4	-0.0230028	0.0577197	-0.3985	0.69151	
d_l_FINANCECH_5	0.00377578	0.0586473	0.0644	0.94886	
d_l_FINANCECH_6	0.113614	0.0595002	1.9095	0.06048	*
EC1	-0.0381046	0.01316	-2.8955	0.00511	***

Mean dependent var	0.003897	S.D. dependent var	0.011433
Sum squared resid	0.003450	S.E. of regression	0.007176

R-squared	0.670095	Adjusted R-squared	0.606084
rho	0.023318	Durbin-Watson	1.946953

Equation 2: d_l_FINANCECH

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	0.0214536	0.0112167	1.9127	0.06007	*
d_l_GDPCH_1	-0.0914035	0.243838	-0.3749	0.70895	
d_l_GDPCH_2	-0.349044	0.232086	-1.5039	0.13730	
d_l_GDPCH_3	0.0394046	0.207357	0.1900	0.84986	
d_l_GDPCH_4	-0.333045	0.205187	-1.6231	0.10926	
d_l_GDPCH_5	0.151561	0.227221	0.6670	0.50705	
d_l_GDPCH_6	0.428173	0.235326	1.8195	0.07331	*
d_l_FINANCECH_1	0.164085	0.12081	1.3582	0.17895	
d_l_FINANCECH_2	0.176926	0.119799	1.4769	0.14440	
d_l_FINANCECH_3	0.180938	0.114403	1.5816	0.11845	
d_l_FINANCECH_4	0.168002	0.118499	1.4177	0.16090	
d_l_FINANCECH_5	-0.182007	0.120404	-1.5116	0.13533	
d_l_FINANCECH_6	-0.0152856	0.122155	-0.1251	0.90079	
EC1	0.0395237	0.0270176	1.4629	0.14817	

Mean dependent var	0.005792	S.D. dependent var	0.015802
Sum squared resid	0.014541	S.E. of regression	0.014732
R-squared	0.272138	Adjusted R-squared	0.130911
rho	-0.000011	Durbin-Watson	1.996661

Cross-equation covariance matrix:

	l_GDPCH	l_FINANCECH
l_GDPCH	4.2591e-005	2.3006e-005
l_FINANCECH	2.3006e-005	0.00017952

determinant = 7.11654e-009

GRANGER CAUSALITY (GDP, SERVICE & FINANCE)

Pairwise Granger Causality Tests
Date: 12/10/13 Time: 18:41
Sample: 1991Q1 2012Q4
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
DLNSERVICECH does not Granger Cause DLNGDPCH	81	1.91888	0.1021
DLNGDPCH does not Granger Cause DLNSERVICECH		0.91526	0.4763

Pairwise Granger Causality Tests
Date: 12/10/13 Time: 18:42
Sample: 1991Q1 2012Q4
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
DSERVICECH does not Granger Cause DGDPCH	80	1.87852	0.0875
DGDPCH does not Granger Cause DSERVICECH		1.21833	0.3056

Pairwise Granger Causality Tests
Date: 12/10/13 Time: 18:44
Sample: 1991Q1 2012Q4
Lags: 6

Null Hypothesis:	Obs	F-Statistic	Prob.
DFINANCECH does not Granger Cause DGDPCH	81	3.11164	0.0094
DGDPCH does not Granger Cause DFINANCECH		2.17050	0.0565

Pairwise Granger Causality Tests
Date: 12/10/13 Time: 18:46
Sample: 1991Q1 2012Q4
Lags: 7

Null Hypothesis:	Obs	F-Statistic	Prob.
DLNFINANCECH does not Granger Cause DLNGDPCH	79	3.03769	0.0080
DLNGDPCH does not Granger Cause DLNFINANCECH		1.87191	0.0889

Affidavit

I herewith declare on oath that I wrote the present master thesis without the help of third persons and without using any other sources and means listed herein; I further declare that I observed the guidelines for scientific work in the quotation of all unprinted sources, printed literature and phrases and concepts taken either word for word or according to meaning from the Internet and that I referenced all sources accordingly.

This thesis has not been submitted as an exam paper of identical or similar form, either in Turkey or abroad and corresponds to the paper graded by the assessors.

Barlas S. RONAY

İzmir, 12.01.2014

Place, Date

Name and Signature of student