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The impacts of Shadow banking system on economy. An empirical analysis

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Abstract

This paper analyzes the impacts of Shadow banking system (SBS) on the nominal and real economy. It studies the SBS's data of 14 countries for 13 years using Generalizing estimation equation (GEE) method in SPSS statistics. The results showed that the increase in SBS was associated with large increase in nominal GDP rather than real GDP and thus causing nominal indicators of the economy to grow more than real ones. The paper concluded by suggesting that the SBS should be regulated and its size should be reduced from the current level to make financial system more stable and prevent future financial crisis.

JEL classification numbers: G2: Financial Institutions and Services
Key words: Shadow banking system, Nominal and real economy, Generalizing estimation equation (GEE).

1 Introduction

In the aftermath of the financial crisis of 2008, economists and bankers have realized the grave problems with the global financial system especially within the shadow banking system (SBS). Researchers believe that the crisis were caused by the unregulated shadow banking activities of the U.S, Turner A (2008), Feng et al (2011) [1] [2]. Since then this is a very hot topic among the experts and a lot of research has been done in order to understand and regulate this huge sector of the financial system.

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The term shadow banking was first introduced by Paul McCulley, he defined the shadow banking as “the whole alphabet soup of levered up non-bank investment conduits, vehicles, and structures” (2007) [3]. Later many other definitions emerged, according to the New York Federal Reserve’s Pozsar et al (2013) shadow banking is “Financial intermediaries that conduct maturity, liquidity and credit transformation without explicit access to central bank liquidity or public sector credit guarantee, Pozsar Z (2014) [4]. There are verity of other definitions available and the each one is debatable, but the most common definition is by Financial Stability Board (FSB). The FSB defines shadow banking as “the system of credit intermediation that involves entities and activities outside the regular banking system" (2011) [5].

Well-developed and healthy financial markets play an important role in economic performance of the country by utilizing and distributing the available resources more effectively and efficiently to the more productive sectors of the economy (2018) [6]. Shadow banking system is about 99 trillion USD in 2016 [7] and is one of the large sector of the global financial system, it plays an important role of allocating money to the fund starve sector of the economy. In doing so it fulfils the needs of those who have surplus and wants to lend and those who have deficiency of funds and want to borrow. Most of these activities take place outside of regulatory authorities’ oversight and that create systemic risks in the economy Pozsar, Z. (2008) [8].

This study is intended to investigate the impacts of shadow banking system on the nominal and real economy of a country by taking the data of 13 countries from year 2001 to 2013.

2 Literature review

Haisen et al, studied the impacts f shadow banking system on monetary policy in china and found that increase in the shadow banking system would result in increase in money supply and CPI. Moreover, the researchers suggested better supervision and regulation on SBS to improve monetary policy. Haisen et al (2015) [9]. Large banks are relatively favoring big companies in providing credit which leave SMEs to look for funding opportunities in private sector Adrin et al (2012) [10]. This caused SBS to grow in size. Li and Wu (2011) [11] analyzed the average required reserve and excess deposits from 2000-2011. Further concluded that high reserve requirements will lead to deposit loss and increase the size of shadow banking system.

Li and Wu (2011) [12] analyzed SBS on monetary supply and concluded that the securitizations products are like new money which is not issued by Central bank which is affecting monetary supply of the central bank. YongTan (2017) [13] investigates the impacts of shadow banking on banking profitability, he found that

there is more competition in non-interest income market than loan and deposit market in china. He concluded that less competition in loan market increases bank profitability and shadow banking also improve the profitability of Chinese banks. Shadow banking play the same role as the traditional banks but difficult to regulate and supervise and each country's banking have some special characteristics (2015) [1]. Claudia M.B (2011) [14] studied the impacts of bank shocks on economy for the U.S and they found that changes in lending in large banks have significant effects on the short term GDP growth.

3 Methodology

We have taken the SBS data for 14 countries (Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, UK, and USA) from 2001 to 2013 from IMF working paper. For the economy we have taken the nominal and real GDP, a common measure for assessing the economy of a country, as a proxy for economy from the World Bank economic indicators database. This study differ from the study of other researchers because this study used the data of shadow banking system computed through "Alternative approach" by IMF. Until now no such study has been conducted to investigate the relationship between the SBS and the economy by taking this data of SBS, computed via alternative approach and GDP.

3.1 Data Collection

For the purpose of this study we have taken the SBS data from IMF database (Harutyunyan, et al., 2015) [15]. Their approach was based on non-core liabilities which are representative of the shadow banking system. They have come up with the size of SBS of 24 countries by using their approach from 2001 to 2013. For this study, the reason for selecting these 14 countries was that the data was not missing, not even for a single year. This data was published by the IMF statistics department and it was previously taken by Vasileios Karagiannis (2016) [16] and Tomas Vaclavicek (2017) [17] as a proxy for shadow banking system.

We have taken nominal and real GDP (base year 2010) as a proxy for economy from the World Bank datasets for year 2001 to 2013. Real GDP is better measure of economy than nominal because it is adjusted for effects of inflation (2018) [18]. Real GDP was also used by other researchers as a proxy for the economy (2014) [14].

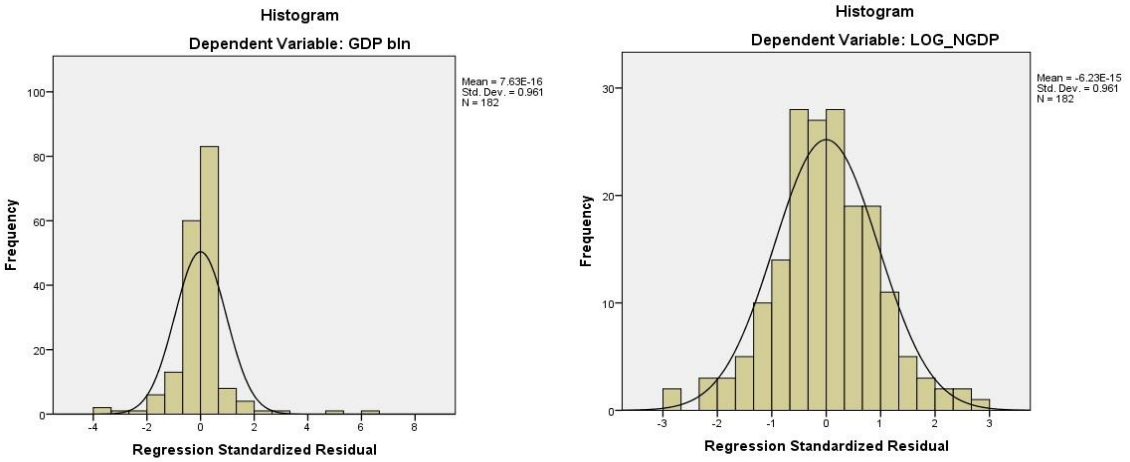
3.2 Data transformation and Modeling

We have selected the Generalized Estimating Equation (GEE) to investigate the impacts of shadow banking system on real GDP and nominal GDP. The GEE is one of the dominant approaches for longitudinal data analysis, Zhang (2016) [19]. SPSS Statistics v23 was used to apply the GEE model for the analysis. The

regressions coefficients of the GEE can be interpreted similarly to those of standard linear and multiple regressions.
The equations used for interpreting the "Parameter Estimates" resulted from the GEE method are given below.

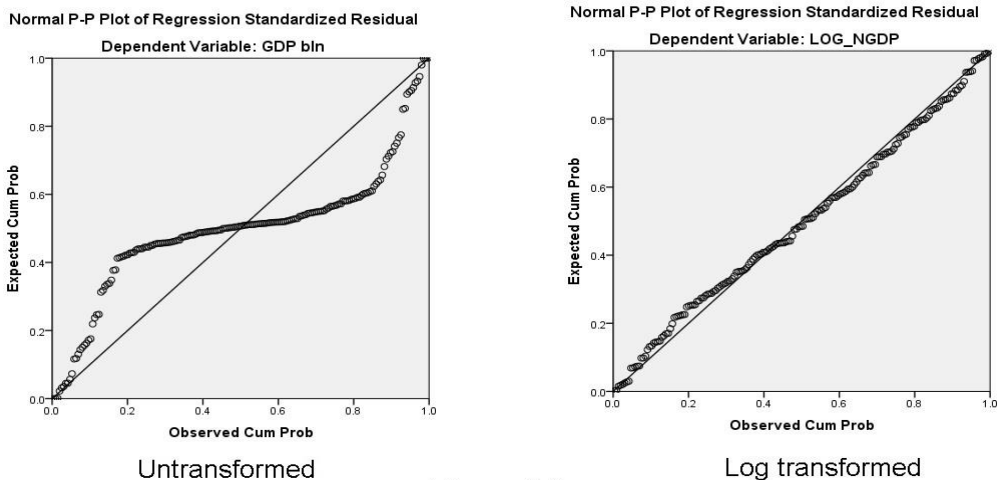
For nominal GDP: $\widehat{logNgdp} = \beta_o + \beta_1 \log SBS + \beta_{country}$ (1)
For real GDP: $\widehat{logRgdp} = \beta_o + \beta_1 \log SBS + \beta_{country}$ (2)

The log transformed values of the variables were used to fit the model best. Figures 1.0 and 2.0 showed the regression residuals of untransformed and transformed values of dependent and independent variables. Both of the figures showed that log transformed values fit the model better.



Untransformed Log transformed

Figure 1.0



Untransformed Log transformed

Figure 2.0

As the values for both, dependent and independent variables, are log transformed, the relationship is elastic in nature. Which means that the regression coefficients will show the percentage change in dependent variable (logNGDP and logRGDP) if the independent variable (logSBS) is changed by one percent. To account for the country specific variation in the data, the variable "country" is taken in in the factor column in GEE which is similar to taking dummy variables in the standard Linear Regression.

In the model, Shadow banking system (logSBS) is an independent variable and nominal GDP (logNGDP) and real GDP (logRGDP) are our dependent variables. Firstly, the logNGDP is used in the model as dependent variable and secondly, the logNGDP is replaced with logRGDP, all other things remain the same. There are total 14 countries and 13 years of data is taken for each country, resulting in 182 observations in total.

The figure 3.0 shows the data in regression variable plot for SBS and nominal GDP. It is obvious that the data varies and the US has the largest GDP and SBS data.

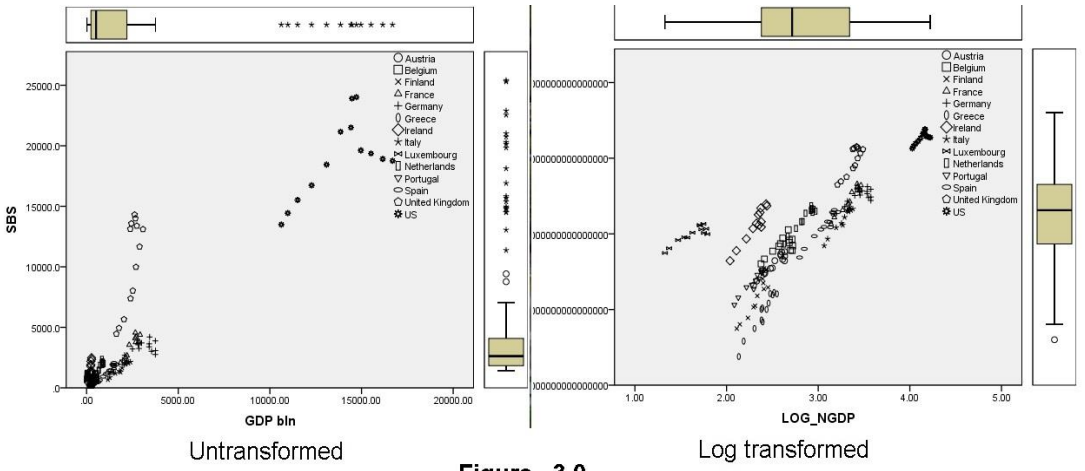


Figure 3.0

4 Results and Discussions

The GEE method is applied, firstly, to estimate the parameter coefficients for the impacts of SBS on nominal GDP and in the second analysis, the real GDP is taken as in dependent variable instead of nominal GDP. Table 1 show the "Parameter Estimates" for nominal GDP and real GDP respectively. Refer to table 2 and table 3 in INDEX 1 to see the results of the analysis. These estimates are obtained by using the GEE method in SPSS statistics v23.

The parameter estimates resulted from the GEE method are presented in table 1. The first beta and significance values are for the nominal GDP (Ngdp) and the second beta and significance (Sig.) values are for the real GDP. All these

parameters are significant. The intercept of nominal GDP (1.765) is less than the real GDP (3.669) because 2010 is taken as a base year for real GDP data which caused the real GDP of years prior to 2010 to be larger than nominal GDP. The values of the country specific beta for US is Zero because this parameter is redundant and all others country specific betas are negative because their GDP and SBS are less than the US shadow banking system and GDP. These Beta co-efficient resulted by GEE method can be treated as co-efficient resulted from dummy variables for country specific variations.

As we have taken the log of the variables, the coefficient can be interpreted as a percentage change dependent variable if the independent variable change by one percent. The beta coefficient for logSBS for nominal GDP (logNGDP) is 0.555 and for the real GDP (logRGDP) is 0.115 for the US. Which means that 1 percent increase in the logSBS is associated with 0.555 percent increase in the logNGDP and with 0.115 percent increase in logRGDP. This show a larger impact of shadow banking on nominal indicators of the economy rather than real economic indicators. The beta coefficients for the nominal GDP for all the countries are larger than the real GDP, so we can conclude that the Increase in SBS is associated larger increase in nominal GDP and relatively smaller increase in real GDP.

Table 1

Parameter	Beta (for Ngdp)	Sig	Beta (for Rgdp)	Sig
(Intercept)	1.765	0.000	3.669	0.000
LOG_SBS	0.555	0.000	0.115	0.000
[country=Austria]	-0.686	0.000	-1.39	0.000
[country=Belgium]	-0.728	0.000	-1.332	0.000
[country=Finland]	-0.651	0.000	-1.541	0.000
[country=France]	-0.338	0.000	-0.658	0.000
[country=Germany]	-0.232	0.000	-0.549	0.000
[country=Greece]	-0.454	0.000	-1.43	0.000
[country=Ireland]	-1.187	0.000	-1.7	0.000
[country=Italy]	-0.266	0.000	-0.709	0.000
[country=Luxembourg]	-1.801	0.000	-2.318	0.000
[country=Netherlands]	-0.692	0.000	-1.132	0.000
[country=Portugal]	-0.777	0.000	-1.578	0.000
[country=Spain]	-0.419	0.000	-0.893	0.000
[country=United Kingdom]	-0.591	0.000	-0.747	0.000
[country=US] 0a		0.000	0a	0.000
(Scale)	0.003	0.000		0.000

Table 2	Table 3
Dependent Variable: LOG_Ngdp	Dependent Variable: LOG_Rgdp
Model: (Intercept), LOG_SBS, country	Model: (Intercept), LOG_SBS, country
a. Set to zero because this parameter is redundant.	a. Set to zero because this parameter is redundant.

In figure 4.0, we have plotted the actual nominal GDP against predicted nominal GDP, and actual real GDP against predicted real GDP computed from GEE model. Equation 1 is used for nominal GDP and equation 2 for real GDP. Anti-log is taken after computing the predicted nominal and real GDP to the compare the predicted values with actual values.

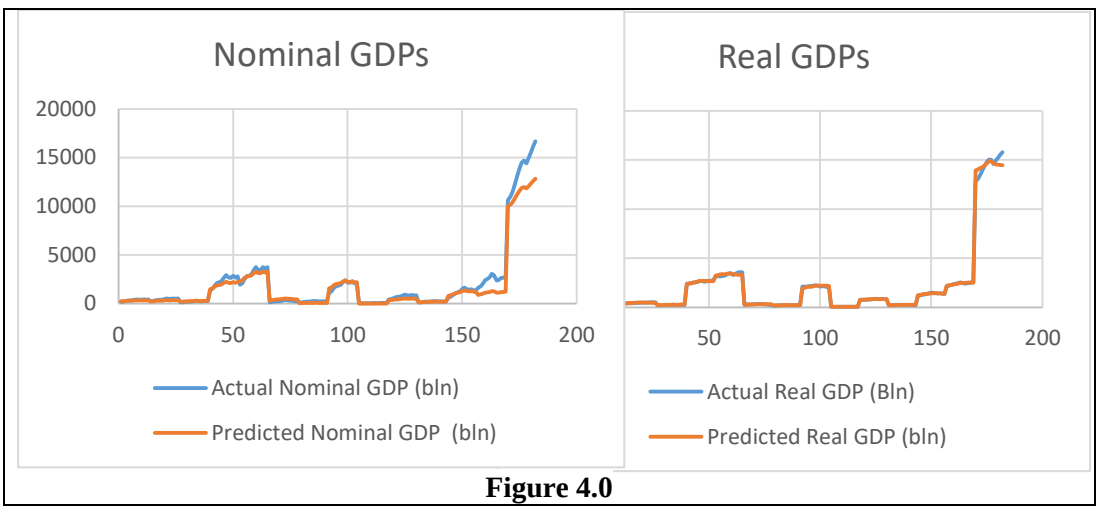


Figure 4.0

In figure 4.0, the GDP (in billion) is potted on Y axis and countries are plotted on X axis. The data is for 14 countries for 13 years, totaling 182 values on X axis. The first 13 values on X axis present the data for 1st country, namely Austria, the next 13 values show the data of next country, namely Belgium, and so on. The last country is USA with highest data points. It can be seen in figure 4.0 that the model is predicted the nominal GDP with relatively larger error and the real GDP with smaller errors. So the model is good enough in predicting the nominal and real GDPs.

We saw that the Increase in Shadow banking system is associated with larger increase in nominal GDP and relatively smaller increase in real GDP. Our findings are same with the finding of Haisen et al (2015) [9]. In their study, the authors concluded that SBS would increase money supply and inflation in China and suggested more regulations and better supervision. According to Adi Sunderam also (2014) [21], SBS caused increase in total money supply before 2008 crisis.

5 Conclusion

The key findings are that the increase in Shadow banking system is associated with larger increase in nominal rather than real economy indicators. And thus SBS is cited by many experts as the cause of 2008 financial crisis. We suggest to regulate this sector to make it more beneficial to the real economy and allow the growth only to the extent that it backs real economy. Nersisyan Yeva et al, 2010 [22] also suggested that the current shadow banking system is too large and it should be downsized to prevent the future financial crisis.

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Parameter Estimates

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test		
			Lower	Upper	Wald Chi-Square	df	Sig.
(Intercept)	1.765	.0978	1.574	1.957	326.048	1	.000
LOG_SBS	.555	.0227	.510	.600	595.581	1	.000
[country=Austria]	-.686	.0402	-.764	-.607	291.496	1	.000
[country=Belgium]	-.728	.0386	-.803	-.652	355.415	1	.000
[country=Finland]	-.651	.0552	-.760	-.543	139.259	1	.000
[country=France]	-.338	.0223	-.382	-.295	230.869	1	.000
[country=Germany]	-.232	.0281	-.287	-.176	67.757	1	.000
[country=Greece]	-.454	.0544	-.560	-.347	69.758	1	.000
[country=Ireland]	-1.187	.0310	-1.247	-1.126	1461.010	1	.000
[country=Italy]	-.266	.0273	-.319	-.212	94.473	1	.000
[country=Luxembourg]	-1.801	.0367	-1.873	-1.729	2404.664	1	.000
[country=Netherlands]	-.692	.0278	-.747	-.638	618.437	1	.000
[country=Portugal]	-.777	.0447	-.865	-.690	302.109	1	.000
[country=Spain]	-.419	.0293	-.476	-.361	203.989	1	.000
[country=United Kingdom]	-.591	.0197	-.630	-.553	902.364	1	.000
[country=US]	0[a]	.	.	.	.	.	.
(Scale)	.003						

Table 2

Dependent Variable: LOG_NGDP

Model: (Intercept), LOG_SBS, country

a. Set to zero because this parameter is redundant.

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test		
			Lower	Upper	Wald Chi-Square	df	Sig.
(Intercept)	3.669	.0362	3.598	3.740	10258.534	1	.000
[country=Austria]	-1.390	.0157	-1.421	-1.359	7838.330	1	.000
[country=Belgium]	-1.332	.0145	-1.360	-1.303	8401.736	1	.000
[country=Finland]	-1.541	.0200	-1.580	-1.502	5927.219	1	.000
[country=France]	-.658	.0095	-.677	-.640	4848.884	1	.000
[country=Germany]	-.549	.0105	-.569	-.528	2751.956	1	.000
[country=Greece]	-1.430	.0246	-1.478	-1.382	3374.860	1	.000
[country=Ireland]	-1.700	.0120	-1.723	-1.676	19942.415	1	.000
[country=Italy]	-.709	.0119	-.732	-.685	3529.496	1	.000
[country=Luxembourg]	-2.318	.0144	-2.346	-2.290	25781.164	1	.000
[country=Netherlands]	-1.132	.0113	-1.154	-1.110	10102.089	1	.000
[country=Portugal]	-1.578	.0174	-1.612	-1.544	8258.431	1	.000
[country=Spain]	-.893	.0120	-.917	-.870	5550.929	1	.000
[country=United Kingdom]	-.747	.0070	-.761	-.734	11354.419	1	.000
[country=US]	0[a]	.	.	.	.	.	.
LOG_SBS	.115	.0082	.099	.131	195.768	1	.000
(Scale)	.000						

Table 3

Dependent Variable: LOG_RGDP
Model: (Intercept), country, LOG_SBS

a. Set to zero because this parameter is redundant.