TESTING THE SUSTAINABILITY OF LEBANON'S FISCAL POLICY (1971-2015)

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TESTING THE SUSTAINABILITY OF LEBANON'S FISCAL POLICY (1971-2015)

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DEDICATION

I would like to dedicate my degree to my family. Their love, care, and support allowed me to receive a higher education at Haigazian University.

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ABSTRACT

TESTING THE SUSTAINABILITY OF LEBANON'S FISCAL POLICY (1971-2015)

This research performs an empirical investigation on the sustainability of Lebanon's fiscal policy. The study employs yearly data from 1971 to 2015. Using the Hakkio & Rush cointegration model, Modified Azar and Asrawi cointegration model, Original Azar and Asrawi model and accounting approach, the research gave contradicting results due to the differences in the approaches applied and the use of different combinations of data. Hakkio and Rush model included the service on debt in the expenditures variables, while Azar and Asrawi model excluded the service on debt and took the Revenues and Expenditures in terms of LBP deposits interest rates. This research concluded that with the current policy in place, it is still possible to consider sustainable and there is ability to survive based on the results.

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I. Introduction and Justification of the Research Study

The concept of fiscal policy sustainability means that a certain government can pay its debt obligations in the upcoming future, and has the ability to make all payments as they come due, no matter how big those payments are. The willingness of any government is decisive in determining the sustainability of fiscal policy. There is not any accepted or agreed definition of fiscal policy sustainability. We will explain it in a way that is as follows; the government's present value of debt must equal to the discounted sum of future surpluses.

The academics and researchers dedicated extensive time and effort to study this issue. The sustainability of government fiscal policy is crucial to determine the future of any country financially and economically. The sizable amount of debt since the end of civil war in Lebanon and the increasing trend in the world gave the sustainability concept considerable interest.

The importance of such a study became obvious lately after the financial crisis of 2008 and a couple of debt and solvency crises inflicted the EU countries because of the fundamental and dramatic shift in budget expenditures and revenues.

Borrowing internally or externally is very common even for developed countries but it should be in acceptable levels and managed effectively and efficiently to put the country fiscally on the safe side and right situation. It is prohibited to continuously finance the debt and the service on debt by additional borrowing, this is called a No-Ponzi scheme. To keep

the fiscal policy sustainable, the government should develop revenue increasing system to pay back the accumulated debt and minimize the expenditures to manage the debt and its service.

This study is econometric, will rely on past performance of variables and assess if the current fiscal policy of Lebanon is sustainable.

II. My Contribution to the Subject

The study of Lebanon's fiscal policy sustainability will provide the researchers and readers a comprehensive analysis, taking into consideration several approaches and adopting the research on a long period to have realistic results.

Before this study, those approaches were not satisfactory for the Lebanese market. The stationarity and cointegration approaches took the period until 2002 and this study will extend it to provide more recent analysis and for a longer period. The accounting and new cointegration regression approaches will focus for the first time on the Lebanese economy.

At the end, the study will give appropriate recommendations based on the results and show the government the risks that surround the accumulation of debt.

III. The Fiscal Developments in Lebanon (1971-2015)

Before the civil war of 1975, Lebanon's economy was one of the most powerful and productive economies in the region. The country was always following the developments worldwide to ensure the maximum growth and expansion. Many Middle Eastern countries

were depending on agriculture and oil as a base for their development, Lebanon, in contrast, had strong dominance in service related sectors like banking, finance, and insurance. Lebanon was an attractive business center due to political stability, high potential for growth, low inflation, and very small budget deficit.

The war caused the government expenditures to rise and the revenues were already low as a percentage of GDP. During the war, tax collection dropped approximately to half, while the expenditures remained the same because the government was trying always to provide the minimum acceptable public services. The expenditures rose more than 100% till the end of the war and this was the main reason to finance the public obligation by borrowing from domestic and foreign sources. The political instability was the main reason for cutting the external sources of support to Lebanon's economy.

The civil war caused crucial changes in the economy of Lebanon by destroying the infrastructure and the foreign investors were more hesitant to risk their money. Moreover, the country lost the experienced, educated and skillful people during the war; a huge number of people left the country through emigration. Even the public finance had a big part in the catastrophic effects of the war because of the inefficiency in tax collection and the absence of forceful collecting system. The results of all these were big pressure on the Lebanese pound, high levels of need to new financing sources and even high inflation levels which passed the 400% at the end of the war.

The early years of 1990-s were the most difficult and demanding years for the Lebanese government, they had the obligation to take care of the stabilization of the

economy on one hand and to cover the post-war reconstruction and rehabilitation expenses on the other hand. The most worrying and alarming problems were the abnormal growth of expenditures, the insufficient tax collection system and rapid aggregation of public debt. The Lebanese government succeeded to improve its tax collection and to decrease the interest payments on the domestic debt from approximately 10% to 5%. All these pushed down the deficit as a percentage of GDP from 34% in 1989 to 11% in 1993 due to government revenues increase, interest payments decrease, rapid growth in money supply and finally because of the stability hopes after the devastating war. In this period, the government monetary authority took the decision to follow conservative policy to stabilize the prices and exchange rates as a main goal.

After 1993, the debt burden was high due to the need and urgency of funding sources to finance the reconstruction projects, and this led to a sharpened increase in the foreign and domestic indebtedness. The period after 1993 recorded high levels in the expenditures side for the Lebanese government, and the wages and the salaries were controlled by freezing the wages for the period between 1993 and 2000. The banking sector in this period turned rapidly to be one of the most efficient and dynamic sectors of the economy. Furthermore, at the end of 1990-s, the GDP growth rate decreased and the external financing resources were becoming more hesitant to finance due to the several crises that the East Asian countries were facing in that period. One of the dominant factors contributed to the expenditures increase was the interest payments on the accumulated debt and the need always to borrow new debts to pay the initial amounts and the service on it.

The gross total debt for the period after the civil war characterized to be mostly domestic and it was counted approximately 80%, the big portion was held by the banking sector because of the difficulty to borrow from foreign borrowers. The percentage between domestic and external were almost equal in the period 2004-2007 and the government used efficiently the long maturities and low-interest rates on external debt. At the end of 2015, the 62% of debt was domestic while the 38% was external.

The growth of the economy in Lebanon was between 7.8% and 9.2% in the period 2007-2010, but thereafter, it decreased to be between 2% and 2.8% which was because of the international financial crisis that made most of the world economies to suffer and the direct effect of the Syrian crisis on the economy of Lebanon. The main reasons behind this deterioration were the recession of demand for exports, tourism and real estate activities.

The twenty-first-century big question was how to decrease the national debt of the country and how to balance between the revenues and the expenditures. The national debt as a percentage of GDP was almost 150% at the end of 2015 and reached its highest levels in 2006 by exceeding 185%. Since 1994, this rate did not hit below 70% and it was hovering between 100% and 180% most of the time, which is huge percentage for a country from the Middle East and not comparable with the region countries total debts. At the end of 2015, Lebanon was in the third place after Japan and Greece in total debt as percentage to GDP. The debt service became a huge concern as well, it reached in the beginning of 21-st century to 16% in terms of GDP (the highest), however, at the end of 2015 decreased to stabilize at

around 10% in terms of GDP. All those big numbers gave to this research more importance to test the sustainability of fiscal policy.

IV. Overview on selected European Countries

With the introduction of Euro in 1999, which bound 19 countries to use a common currency, the union is regulated and managed by the European Central Bank while allowing each government the flexibility to set budget and tax policies. Some economists showed hesitation to this unification and believed it was doomed from day one.

Greece

After the financial crisis in 2008, while the global markets were still reeling, Greece raised alarms about the stability of its financial system. The Troika (International Monetary Fund, European Central Bank and European Commission) issued the bailout for Greece, which would total more than €240 billion. This bailout had very strict conditions; and the lenders enforced punitive terms, like budget cuts and higher taxes.

The bailout money went towards paying off Greece's aggregated international debt rather than stimulating the economy.

The country wouldn't be receiving a penny until the International Monetary Fund was satisfied that country's debt was managed sustainably.

Greece met a number of demands required by the creditors such as pension cuts and lowering its tax-free income threshold. However, the government still had to enforce other austerity tolls.

Paul Thomsen, IMF's European department chief and Greece's original bailout architect said that structural reform was required, such as unemployment rate decrease, which is currently is over 22%.

Greece's economy experienced economic boom after WWII thanks to its production capacity. But after the downfall of the military dictatorship in the 1970s, the economy started struggling again with the unemployment rate reaching roughly 10% in 1993, and was hovering around 10% until 2008. However, starting from 2009 it went up to reach its highest level in 2014, which was 28%. During the period of 1973 to 1993 the inflation rate averaged 18% yearly, and the government debt-to-GDP ratio increased from 18% in 1973 to almost 48% in 1986, and reached approximately 75% in early 1990s.

The country's debt situation got worse throughout the bailout; the debt-to-GDP ratio continued to increase which made it difficult for the government to keep its commitment to manage the debt sustainably.

The debt to GDP ratio was increasing in small digits during the period 2000 to 2008. The rate increased by 20% in 2009 to reach 126% and 146% in 2010. Currently, the rate jumped over 170% for the four years out of the last five. Greece now is only second to Japan in highest public debt-to-GDP ratio worldwide.

Ireland

Ireland is one of those European countries, that made a few mistakes which resulted to drive their economy into stagnation.

Prior to 1970s, the country enjoyed long-term economic growth and low unemployment as well as budget surpluses. Ireland reacted to the 1970s global downturn by running big fiscal deficits, which led to a major debt crisis in the 1980s. By the middle of 1980s, the public debt-to-GDP ratio exceeded 110%, and the service on the accumulated debt in terms of GDP reached approximately to 10% for the service on the accumulated debt. In the beginning of 1990s, with some fiscal reforms, the country's debt was managed more responsibly.

In the 1990s, the Irish economy developed remarkably, despite Ireland's small population and economy, foreign investment was significant thanks to the wider European market covering over 500 million people across Europe. This was the reason for the employment rate to rise dramatically from 1.1 million in the late 1980s to 2.1 million in 2007. From 1987 to 2007, the economy growth was averaging annually at 6.3%.

When Ireland entered the recession in 2008, there were economists who blamed the global financial crisis for the country's economic collapse, while others thought that the economy was facing a crisis of its own doing. At the time of housing market collapse, the government revenues disappeared almost overnight because most of the funds had been directed to fund major construction funds. The Irish crisis became more severe when the banking system also collapsed.

After a period of stable debt-to-GDP ratio from 1998 to 2008, which was always less than 40%, the ratio was increasing dramatically each year until it reached approximately 120% in 2012. The fiscal adjustment program drafted in coordination with the Troika reached its targets, and the Irish government benefited from several economic developments. The budget deficit was about 7.3% in 2013; and it went down to 2.1% as percentage to GDP in 2015.

By summer 2013, the public debt rate returned to pre-crisis levels, which confirmed that the country could exit the Troika bailout program. The debt-to-GDP ratio increased from 24% in 2007 to 120% in 2013. Ireland's additional efforts successfully reduced it to 75% in 2016. From August 2011 onwards, Ireland's success story was the most remarkable within the other highly indebted European countries.

Spain

After a period of economic development and expansion, which started in the mid-1990s, Spain was ranking as the 5th largest EU economy. The slowdown alert knocked Spain's door with the worldwide financial crisis of 2007, which worsened in 2008.

Depending heavily on construction activities proved to be wrong and played a key role in the economic crisis. The economy went into recession from 2008 to 2009, the unemployment rate increased from 8.3% in 2007 to 20% in late 2010 and it was still near that rate based on the latest reports. The Spanish economy went from enjoying a budget surplus of 1.9% in terms of GDP in 2007 to a deficit of almost 10% in terms of GDP in

2010. Later, the economy achieved the EU target by decreasing the deficit to 6.3% in terms of GDP in 2013. Improvement became almost impossible due to the following measures;

1. Contraction of the tax base with a consequent reduction in government revenues.
2. Inescapable increase in certain items in expenditures, such as unemployment benefits and servicing debt.

The public debt in terms of GDP increased from 36% in 2007 to 60% in 2010 and passed the 100% in 2014.

One of the main reasons that made the economic situation worse was following the monetary policy set by the European Central Bank when Spain joined the Eurozone in 2001. The low interest rates damaged the cyclical Spanish economy. Spain's fiscal policy wasn't appropriate for the specific situation at the time.

The fast increase of public debt was the consequence of the severe banking crisis and recession. The significant fall of government revenues and required public rescues of banks led to a strong deterioration of public finances. Spain received a 100 billion €-s as a program from ECB in June 2012 to recapitalize the banking sector, but at the end used only 41.3 billion €-s for that purpose. In 2015, Spain's economy was one of the fastest growing Eurozone economies. However, the indebtedness remained very high, at nearly 100% debt-to-GDP ratio in the last three years (2014-2016).

Italy

While the attention was always concentrating on Greece, there is no secret that the Italian economy was facing the challenge of a risky macroeconomic situation without any sign of improvement. Italy's economic problem remains more structural in nature. Since the introduction of the Euro, the country showed very poor performance of economic growth throughout the years, averaging at 1.2% growth between 2001-2007.

Italy is the third largest economy in the Eurozone after Germany and France. The public debt has been growing at an astonishing pace, reaching its highest point of 132.6% in 2016, putting Italy in the second place after Greece in the Eurozone in terms of public debt. The budget deficit reached almost 6% in 2008, however, in the period of 2012-2016 it was always under 3% in terms of GDP. In 2017, it is expected to decrease to 2% due to tax raise on tobacco and gambling, as well as measures to reduce tax evasion.

During the period of 2007-2013, the country lost 24% of its industrial production, home sales dropped 29% in 2012, back to the level of 1985.

The Italian economy still sending mixed signals to the world as the country is struggling due to political instability and unclear economic reform plans.

The Italians are facing many important challenges, the most important is the unemployment. It highlights the weakness of the labor market and the lack of global competition. At the end of 2013, Italy was the largest debtor worldwide. The European Union is still encouraging the government to make structural reforms due to excessive macroeconomic imbalances.

			COLUMN #1			COLUMN #2					COLUMN #3	COLUMN #4
Greece	**GDP Growth Rate**	**Long Term Interest Rate**	**(r-g)**	**GDP (Millions of Euros)**	**Debt (Millions of Euros)**	**(r-g)*B/Y**	**Revenues (Millions of Euros)**	**Expenditures (Millions of Euros)**	**Interest of Debt (Millions of Euros)**	**Primary Surplus/ Deficit (Millions of Euros)**	**P/Y**	**(r-g)*B/Y - P/Y**
	g	**R**		**Y**	**B**		**R**	**G**	**rB**	**P**		
2005	2.911	3.555	0.644	225,906.64	213,970.00	0.6103	78,449.0	90,778.0	9,353.0	-2,976.0	(0.0132)	**0.62**
2006	9.294	4.046	-5.247	250,551.82	225,648.00	-4.7259	85,338.0	98,292.0	9,623.0	-3,331.0	(0.0133)	**(4.71)**
2007	6.807	4.487	-2.320	236,411.94	239,915.00	-2.3542	93,921.0	109,528.0	10,469.0	-5,138.0	(0.0217)	**(2.33)**
2008	3.849	4.681	0.832	233,487.21	264,775.00	0.9431	98,416.0	123,041.0	11,653.0	-12,972.0	(0.0556)	**1.00**
2009	-1.698	4.311	6.009	242,757.43	301,062.00	7.4519	92,488.0	128,454.0	11,972.0	-23,994.0	(0.0988)	**7.55**
2010	-4.652	4.036	8.688	236,779.37	330,570.00	12.1292	93,307.0	118,616.0	13,239.0	-12,070.0	(0.0510)	**12.18**
2011	-8.541	5.423	13.964	208,675.71	356,289.00	23.8416	91,096.0	112,376.0	15,076.0	-6,204.0	(0.0297)	**23.87**
2012	-7.681	5.493	13.174	217,352.60	305,096.00	18.4917	88,923.0	105,923.0	9,744.0	-7,256.0	(0.0334)	**18.53**
2013	-5.644	4.316	9.960	215,497.86	320,511.00	14.8138	88,724.0	112,473.0	7,276.0	-16,473.0	(0.0764)	**14.89**
2014	-1.497	2.893	4.390	216,956.44	319,728.00	6.4701	83,532.0	90,048.0	7,097.0	581.0	0.0027	**6.47**
2015	-1.373	1.714	3.087	257,179.30	311,668.00	3.7407	84,820.0	95,247.0	6,322.0	-4,105.0	(0.0160)	**3.76**

			COLUMN #1			COLUMN #2					COLUMN #3	COLUMN #4
Ireland	**GDP Growth Rate**	**Long Term Interest Rate**	**(r-g)**	**GDP (Millions of Euros)**	**Debt (Millions of Euros)**	**(r-g)*B/Y**	**Revenues (Millions of Euros)**	**Expenditures (Millions of Euros)**	**Interest of Debt (Millions of Euros)**	**Primary Surplus/Deficit (Millions of Euros)**	**P/Y**	**(r-g)*B/Y - P/Y**
	g	**R**		**Y**	**B**		**R**	**G**	**rB**	**P**		
2005	9.004	3.585	-5.419	135,245.84	44,379.30	-1.7783	59,477.5	56,741.8	1,737.4	4,473.1	0.0331	**(1.81)**
2006	8.755	4.070	-4.685	150,654.15	43,692.30	-1.3587	67,808.1	62,609.8	1,846.3	7,044.6	0.0468	**(1.41)**
2007	6.587	4.500	-2.087	150,328.20	47,147.80	-0.6544	71,265.7	70,727.5	1,979.2	2,517.4	0.0167	**(0.67)**
2008	-4.877	4.803	9.679	135,745.54	79,619.60	5.6771	65,400.3	78,499.1	2,397.5	-10,701.3	(0.0788)	**5.76**
2009	-9.596	5.174	14.770	135,555.37	104,684.30	11.4063	56,510.0	79,951.6	3,411.5	-20,030.1	(0.1478)	**11.55**
2010	-1.537	9.092	10.628	148,789.73	144,227.10	10.3023	55,406.7	109,084.0	4,743.2	-48,934.1	(0.3289)	**10.63**
2011	3.547	15.749	12.202	149,617.75	189,725.10	15.4728	57,715.6	79,602.5	5,764.4	-16,122.5	(0.1078)	**15.58**
2012	1.529	22.498	20.968	166,191.29	210,015.60	26.4974	59,476.3	73,620.8	7,294.3	-6,850.2	(0.0412)	**26.54**
2013	2.485	10.054	7.569	167,284.25	215,296.30	9.7419	61,523.1	71,819.8	7,718.9	-2,577.8	(0.0154)	**9.76**
2014	7.162	6.929	-0.233	178,381.30	203,326.00	-0.2653	65,931.9	73,108.4	7,583.1	406.6	0.0023	**(0.27)**
2015	32.498	9.666	-22.832	286,653.77	201,384.20	-16.0400	70,546.9	75,579.6	6,839.6	1,806.9	0.0063	**(16.05)**

			COLUMN #1			COLUMN #2					COLUMN #3	COLUMN #4
Spain	**GDP Growth Rate**	**Long Term Interest Rate**	**(r-g)**	**GDP (Millions of Euros)**	**Debt (Millions of Euros)**	**(r-g)*B/Y**	**Revenues (Millions of Euros)**	**Expenditures (Millions of Euros)**	**Interest of Debt (Millions of Euros)**	**Primary Surplus/Deficit (Millions of Euros)**	**P/Y**	**(r-g)*B/Y - P/Y**
	g	**r**		**Y**	**B**		**R**	**G**	**rB**	**P**		
2005	3.062	3.321	0.259	1,400,387.98	393,479.00	0.0728	367,699.0	356,470.0	16,220.0	27,449.0	0.0196	**0.05**
2006	4.038	3.789	-0.249	1,498,635.98	392,132.00	-0.0651	407,937.0	385,793.0	16,100.0	38,244.0	0.0255	**(0.09)**
2007	3.799	4.328	0.529	1,451,279.12	384,662.00	0.1403	442,300.0	421,544.0	16,892.0	37,648.0	0.0259	**0.11**
2008	1.388	4.550	3.162	1,422,597.46	440,621.00	0.9794	409,909.0	459,280.0	17,256.0	-32,115.0	(0.0226)	**1.00**
2009	-3.670	5.233	8.902	1,468,062.52	569,535.00	3.4537	375,628.0	493,850.0	18,348.0	-99,874.0	(0.0680)	**3.52**
2010	1.977	5.993	4.015	1,569,603.82	650,079.00	1.6630	391,661.0	493,090.0	20,248.0	-81,181.0	(0.0517)	**1.71**
2011	2.196	9.578	7.382	1,551,453.11	744,323.00	3.5414	387,353.0	490,234.0	26,315.0	-76,566.0	(0.0494)	**3.59**
2012	-1.511	5.992	7.503	1,679,209.88	891,502.00	3.9834	391,168.0	500,054.0	30,922.0	-77,964.0	(0.0464)	**4.03**
2013	-0.554	3.828	4.383	1,638,866.68	979,031.00	2.6181	395,597.0	467,433.0	35,617.0	-36,219.0	(0.0221)	**2.64**
2014	1.061	2.264	1.203	1,662,661.33	1,041,624.00	0.7538	403,431.0	465,592.0	36,026.0	-26,135.0	(0.0157)	**0.77**
2015	1.244	1.113	-0.130	2,040,118.17	1,073,894.00	-0.0686	415,539.0	470,667.0	33,227.0	-21,901.0	(0.0107)	**(0.06)**

			COLUMN #1			COLUMN #2					COLUMN #3	COLUMN #4
Italy	GDP Growth Rate	Long Term Interest Rate	(r-g)	GDP (Millions of Euros)	Debt (Millions of Euros)	(r-g)*B/Y	Revenues (Millions of Euros)	Expenditures (Millions of Euros)	Interest of Debt (Millions of Euros)	Primary Surplus/Deficit (Millions of Euros)	P/Y	(r-g)*B/Y - P/Y
	g	r		Y	B		R	G	rB	P		
2005	8.027	3.386	-4.641	972,103.66	1,518,639.70	-7.2497	640,143.0	702,315.0	67,175.0	5,003.0	0.0051	(7.25)
2006	8.318	3.784	-4.534	1,090,641.05	1,588,072.30	-6.6020	681,983.0	737,532.0	68,869.0	13,320.0	0.0122	(6.61)
2007	7.226	4.307	-2.919	1,076,944.16	1,606,203.20	-4.3536	728,556.0	753,127.0	76,660.0	52,089.0	0.0484	(4.40)
2008	3.275	4.364	1.088	1,050,410.41	1,671,400.80	1.7319	736,728.0	780,664.0	80,461.0	36,525.0	0.0348	1.70
2009	-3.330	3.974	7.305	1,080,897.86	1,770,189.10	11.9628	721,780.0	804,661.0	69,457.0	-13,424.0	(0.0124)	11.98
2010	0.174	4.250	4.076	1,124,604.05	1,851,741.70	6.7112	732,373.0	800,494.0	68,836.0	715.0	0.0006	6.71
2011	-0.971	5.437	6.408	1,077,468.31	1,907,909.60	11.3474	747,781.0	808,562.0	76,416.0	15,635.0	0.0145	11.33
2012	-2.864	5.847	8.710	1,164,413.57	1,990,045.60	14.8865	771,658.0	818,874.0	83,566.0	36,350.0	0.0312	14.86
2013	-1.358	4.562	5.920	1,144,559.02	2,070,179.70	10.7082	772,090.0	819,006.0	77,605.0	30,689.0	0.0268	10.68
2014	1.111	2.722	1.611	1,178,980.72	2,137,239.70	2.9208	776,480.0	825,479.0	74,377.0	25,378.0	0.0215	2.90
2015	3.724	1.735	-1.988	1,453,146.56	2,172,850.30	-2.9733	785,938.0	830,135.0	68,066.0	23,869.0	0.0164	(2.99)

$$(r - g)\frac{B}{Y} - \frac{P}{Y} = 0$$

Based on the results of sustainability test above, the column #4 figures sign (- or +) will determine if there is fiscal sustainability, the negative sign is an indicator of sustainable path and the positive sign is an indicator of explosive fiscal path.

Greece

Before the financial crisis, the Greece economy was showing sustainable path. The worldwide downturn affected this country the most in the Euro area and the period between 2010-2014 was showing always double digits. Recently, in the last two years, the economy showed some recovery to go back to the sustainable path, but it is still far from showing strong sustainability.

Ireland

Before the financial crisis, the Irish economy was showing a sustainable path. The housing market collapse resulted in big positive numbers between 2009-2012. In the end of 2015, the Irish economy showed sustainable path with big expectations to be in the safe zone.

Spain

The Spanish economy wasn't showing alarming figures based on the test above. However, the economy was always in the unsustainable path during the most of last 10 years. The country should take real steps to follow the sustainability path.

Italy

The Italian economy was showing positive figures in the first three years of our study (2005-2007). The worldwide financial crisis, made the country's economy to be on the explosive path. In 2015, the economy recovered to show some sustainability hope.

V. Survey of Literature

Since the early of 1970-s, there has been important literature that discussed the issue of debt sustainability and many approaches applied to test if the fiscal policy of a specific country is sustainable. Recently, the national debt sustainability received considerable attention & increasing number of researchers dedicated significant efforts to see if the debt of certain economy is sustainable. Stationarity, Cointegration between revenues and expenditures, Accounting and New cointegration regression approaches will be used in this research to test the sustainability of Lebanese fiscal policy.

1-Stationarity of various fiscal variables

A stationary process reverts around a constant long-term mean and has a constant variance independent of time. Stationarity of fiscal variable means that this variable has a tendency to revert to the constant mean and it has been used as a tool in time series analysis.

For the US economy, a research has been done by Hamilton and Flavin in 1986, the study presented the following budget balance equation:

$$B_t + \sum_{j=1}^{\infty}(1+r)^{-j}G_{t+j} = \sum_{j=1}^{\infty}(1+r)^{-j}R_{t+j}$$

B_t: Debt at time t, r: interest rate, G: Expenditures excluded the service on debt,

R: Revenues

In any time, when the revenues decrease and the expenditures remain the same, the above expression will change and the need to borrow additional debt will increase.

The paper showed that the government is subject to the present value constraint, where the result will show if the government in the coming future is going to pay the interest on the debt by increasing the revenues or by continuously issuing new debt.

To see if borrowing continuously will lead to unsustainable path, the present value constraint must be satisfied, where the expected present value of expenses must be less than the expected present value of revenues, the result of Hamilton & Flavin study concluded that there was no violation of this constraint, the study also showed that the Non-Ponzi scheme game condition:

$\lim_{t\to\infty} \frac{G_t - R_t}{(1+r)^t} = 0$ Should not be violated to remain the government budget balanced.

The alternative hypothesis for the above constraint, when the future surpluses cannot be balanced with the government deficit and this expressed by Hamilton and Flavin like the following:

$$\lim_{t\to\infty} \frac{G_t - R_t}{(1+r)^t} = A_0 > 0$$

The following equation suggested by this study to test the stationarity:

$$X_t - X_{t-1} = B_0 + B_1 X_{t-1} + B_2 (X_{t-1} - X_{t-2}) + e_t$$

Where: X: variable under examination (for example: Debt, Primary Surplus)

The result was -2.92 for the surplus and -2.82 for the debt, comparing with the ten percent critical value of -2.63, the study test on the limits of borrowing showed that the government deficit with the debt series are stationary for the period 1962-1984.

Another study for the US economy has been done by David W. Wilcox (1989) to test the influence of deficit on the economy.

The accumulation of debt described like the following:

$$B_t = (1 + r_{t-1}) B_{t-1} - S_t$$

B: Debt, r: Interest rate, S: Primary surplus.

The researcher followed the same path of Hamilton and Flavin in studying the borrowing constraint by changing the following:

1- Stochastic real interest rate has been used instead of fixed real interest rate, which is better for sustainability.
2- The non-stationary of surpluses has been allowed, whereas for Hamilton &Flavin the stationarity of surplus was necessary.

The stationarity test is important to see if there is a violation of the Non-Ponzi Game constraint, when the debt is stationary then the constraint is approaching to a constant value,

in contrast, if the debt is not stationary, then there is a violation and the Non-Ponzi Game is not approaching to a constant value.

By applying the previously mentioned changes, the conclusion was that the period from 1960-1984, cannot be tested as a whole due to strong structural break occurrence in the structure of fiscal policy. The borrowing constraint, in general, does not appear to be fully satisfied because the statistical tests supported the result that the fiscal policy is not sustainable and this contradicted the findings of Hamilton and Flavin.

The accumulation of debt can be described based on the study of Trehan and Walsh (1991) like the following:

$$B_t - B_{t-1} = r_t B_{t-1} - S_t$$

B: Debt, r: Real interest rate, S_t: Primary surplus.

By taking the expectations on the information into consideration, the above equation will become:

$$B_{t-1} = -\sum_{j=0}^{\infty} (1+r)^{-(j+1)} E\left(d_{t+j} | I_{t-1}\right) + \lim_{j\to\infty} (1+r)^{-(j+1)} E\left(S_{t+j} | I_{t-1}\right)$$

r: Expected rate of return, d: deficit net of interest, B: Stock of outstanding debt,

I: Information set of private agents.

This study has shown that if the expected real rates are constant, the stationarity of deficit excluded the interest on debt & the debt are necessary to satisfy the IBC,

Furthermore, if the expected real rates are positive, the stationarity of deficit included the interest on debt & the debt are necessary to satisfy the IBC. The study has been applied for a period longer than other papers (1890-1983). The conclusion was that the stationarity existence satisfied for the expenditures inclusive the interest on debt and this finding led to conclude that the debt was sustainable.

The government budget constraint expressed by Kremers (1988)

$$\Delta B_t = G_t - R_t + r_{t-1}B_{t-1}$$

ΔB: Difference between the current period debt and the previous period, G: Expenditures excluding the service on debt, R: Revenues, r: Interest paid on debt, B: Debt

The study of unit root test for stationarity is recommended by Downes and Leon (1987) and the researchers used different periods to test the sustainability of US federal debt and found that the debt was sustainable from 1920 to 1981 but after that date until 1985, the service cost of debt failed to produce deficit reductions like it did before.

Outside of US, the stationary framework has been conducted to test the sustainability of fiscal policy all over the world.

For the Canadian economy, Smith & Zin (1991) used the same hypothesis considered by Hamilton and Flavin, where the market value of debt must equal to the present discounted value of future surpluses.

The government financing identity provided in this study:

$$B_t = (1 + r_{t-1})B_{t-1} + G_t - R_t - (M_t - M_{t-1})/P_t$$

B: Real outstanding debt, r: Real interest rate, G: Real expenditures excluded the service on debt, R:Real revenues excluded seigniorage, M: Money supply, P: Price level.

The following equation rules out the scheme where the government pays the due interest on its debt by additional new debts.

$$B_t = E_t \sum_{j=1}^{\infty} \left(1 + r_{t+j-1}\right)^{-1} \left(S_{t+j} + (M_{t+j} - M_{t+j-1})/P_{t+j}\right) + \lim_{n\to\infty} E_t (1 + r_{t+n-1})^{-t-n} B_{t+n}$$

$$\lim_{n\to\infty} E_t (1 + r_{t+n-1})^{-t} B_{t+n} = 0$$

This condition does not signify that the debt must be paid off; it is accepted to grow forever at a rate less than the rate of interest.

The stationarity test of public debt and deficit resulted that the debt was not sustainable based on monthly data for period 1946-1984.

For Indian economy, Buiter and Patel (1992) used the stationarity test by applying four different interest rates (Borrowing rate in domestic and USD currencies and Lending rate in domestic and USD currencies), the result was negative which means not sustainable.

The stationarity test of Phillips and Perron (1988) used in this study:

$$B_t = \alpha_0 + \alpha_1 t + \beta B_{t-1} + u_t$$

The null hypothesis is when β=1 and α_1=0, if the result failed to reject this hypothesis then the debt is unsustainable. If the null hypothesis rejected and the value of α_1

was showing a positive deterministic trend in the debt series, the insolvency is still a possible end.

The test showed that for the period 1970-1988, the Indian public debt was not sustainable.

Caporale (1995) extended the study to conduct studies on groups of European Union countries over the period of 1960-1991 based on semiannual data.

The budget constraint given:

$$B_{t+1} + R_{t+1} + \frac{M_{t+1} - M_t}{P_t} = (1 + r - g)B_t + G_t$$

B: Outstanding real debt, R: Real revenues excluded seigniorage, $\frac{M_{t+1}-M_t}{P_t}$Real inflation tax revenues, r: real interest rate, g: Growth of GDP, G: Expenses exclusive the service on debt.

The stationarity test to see if the surplus follows zero mean:

$$S_t = \beta S_{t-1} + u_t$$

If β<1, will result stationarity process.

The surplus or deficit stationarity has been tested in this paper due to the importance of this variable to revert to zero in the long run in order to assure the sustainability of fiscal policy.

The results showed that Italian, Greece, Danish and German debts were not sustainable, however, France, UK, Italy, Belgium, Ireland and Spain were sustainable, the

study has been done on Debt/GDP and Surplus/GDP variables to test the occurrence of the unit root.

For the Arab world, by the beginning of the twenty-first century, couple of studies tested the sustainability of fiscal policy by using the stationarity framework of various fiscal variables.

For the Jordanian economy, the test conducted to see the stationary on budget deficit & external debt as a percentage of GDP, Shahateet, Al-Habashneh& Al-Majali (2014) used autoregressive distributed lag model:

1- Constant and linear trend.

$$\Delta BD_t = Y_o + \sum_{i=1}^{n} \gamma_{1i} \Delta BD_{t-i} + \sum_{i=0}^{m} \gamma_{2i} \Delta ED_{t-i} + \gamma_3 t + u_1$$

$$\Delta ED_t = \delta_o + \sum_{i=1}^{n} \delta_{1i} \Delta ED_{t-i} + \sum_{i=0}^{m} \delta_{2i} \Delta BD_{t-1} + \delta_3 t + u_2$$

2- Constant without time trend.

$$\Delta BD_t = \alpha_o + \sum_{i=1}^{n} \alpha_{1i} \Delta BD_{t-i} + \sum_{i=0}^{m} \alpha_{2i} \Delta ED_{t-1} + u_3$$

$$\Delta ED_t = \beta_o + \sum_{i=1}^{n} \beta_{1i} \Delta ED_{t-i} + \sum_{i=0}^{m} \beta_{2i} \Delta BD_{t-1} + u_4$$

ED: External debt to GDP, BD: Budget deficit to GDP ratio, Δ: first difference operator, n, m: Maximum number of lags, Y, δ, α, β: Coefficients, u: Stationary stochastic process.

Autoregressive Distributed Lag model showed the relationship between variables by using OLS method and this technique is advisable for small size samples.

The result showed non-stationarity at level and stationarity at first difference, so the result was not informative and it should conduct other tests to reach to more useful and meaningful results.

For selected countries from the Middle East and North Africa, Neaime (2010) examined the sustainability of Egypt, Jordan, Morocco, Tunisia & Turkey, the researcher looked to the stationarity of budget deficit, which is a sufficient condition for the fiscal policy sustainability.

The government financing constraint is provided by this-study:

$$B_{t-1} = \sum_{j=0}^{n} \frac{R_{t+j}}{(1+r)^{j+1}} - \sum_{j=0}^{n} \frac{G_{t+j}}{(1+r)^{j+1}} + \frac{B_{n+1}}{(1+r)^{n+1}}$$

Where $\frac{B_{n+1}}{(1+r)^{n+1}}$ approaches to zero as the period numbers increase.

The modified equation in ratios to GDP looked like the following:

$$\frac{B_0}{Y_o} = \sum_{j=0}^{n} \left(\frac{1+n}{1+r}\right)^{j+1} \frac{R_j}{Y_j} - \sum_{j=0}^{n} \left(\frac{1+n}{1+r}\right)^{j+1} \frac{G_j}{Y_j} + \left(\frac{1+n}{1+r}\right)^{n+1} \frac{B_{n+1}}{Y_{n+1}}$$

Where the last term is the Non-Ponzi Game constraint and it must converge to zero.

The results showed strong sustainability for Tunisia and weak for Egypt, while other countries were on unsustainable path.

For the Lebanese economy, there is a study conducted for the period 1960-2002. Neaime (2004) in this study added the seigniorage revenue in the mathematical equation:

$$B_{t-1} = \sum_{j=0}^{n} \frac{R_{t+j}}{(1+r)^{j+1}} + \sum_{j=0}^{n} \frac{M_t - M_{t-1}}{P_{t+j}} - \sum_{j=0}^{n} \frac{G_{t+j}}{(1+r)^{j+1}} + \frac{B_{n+1}}{(1+r)^{n+1}}$$

Where the $\lim_{n\to\infty} \frac{B_{n+1}}{(1+n)^{n+1}} = 0$ must be satisfied.

The stationary test of budget deficit showed that Lebanon deficit was not integrated of order zero and budget deficit may grow without bound.

2 Co-integration Tests.

Cointegration means that the pair of series under examination may move apart from each other but will not drift too far.

Here we will see if a long-term relationship exists between the government revenues & expenditures. If the results were positive, then it will support the concept of sustainable fiscal policy.

A study for the US economy where quarterly data for the period of 1950:2 till 1988:4 has been used, Hakkio & Rush (1991) tested the government real expenditures and revenues and see the co-integration existence. As an exception from other studies, this study allowed fluctuations in interest rate, in contrast to other researchers where the interest rate was constant. The cointegration test applied on the whole sample and subsamples as well.

The following constrained cointegration regression equation of Engle and Granger has been estimated to show the relation between the real expenditures and revenues:

$$R_t = \alpha + \beta G_t + u_t$$

The null hypothesis is where β=1 → Expenditures and revenues are cointegrated.

When the revenues and expenditure are not in stationarity situation, then the cointegration is necessary to satisfy the present value constraint.

The result showed that β was significantly less than 1, for each increase in expenditures by 1, the revenues were increasing by 0.68. This clearly means that fiscal policy isn't sustainable

Another regression equation has been used also.

$$\Delta S_t = -pS_{t-1} + u_t$$

When p=0 → Expenditures and Revenues are not cointegrated.

When p is significantly different than 0 → cointegrated.

This study used Durbin-Watson, Dicky Fuller, Augmented Dicky Fuller, VAR and Stock Watson statistic to see the cointegration between expenditures and revenues in real, real to GDP and real per capita terms.

The result showed that the current government tax policy is violating the intertemporal budget constraint & the US government should look for solutions to reduce the unneeded spending and invent an efficient system to increase the tax revenues, hence,

the possibility of debt default is high. Only the data deflated to population was sufficient to conclude that the revenues and expenditures are cointegrated.

The deficit of the US economy always attracted the interest of researchers all over the world. The lack of co-integration relationship between expenditures and revenues concluded that the government debt is unsustainable. Tanner & Liu (1994) used the method of Hakkio and Rush to test intertemporal budget balance.

$$R_t = \alpha + \beta G_t + u_t$$

The β =1 is necessary to prevent the debt from limitless increase.

This study included the break date implications by showing the results before and after the significant change of the fiscal policy after 1981. If the structural shift wasn't accounted, the IBC would be invalid.

The modified equation will be:

$$R_t = \alpha + \alpha^D D_t + \beta G_t + u_t$$

D=1 for the period after 1981 and 0 otherwise.

The study concluded that the government can run a deficit over a period of time, for that reason, all economists look to the intertemporal constraint to test the sustainability.

The study was for the period between 1950:1-1989:4, 1964-1989 & 1976-1989 for the US economy, the results showed that the government debt remained bounded for this period then the expenditures inclusive the service of debt and Revenues of taxes were co-

integrated which assure that the U.S. government debt does not violate the Intertemporal Budget Constraint. This study contradicted the conclusion of Hakkio & Rush.

Another paper for the US economy, Haug (1991) tried to see if the current outstanding debt will be covered by the expected future surpluses, this paper suggested that the Present Value Constraint is necessary condition for debt sustainability.

The period by period budget constraint is described:

$$\Delta B_t = rB_{t-1} - S_t + u_t$$

Where: B: Debt, S: Surplus which is defined $T_t - G_t$, T_t: Govermnet tax revenues included money seignorage, G_t: Expenditures excluded the debt interest payments,r: real interest rate, u_t: measurement error.

Based on the definition provided by Engle and Granger (1987), two variables can be considered cointegrated if they "move so that they do not drift too far apart"

The cointegration vector estimated by regressing surpluses and debt.

$$S_t = C + \alpha B_{t-1} + u_t$$

C: Constant, S: Surplus, B: Debt, u_t: stationary zero-mean error, B: Debt

By adopting several tests on the cointegration like: ADF, DF, CRDW, and after calculating the critical value based on those tests, the result showed that the null hypothesis of no cointegration is rejected and the plan of retiring the current outstanding debt with the future surpluses cannot be achieved for the period 1960:1-1987:4

For the UK and the US economies, Ahmed & Roger (1995) published a paper for the period 1792-1992 for the US and 1692-1992 for the UK but with differences in the availability of data within each country, the result for the US economy expected that future situation of fiscal policy can be sustainable based on the cointegration test. For the UK economy, the test of long-term relationship of expenditures & revenues implied by the government has shown to be satisfied over the whole period.

There are researchers preferred to test the sustainability on a group of countries between revenues and expenditures using the intertemporal budget constraint to see the long-run relationship between them.

Like other studies, Kalyoncu (2005) took the budget constraint as starting point to derive the present value of budget constraint:

$$G_t + (1 + r_t)B_{t-1} = R_t + B_t$$

G: Expenses in real terms excluded the service on debt, r: Interest rate, R: Revenues in real terms, B: Public debt in real terms.

By modifying the above to become an equation for several periods:

$$B_t = \sum_{s=1}^{n} \frac{R_{t+s} - G_{t+s}}{\prod_{j=1}^{s}(1 + r_{t+j})} + \lim_{s \to \infty} \prod_{s=n}^{\infty} \frac{B_{t+s}}{1 + r_{t+s}}$$

Based on the above equation, the paper suggested that the supply of bond, on average should not exceed on average the rate of interest.

$$\lim_{s\to\infty} \frac{B_{t+s}}{(1+r)^s} = 0$$

This study adopted the same cointegration regression of Hakkio and Rush (1991):

$$R_t = \alpha + \beta G_t + u_t$$

When β=1 →cointegration exists → Deficit is sustainable.

When β<1 → Expenses are growing faster than revenues and deficit may not be sustainable.

Based on Johansen approach, the results showed that South Korea & Turkey met the weak sustainability conditions, while Mexico, the Philippines & South Africa could not meet the conditions of sustainability and are violating the IBC in long run.

The studied period for all countries was between 1970 and 2003 except for South Korea was between 1980 and 2003 based on quarterly data

Richter &Paparas (2012) conducted a study for the Greece economy tested the government IBC for two different periods 1833-2009 & 1960-2009, the cointegration technique used the same regression equation of Hakkio & Rush (1991), furthermore, adopted the approach of Engle & Granger (1987) and Johansen maximum likelihood approach.

$$R_t = \alpha + \beta G_t + D_m + e_t$$

The empirical results showed a sustainable fiscal policy for both periods. This paper mentioned the crucial role of rating agencies by downgrading or upgrading some of EU countries.

For another economy from the European Union, Oscar Bajo-Rabio, Carmer Diaz Roldan and VicenteEsteve (2010) have been conducted a study for Spain economy for the period 1850-2000, the cointegration framework to test the IBC:

$$\Delta B_t = \sum_{j=0}^{\infty} \left[\frac{1+g}{1+r}\right]^{j+1} E_t \Delta S_{t+j+1} + \lim_{j\to\infty} \left[\frac{1+g}{1+r}\right]^{j+1} E_t \Delta B_{t+j+1}$$

Where: g: real GDP growth rate, r: real interest rate, S: Primary surplus, B: Debt, E: expectations

The sustainability requires: $\lim_{j\to\infty} \left[\frac{1+g}{1+r}\right]^{j+1} E_t \Delta B_{t+j+1}$

The regression model form: $R_t = \alpha + \beta G_t + \varepsilon_t$

Where: R: Revenues, G: Expenditures included interest payments.

$\beta=1 \rightarrow$ Cointegrated$\rightarrow$ Sustainable.

$0<\beta<1 \rightarrow$ Weakly sustainable.

$\beta=0 \rightarrow$ Unsustainable.

The study concluded that there was long-term relationship between revenues and expenditures, this study applied a period longer than other researchers because using extended data will give more informative and meaningful results.

Another group of countries from Europe, the cointegration test between government expenditures and revenues have been tested, Curtasu (2011), took several periods for the countries under investigation between the periods 1970-2010.

When the relationship between expenses and revenues is bidirectional → Expenses decisions will not be made isolated from revenues.

Denmark, Greece, Netherland, Portugal, Spain and UK results were positive while Germany, Belgium, Finland, and Ireland were negative, the lack of cointegration suggested modified healthy policies in order to avoid large fiscal imbalances and insolvency risks in the upcoming future.

Tshiswaka-Kashalala (2006) conducted another study on an African country, which is South Africa for the period 1990-2004, the results could not reject that the government spending, revenues and the interest payments on the accumulated debt are co-integrated. This result supported the idea that the fiscal policy was sustainable.

3- Accounting approach

Neaime (2014) conducted a study by applying this framework for a group of selected European countries for the period 2008-2013.

Here the approach named accounting approach:

$$Y_t = (1+g)Y_{t-1}$$

Y_t: Current period GDP, g: growth rate of GDP, Y_{t-1}: Previous period GDP

Financing constraint in terms of GDP

$$\frac{B_t}{Y_t} = (1+r)\frac{B_{t-1}}{Y_t} - \frac{S_t}{Y_t}$$

Substituting the first equation into the second: $\frac{B_t}{Y_t} = \frac{(1+r)}{(1+g)}\frac{B_{t-1}}{Y_{t-1}} - \frac{S_t}{Y_t}$

$$s_t = (r-g)b_{t-1}$$

g>r, Debt will stabilize even with budget deficit.

g=r, No additional debt, but will stabilize if the budget balanced.

g<r, Debt will grow even in the presence of budget surplus.

The result was negative for most of the applied countries France, Italy, Ireland, Greece, Portugal and Spain except Germany that showed positive results for two years out of six. Austerity measures and lowering interest rates through the monetization could decrease the debt pressure and give some hope for investment resources. The negative results main reason was the 2008 financial crisis.

Greiner, Koeller, and Semmler (2006) conducted a study on Germany, the researchers looked and tested the time series relation of public debt to GDP, the intertemporal budget constraint is satisfied for dynamic efficient economies. The result showed that the discounted rate exceeded the GDP growth rate.

4- New cointegration regression model

As a new approach to test the sustainability of fiscal policy, Azar and Asrawi (2011) reached to a new cointegration regression model that depends on stochastic interest rates and on non-stationarity nature of debt, of revenues scaled by time variable interest rates and of government spending scaled by time variable interest rates.

The following expression provided by this study to see the government budget constraint:

$$B_0 = \sum_{t=1}^{\infty} \prod_{i=1}^{\infty} (1 + r_i)^{-t}(R_t - G_t) + \lim_{t \to \infty} (1 + r_t)^{-t} B_t$$

r: Interest rate, R: Tax receipts, G: Spending excluded the interest payments, t: Time period, B: Public debt.

By imposing the NPG condition and taking into consideration the expectations at zero with flat yield curve, r_o is known previously and assuming that R and G are following random walk, the equation becomes:

$$B_0 = \sum_{t=1}^{\infty} (1 + r_0)^{-t}(R_0) - \sum_{t=1}^{\infty} (1 + r_0)^{-t}(G_0)$$

The revenues and expenditures are known at time zero, then the PVC will be like:

$$B_0 = \frac{R_0}{r_0} - \frac{G_0}{r_0}$$

The same equation for every period will be:

$$B_t = \frac{R_t}{r_t} - \frac{G_t}{r_t}$$

In any study if, $B_t, \frac{R_t}{r_t}, \frac{G_t}{r_t}$ are found non-stationarity, then, there is cointegration regression between those three variables:

$$B_t = \alpha + \beta_1 \frac{R_t}{r_t} - \beta_2 \frac{G_t}{r_t} + \varepsilon_t$$

The study concluded that during the period 1966: Q1 to 2011: Q3, the US fiscal policy has been sustainable, and there was not any significant change in the fiscal stance after 2006. Furthermore, no different results appeared with the change in the political power.

VI. Data

The data of this research collected from the International Monetary Fund's direction of trade statistics, International Financial Statistics, World economic outlook database of IMF, Ministry of Finance reports, World Bank data, Banque de Liban, and FFA private banking publications for the period 1971-2015.

VII. Approaches/Methods.

As mentioned above, this study followed several approaches and frameworks to test the sustainability of Lebanese fiscal policy.

The objective of this study is to provide a research examining the sustainability of Lebanese fiscal policy for the period 1971-2015 by taking the stationarity preliminary test of various fiscal variables and based on the results looking into co-integration between budget revenues and expenditures. The concern here is that a growing debt without limit would

eventually become unmanageable, leading to some undesirable consequences. Furthermore, this study applied the accounting approach where we will see the relation between interest rates and growth rate of GDP.

As a new test, this paper applied the approach of Asrawi and Azar for US economy where the test provided to the researchers in this field a new cointegration equation between public debt on one hand and budget revenues and expenditures on the other hand.

Although the actual behavior of each government is different, however, the tests equation that we are studying is all common.

The Present value constraint and non-Ponzi game constraint showed in this study if the fiscal policy of Lebanon is sustainable, by capturing time series properties.

The following equation presents the stock of debt:

$$B_t = B_{t-1} + rB_{t-1} - S_t$$

B_t: Outstanding debt at the end of period *t*, $B_{t-1}$is the last period debt, $rB_{t-1}$is the service on debt and S_t: is the primary surplus or negative.

The stationarity test applied both Phillip-Perron and Augmented Dickey Fuller unit root tests for several variables: Government spending included the service on debt, Government spending included the service on debt/GDP, Government spending excluded the service on debt, Government spending excluded the service on debt/GDP, Revenues, Revenues/GDP, Deficit, Deficit/GDP, Debt and Debt/GDP, Domestic Debt and Domestic Debt/GDP, External Debt and External Debt/GDP

$$\Delta X_t = \beta_1 + \beta_2 X_{t-1} + \sum_{t=1}^{k} \delta_i \Delta X_{t-1} + \varepsilon_t$$

Δ is the first difference operator, *(Xi,t)* is the fiscal variables time series, βi and δi are constant parameters and εi is the stationary stochastic process.

Vector Error Correction Regression, The Johansen efficient maximum likelihood test and ARDL has been used to test the existence of the long-term relationship between expenditures and revenues and the result will give the answer if the debt of Lebanon is growing with or without bound.

$$X_t = A_1 X_{t-1} + \cdots + A_z X_{t-z} + \varepsilon_t$$

This is the vector auto-regression of order z, Xt is the y-vector of the non-stationarity of government revenues and expenditures series and εt is the vector of innovations.

The Present value constraint and non-Ponzi game constraint will show in this study if the fiscal policy of Lebanon is sustainable, by capturing time series properties.

The following equation presents the stock of debt:

$$B_t = B_{t-1} + rB_{t-1} - S_t$$

B_t*:* Outstanding debt at the end of period *t,* $B_{t-1}$is the last period debt, $rB_{t-1}$is the service on debt and S_t*:* is the primary surplus or deficit.

The accounting approach will see the relation between interest rates and GDP growth rate.

As a new cointegration test, we will take the method of Azar and Asrawi study on US market to see if the government is looking to reduce the debt and applying a policy appropriate to that.

All the above helped us conclude whether, with the current fiscal policy, the government can pursue the same policy in the future without fundamental changes in the structure of the policy.

VIII. Research Questions and Hypotheses

Research questions.

Based on the literature review, the following are the questions of this study:

1- Is the current fiscal policy of Lebanon sustainable?

2- Is the debt of Lebanon growing without bound?

By looking to: A-The stationarity test on various fiscal variables.

B- The relation between revenues and expenditures included and excluded the service of debt.

3- Is the government of Lebanon taking the needed steps to secure enough surpluses against the accumulation of debt?

Hypotheses.

The first set of Hypotheses: (LBP, USD, LBP or USD/GDP)

H0: Revenues and expenditures (included the service of debt) are not cointegrated.

H1: Revenues and expenditures (included the service of debt) are cointegrated.

The second set of Hypotheses: (LBP, USD, LBP or USD/GDP)

H0: Debt and Primary Surplus are not cointegrated.

H1: Debt and Primary Surplus are cointegrated.

The third set of Hypotheses: (LBP, USD, LBP or USD/GDP)

H0: External Debt and Primary Surplus are not cointegrated.

H1: External Debt and Primary Surplus are cointegrated.

The fourth set of Hypotheses: (LBP, USD, LBP or USD/GDP)

H0: Domestic Debt and Primary Surplus are not cointegrated.

H1: Domestic Debt and Primary Surplus are cointegrated.

The fifth set of Hypotheses: (LBP)

H0: Debt, Revenues and Expenditures (excluded the service of debt) in terms of deposits interest rates are not cointegrated.

H1: Debt, Revenues and Expenditures (excluded the service of debt) in terms of deposits interest rates are cointegrated.

The sixth set of Hypotheses:

H0: The difference between Interest rate and GDP growth rate is more than zero.

H1: The difference between Interest rate and GDP growth rate is less than zero.

IX. Empirical Results

The two main frameworks of this study are stationarity and co-integration for several variables.

The stationarity test is a preliminary test for fiscal policy sustainability before going and checking the cointegration regression relationship between various fiscal variables, the stationarity of fiscal variables implies the lack of broad trends in data, this is an important consideration while doing econometric analysis.

The non-stationarity data means that the average changes over time, the data is unpredictable and cannot be modeled which creates misleading conclusions about fiscal variables, non-stationarity series tendency to shocks is infinite, that is why it is crucial to transform the data to stationarity to have consistent results.

If the variables are not stationary then the estimated regression cannot be trusted and spurious regression will be generated, which means misleading statistical relationship between the non-stationarity variables and it may indicate relationship between the variables where one does not exist. Differencing the variables to make them stationarity was the solution in this research, and the other way to deal with it by applying the cointegration regression by using the Johansen method which is good for the same order integrated variables, and Vector Error Correction model which combines levels and differences. The third method applied was ARDL which is more reliable especially for small size data and when variables aren't integrated with the same order.

The reason of applying cointegration regression analysis is because the variables showed non-stationarity process at level, if the variables were stationarity then normal simple regression techniques were enough.

The stationarity or not stationarity of the fiscal variable examined in this research is tested by applying both ADF & PP unit root tests.

Dickey and Fuller did the early and pioneering work on testing the unit root availability on time series sample in 1979, it is the best known and most widely used test. Augmented Dicky Fuller changed the test by using p lags of the variables, which is specified

for large data. A study can determine the number of lags either by keeping it to the frequency of data to decide or by taking a specific information criterion.

Phillips-Perron developed more comprehensive theory of unit root, the test is very similar to the ADF but provides automatic correction to DF to allow autocorrelated residuals and it is more robust test to unspecified heteroscedasticity in the process of the test equation.

The main criticism of ADF & PP is the low power when the process is stationarity and sensitivity for structural breaks.

The choice of an appropriate test depends primarily on the subjective judgment of the analyst, ADF & PP are the best options for time series with long and short observations, both tests are the most commonly used because of the advantage of simple construction and feasibility.

Tests are performed at level and first difference. Trend & Intercept will be included in the test equation, and the number of maximum lags will be determined based on Schwarz information criterion.

1. Augmented Dicky Fuller & Phillips-Perron Stationarity Tests results

Table of Terminology

Variable	Description
R	Revenues
R/Y	Revenues to GDP
R/r	Revenues over Interbank interest rate

R/r*	Revenues over Deposits interest rate
R/r**	Revenues over Loans interest rate
G	Expenditures
G/Y	Expenditures to GDP
G*	Expenditures (Excluding the service on Debt)
G*/Y	Expenditures (Excluding the service on Debt) to GDP
G*/r	Expenditures (Excluding the service on Debt) over Interbank interest rate
G*/r*	Expenditures (Excluding the service on Debt) over Deposits interest rate
G*/r**	Expenditures (Excluding the service on Debt) over Loans interest rate
B	Total Gross Debt
B/Y	Total Gross Debt to GDP
DD	Total Domestic Debt
DD/Y	Total Domestic Debt to GDP
ED	Total External Debt
ED/Y	Total External Debt to GDP
DS	Debt Service
DS/Y	Debt Service to GDP
P	Primary Surplus/Deficit
P/Y	Primary Surplus/Deficit to GDP
D	Deficit/Surplus
D/Y	Deficit/Surplus to GDP
Y	GDP

Augmented Dicky-Fuller Unit Root Test (AT LEVEL) - LBP

Variable	P-Value	T-statistic	Test Critical Values – 5% Level	Result
R	0.8638	-1.3421	-3.5155	Not Stationary
R/Y	0.3102	-2.5362	-3.5155	Not Stationary
R/r	0.7326	-1.6893	-3.5577	Not Stationary
R/r*	0.9992	+0.5884	-3.5484	Not Stationary
R/r**	0.9938	-0.0721	-3.5180	Not Stationary
G	0.8780	-1.2876	-3.3515	Not Stationary
G/Y	0.0274	-3.7769	-3.5155	Stationary
G*	0.8781	-1.2875	-3.5155	Not Stationary
G*/Y	0.0582	-3.4463	-3.5155 -3.1882	Not Stationary at 5% Stationary at 10%
G*/r	0.9291	-1.0084	-3.5529	Not Stationary
G*/r*	1.0000	+1.3906	-3.5330	Not Stationary
G*/r**	1.0000	+1.5907	-3.5330	Not Stationary
B	0.9930	-0.1161	-3.5155	Not Stationary
B/Y	0.0970	-3.2034	-3.5155	Not Stationary
DD	0.9769	-0.5522	-3.5180	Not Stationary
DD/Y	0.1349	-3.0340	-3.5155	Not Stationary
ED	0.8508	-1.3867	-3.5180	Not Stationary
ED/Y	0.7483	-1.6677	-3.5180	Not Stationary
DS	0.5418	-2.0801	-3.5180	Not Stationary
DS/Y	0.8348	-1.4377	-3.5207	Not Stationary

P	0.6189	-1.9361	-3.5155	Not Stationary
P/Y	0.1464	-2.9904	-3.5155	Not Stationary
D	0.4407	-2.2701	-3.5155	Not Stationary
D/Y	0.0615	-3.4210	-3.5155 -3.1882	Not Stationary at 5% Stationary at 10%

Phillips-Perron Unit Root Test (AT LEVEL) - LBP

Variable	**P-Value**	**T-statistic**	**Test Critical Values – 5% Level**	**Result**
R	0.8589	-1.3599	-3.5155	Not Stationary
R/Y	0.2811	-2.6027	-3.5155	Not Stationary
R/r	0.8387	-1.4115	-3.5529	Not Stationary
R/r*	0.9627	-0.7469	-3.5180	Not Stationary
R/r**	0.9893	-0.2635	-3.5180	Not Stationary
G	0.8623	-1.3478	-3.5155	Not Stationary
G/Y	0.0285	-3.7601	-3.5155	Stationary
G*	0.8711	-1.3150	-3.5155	Not Stationary
G*/Y	0.0921	-3.2290	-3.5155 -3.1882	Not Stationary at 5% Stationary at 10%
G*/r	0.9291	-1.0084	-3.5529	Not Stationary
G*/r*	0.9840	-0.4116	-3.5180	Not Stationary
G*/r**	0.9977	+0.2479	-3.5180	Not Stationary
B	0.9910	-0.2044	-3.5155	Not Stationary

B/Y	0.1049	-3.1642	-3.5155	Not Stationary
DD	0.9955	0.0325	-3.5155	Not Stationary
DD/Y	0.1349	-3.0340	-3.5155	Not Stationary
ED	0.8881	-1.2455	-3.5155	Not Stationary
ED/Y	0.5668	-2.0342	-3.5155	Not Stationary
DS	0.6740	-1.8280	-3.5155	Not Stationary
DS/Y	0.0988	-3.1944	-3.5155	Not Stationary
P	0.6903	-1.7947	-3.5155	Not Stationary
P/Y	0.2098	-2.7862	-3.5155	Not Stationary
D	0.4611	-2.2314	-3.5155	Not Stationary
D/Y	0.0740	-3.3348	-3.5155 -3.1882	Not Stationary at 5% Stationary at 10%

Augmented Dicky-Fuller Unit Root Test (AT FIRST DIFFERENCE) - LBP

Variable	**P-Value**	**T-statistic**	**Test Critical Values – 5% Level**	**Result**
R	0.0008	-5.1251	-3.5180	Stationary
R/Y	0.0001	-5.9400	-3.5180	Stationary
R/r	0.0099	-4.2896	-3.5628	Stationary
R/r*	0.9950	+0.0281	-3.5529	Not Stationary
R/r**	0.0045	-4.4962	-3.5207	Stationary
G	0.0003	-5.4122	-3.5180	Stationary
G/Y	Stationarity at Level	----------	----------	----------

G*	0.0000	-6.2755	-3.5180	Stationary
G*/Y	0.0000	-6.8060	-3.5180	Stationary
G*/r	0.0009	-5.2360	-3.5577	Stationary
G*/r*	0.0190	-3.9576	-3.5330	Stationary
G*/r**	0.0507	-3.5267	-3.5330 -3.1983	Not Stationary at 5% Stationary at 10%
B	0.0021	-4.7593	-3.5180	Stationary
B/Y	0.0000	-8.3857	-3.5180	Stationary
DD	0.0024	-4.7098	-3.5180	Stationary
DD/Y	0.0000	-6.7004	-3.5180	Stationary
ED	0.0158	-4.0067	-3.5180	Stationary
ED/Y	0.0000	-6.9986	-3.5180	Stationary
DS	0.0025	-4.6971	-3.5180	Stationary
DS/Y	0.0000	-8.9745	-3.5207	Stationary
P	0.0000	-7.4978	-3.5180	Stationary
P/Y	0.0000	-7.7555	-3.5180	Stationary
D	0.0000	-6.8022	-3.5180	Stationary
D/Y	0.0000	-8.0746	-3.5180	Stationary

Phillips-Perron Unit Root Test (AT FIRST DIFFERENCE) - LBP

Variable	**P-Value**	**T-statistic**	**Test Critical Values – 5% Level**	**Result**
R	0.0011	-4.1864	-3.5180	Stationary

R/Y	0.0000	-6.4147	-3.5180	Stationary
R/r	0.0595	-3.4740	-3.5577 -3.2123	Not Stationary at 5% Stationary at 10%
R/r*	0.0548	-3.4789	-3.5207 -3.1912	Not Stationary at 5% Stationary at 10%
R/r**	0.0049	-4.4617	-3.5207	Stationary
G	0.0003	-5.4245	-3.5180	Stationary
G/Y	Stationarity at Level	----------	----------	----------
G*	0.0000	-6.2587	-3.5180	Stationary
G*/Y	0.0000	-10.5006	-3.5180	Stationary
G*/r	0.0010	-5.2195	-3.5577	Stationary
G*/r*	0.0001	-5.7215	-3.5207	Stationary
G*/r**	0.0001	-5.8491	-3.5207	Stationary
B	0.0019	-4.8057	-3.5180	Stationary
B/Y	0.0000	-9.3762	-3.5180	Stationary
DD	0.0031	-4.6263	-3.5180	Stationary
DD/Y	0.0000	-6.8772	-3.5180	Stationary
ED	0.0174	-3.9674	-3.5180	Stationary
ED/Y	0.0000	-6.9878	-3.5180	Stationary
DS	0.0025	-4.6971	-3.5180	Stationary
DS/Y	0.0000	-8.6111	-3.5207	Stationary
P	0.0000	-7.5158	-3.5180	Stationary
P/Y	0.0000	-14.9781	-3.5180	Stationary
D	0.0000	-6.8022	-3.5180	Stationary
D/Y	0.0000	-19.5291	-3.5180	Stationary

Augmented Dicky-Fuller Unit Root Test (AT LEVEL) - USD

Variable	P-Value	T-statistic	Test Critical Values – 5% Level	Result
R	0.9141	-1.1188	-3.5155	Not Stationary
R/Y	0.3102	-2.5362	-3.5155	Not Stationary
G	0.9288	-1.0319	-3.5155	Not Stationary
G/Y	0.0274	-3.7769	-3.5155	Stationary
G*	0.9236	-1.0645	-3.5155	Not Stationary
G*/Y	0.0582	-3.4463	-3.5155 -3.1882	Not Stationary at 5% Stationary at 10%
B	0.9958	+0.0551	-3.5155	Not Stationary
B/Y	0.0970	-3.2034	-3.5155	Not Stationary
DD	0.9758	-0.5701	-3.5180	Not Stationary
DD/Y	0.1349	-3.0340	-3.5155	Not Stationary
ED	0.8657	-1.3339	-3.5180	Not Stationary
ED/Y	0.7483	-1.6677	-3.5180	Not Stationary
DS	0.5327	-2.0971	-3.5180	Not Stationary
DS/Y	0.8348	-1.4377	-3.5207	Not Stationary
P	0.5389	-2.0861	-3.5155	Not Stationary
P/Y	0.1464	-2.9904	-3.5155	Not Stationary
D	0.2328	-2.7231	-3.5155	Not Stationary
D/Y	0.0615	-3.4210	-3.5155 -3.1882	Not Stationary at 5% Stationary at 10 %

Phillips-Perron Unit Root Test (AT LEVEL) - USD

Variable	P-Value	T-statistic	Test Critical Values – 5% Level	Result
R	0.9092	-1.1455	-3.5155	Not Stationary
R/Y	0.2811	-2.6027	-3.5155	Not Stationary
G	0.9107	-1.1372	-3.5155	Not Stationary
G/Y	0.0285	-3.7601	-3.5155	Stationary
G*	0.9195	-1.0888	-3.5155	Not Stationary
G*/Y	0.0921	-3.2290	-3.5155 -3.1882	Not Stationary at 5% Stationary at 10%
B	0.9943	-0.0464	-3.5155	Not Stationary
B/Y	0.1049	-3.6142	-3.5155	Not Stationary
DD	0.9968	+.1449	-3.5155	Not Stationary
DD/Y	0.1349	-3.0340	-3.5155	Not Stationary
ED	0.8942	-1.2186	-3.5155	Not Stationary
ED/Y	0.5668	-2.0342	-3.5155	Not Stationary
DS	0.6541	-1.8677	-3.5155	Not Stationary
DS/Y	0.0988	-3.1944	-3.5155	Not Stationary
P	0.5389	-2.0861	-3.5155	Not Stationary
P/Y	0.2098	-2.7862	-3.5155	Not Stationary
D	0.1995	-2.8160	-3.5155	Not Stationary
D/Y	0.0740	-3.3348	-3.5155 -3.1882	Not Stationary at 5% Stationary at 10 %

Augmented Dicky-Fuller Unit Root Test (AT FIRST DIFFERENCE) - USD

Variable	P-Value	T-statistic	Test Critical Values – 5% Level	Result
R	0.0004	-5.3276	-3.5180	Stationary
R/Y	0.0001	-5.9400	-3.5180	Stationary
G	0.0003	-5.5021	-3.5180	Stationary
G/Y	Stationarity at Level	----------	----------	----------
G*	0.0000	-6.1623	-3.5180	Stationary
G*/Y	0.0000	-6.8060	-3.5180	Stationary
B	0.0006	-5.2112	-3.5180	Stationary
B/Y	0.0000	-8.3857	-3.5180	Stationary
DD	0.0038	-4.5523	-3.5180	Stationary
DD/Y	0.0000	-6.7004	-3.5180	Stationary
ED	0.0105	-4.1661	-3.5180	Stationary
ED/Y	0.0000	-6.9986	-3.5180	Stationary
DS	0.0213	-3.8976	-3.5266	Stationary
DS/Y	0.0000	-8.9745	-3.5207	Stationary
P	0.0000	-7.4330	-3.5180	Stationary
P/Y	0.0000	-7.7555	-3.5180	Stationary
D	0.0000	-6.7458	-3.5180	Stationary
D/Y	0.0000	-8.0746	-3.5180	Stationary

Phillips-Perron Unit Root Test (AT FIRST DIFFERENCE) - USD

Variable	P-Value	T-statistic	Test Critical Values – 5% Level	Result
R	0.0005	-5.2473	-3.5180	Stationary
R/Y	0.0000	-6.4147	-3.5180	Stationary
G	0.0003	-5.5021	-3.5180	Stationary
G/Y	Stationarity at Level	----------	----------	----------
G*	0.0000	-6.1601	-3.5180	Stationary
G*/Y	0.0000	-10.500	-3.5180	Stationary
B	0.0006	-5.2112	-3.5180	Stationary
B/Y	0.0000	-9.3762	-3.5180	Stationary
DD	0.0042	-4.5103	-3.5180	Stationary
DD/Y	0.0000	-6.8772	-3.5180	Stationary
ED	0.0115	-4.1318	-3.5180	Stationary
ED/Y	0.0000	-6.9878	-3.5180	Stationary
DS	0.0008	-5.1165	-3.5180	Stationary
DS/Y	0.0000	-8.6111	-3.5180	Stationary
P	0.0000	-7.5992	-3.5180	Stationary
P/Y	0.0000	-14.978	-3.5180	Stationary
D	0.0000	-6.8450	-3.5180	Stationary
D/Y	0.0000	-19.529	-3.5180	Stationary

2. Cointegration Regression

Based on Hakkio and Rush model, if the expenditures included the service on debt, and revenues contain unit root, then we must search for long-term equilibrium relationship between them. The coefficient of the cointegration regression should be unitary to assure that the expenditures included the service on debt aren't surpassing the generated revenues of the year.

This research applied different tests to show the cointegration relationship (Vector-Error Correction Regression, Johansen Likelihood Test and Auto-Regressive Distributed Lag Model).

The research imposed restrictions on Vector-Error Correction Regression test to force the coefficients to be some number, for example 1, -1 or the inverse of the mean of interest rates. The purpose to see the probability if Revenues and Expenditures are increasing one to one.

A. Cointegration Regression results of Hakkio & Rush Model (Between Revenues and Expenditures Included service on Debt)

The following is the equation used by Hakkio and Rush to test intertemporal budget constraint

$$R_t = \alpha + \beta G_t + u_t$$

LBP (Nominal numbers)

- ***Vector Error Correction Regression***

Specifications	Number of Lags	Restrictions	Deterministic Trend Specification
	2	No	Intercept (No Trend) in CE & VAR

Cointegrating Equation

Variable	Coefficient	Std. Error	T-Statistic
Expenditures included the service on debt (Nominal – LBP)	-0.7998	0.1206	-6.6296

- For every 1.00 LBP increase in Expenditures included the service on debt, the revenues are increasing by 0.79 LBP
- Schwarz Criterion: 32.51

Specifications	Number of Lags	Restrictions	Deterministic Trend Specification
	1	No	Intercept (No Trend) in CE & VAR

Cointegrating Equation

Variable	Coefficient	Std. Error	T-Statistic
Expenditures included the service on debt (Nominal – LBP)	-0.7603	0.0941	-8.0783

- For every 1.00 LBP increase in Expenditures included the service on debt, the revenues are increasing 0.76 LBP
- Schwarz Criterion: 32.13
- We took the result that showed lower Schwarz Criterion and impose restrictions

Specifications	**Number of Lags**	**Restrictions**	**Deterministic Trend Specification**
	1	Yes B(1,1)=1,B(1,2)=-1	Intercept (No Trend) in CE & VAR

- Chi Square: 2.70
- Probability: 0.10 is higher than 5% level → Coefficient is not different than +1 → Fiscal policy is sustainable.

- ***Johansen Cointegration Test***

Type	**Trace Statistic**	**0.05 Critical Value**	**Probability**
Unrestricted Cointegration Rank Test (Trace)	5.2464	15.4947	0.78

No cointegration between revenues and expenditures included the service on debt at 5% level → the variables are drifting too far→ Failed to reject the null hypothesis of no co-integration

Type	**Trace Statistic**	**0.05 Critical Value**	**Probability**
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)	4.3450	14.2646	0.82

No cointegration between revenues and expenditures included the service on debt at 5% level → the variables are drifting too far→ Failed to reject the null hypothesis of no co-integration

- ***Auto-Regressive Distributed Lag Model***

Level Equation

Restricted Constant and No Trend

Variable	**Coefficient**	**Std. Error**	**T-Statistic**	**Probability**
Expenditures included the service on debt (Nominal – LBP)	0.8935	0.0998	8.9467	0.0000

- For every 1.00 LBP increase in Expenditures included the service on debt, the revenues are decreasing 0.89 LBP

Maximum Dependent Variable Lags: **4**

Model Selection Criteria: **Schwarz Criterion**

Type	**Value**	**Significance**	**I (0)**	**I (1)**
F-Bound Test	2.2044	10%	3.02	3.51
		5%	3.62	4.16
		2.5%	4.18	4.79
		1%	4.94	5.58

Conclusion: The F-value is 2.2044, which is lower than the upper bound value 4.16 and the lower bound value 3.62 at 5% significance level → We failed to reject the null hypothesis→ No Long-term cointegration relationship between Revenues & Expenditures included the service on debt→ Fiscal policy is not sustainable.

Summary:

- ***Vector Error Correction Regression*** – Fiscal policy is weakly sustainable
- ***Johansen Cointegration Test*** – Fiscal policy is not sustainable
- ***Auto-Regressive Distributed Lag Model*** **-** Fiscal policy is not sustainable

LBP or USD (In Terms of GDP)

- ***Vector Error Correction Regression***

Specifications	Number of Lags	Restrictions	Deterministic Trend Specification
	2	No	Intercept (No Trend) in CE & VAR

Cointegrating Equation

Variable	Coefficient	Std. Error	T-Statistic
Expenditures included the service on debt (LBP or USD in terms of GDP)	19.4450	5.9646	3.2765

- Schwarz Criterion: 13.51

Specifications	Number of Lags	Restrictions	Deterministic Trend Specification
	1	No	Intercept (No Trend) in CE & VAR

- Schwarz Criterion: 13.23
- We took the result that showed lower Schwarz Criterion and impose restrictions

Specifications	Number of Lags	Restrictions	Deterministic Trend Specification
	1	Yes	Intercept (No Trend) in CE & VAR

		B(1,1)=1,B(1,2)=-1	

- Chi Square: 6.70
- Probability: 0.009 is lower than 5% level → Coefficient is different than +1 → Fiscal policy is not sustainable.

- ***Johansen Cointegration Test***

Type	**Trace Statistic**	**0.05 Critical Value**	**Probability**
Unrestricted Cointegration Rank Test (Trace)	19.0476	15.4947	0.013

There is cointegration between revenues and expenditures included the service on debt at 5% level → the variables are not drifting too far→ Reject the null hypothesis of no-cointegration

Type	**Trace Statistic**	**0.05 Critical Value**	**Probability**
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)	15.0164	14.2646	0.038

There is cointegration between revenues and expenditures included the service on debt at 5% level → the variables are not drifting too far→ Reject the null hypothesis of no-cointegration

- ***Auto-Regressive Distributed Lag Model***

Level Equation

Restricted Constant and No Trend

Variable	**Coefficient**	**Std. Error**	**T-Statistic**	**Probability**
Expenditures included the service on debt (in terms of GDP)	-0.3237	0.5225	-0.6196	0.5392

Maximum Dependent Variable Lags: **4**

Model Selection Criteria: **Schwarz Criterion**

Type	**Value**	**Significance**	**I (0)**	**I (1)**
F-Bound Test	1.8601	10%	3.02	3.51
		5%	3.62	4.16
		2.5%	4.18	4.79
		1%	4.94	5.58

Conclusion: The F-value is 1.8601, which is lower than the upper bound value 4.16 and the lower bound value 3.62 at 5% significance level → We failed to reject the null hypothesis→ No Long-term cointegration relationship

between Revenues & Expenditures included the service on debt→ Fiscal policy is not sustainable.

Summary:

- ***Vector Error Correction Regression*** – Fiscal policy is not sustainable
- ***Johansen Cointegration Test*** – Fiscal policy is sustainable
- ***Auto-Regressive Distributed Lag Model -*** Fiscal policy is not sustainable

USD (Nominal numbers)

- ***Vector Error Correction Regression***

Specifications	**Number of Lags**	**Restrictions**	**Deterministic Trend Specification**
	2	No	Intercept (No Trend) in CE & VAR

Cointegrating Equation

Variable	**Coefficient**	**Std. Error**	**T-Statistic**
Expenditures included the service on debt (Nominal - USD)	-0.8256	0.09585	-8.6142

- For every 1.00 USD increase in Expenditures, the revenues are increasing 0.82 USD

- Schwarz Criterion: 3.49

Specifications	Number of Lags	Restrictions	Deterministic Trend Specification
	1	No	Intercept (No Trend) in CE & VAR

Cointegrating Equation

Variable	Coefficient	Std. Error	T-Statistic
Expenditures included the service on debt (Nominal - USD)	-0.8051	0.0751	-10.7109

- For every 1.00 USD increase in Expenditures, the revenues are increasing 0.80 USD
- Schwarz Criterion: 3.12
- We took the result that showed lower Schwarz Criterion and impose restrictions

Specifications	Number of Lags	Restrictions	Deterministic Trend Specification
	1	Yes B(1,1)=1,B(1,2)=-1	Intercept (No Trend) in CE & VAR

- Chi Square: 3.87
- Probability: 0.049 is lower than 5% level → Coefficient is different than +1 → Fiscal policy is not sustainable.

- ***Johansen Cointegration Test***

Type	**Trace Statistic**	**0.05 Critical Value**	**Probability**
Unrestricted Cointegration Rank Test (Trace)	7.2332	15.4947	0.55

No cointegration between revenues and expenditures included the service on debt at 5% level → the variables are drifting too far→ Failed to reject the null hypothesis of no co-integration

Type	**Trace Statistic**	**0.05 Critical Value**	**Probability**
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)	6.6436	14.2646	0.53

No cointegration between revenues and expenditures included the service on debt at 5% level → the variables are drifting too far→ Failed to reject the null hypothesis of no co-integration

Auto-Regressive Distributed Lag Model

Level Equation				
Restricted Constant and No Trend				
Variable	**Coefficient**	**Std. Error**	**T-Statistic**	**Probability**

Expenditures included the service on debt (Nominal - USD)	0.9206	0.1025	8.9749	0.0000

- For every 1.00 USD increase in Expenditures, the revenues are decreasing by 0.92 USD

Maximum Dependent Variable Lags: **4**

Model Selection Criteria: **Schwarz Criterion**

Type	**Value**	**Significance**	**I (0)**	**I (1)**
F-Bound Test	2.08	10%	3.02	3.51
		5%	3.62	4.16
		2.5%	4.18	4.79
		1%	4.94	5.58

Conclusion: The F-value is 2.08, which is lower than the upper bound value 4.16 and the lower bound value 3.62 at 5% significance level → We failed to reject the null hypothesis→ No Long-term cointegration relationship between Revenues & Expenditures included the service on debt→ Fiscal policy is not sustainable.

Summary:

- ***Vector Error Correction Regression*** – Fiscal policy is weakly sustainable
- ***Johansen Cointegration Test*** – Fiscal policy is not sustainable
- ***Auto-Regressive Distributed Lag Model -*** Fiscal policy is not sustainable.

B. Cointegration Regression results of modified Azar & Asrawi Model

The following model is the variant of Azar & Asrawi equation where the coefficient between revenues and expenditures (Excluded the service on debt) is constrained to be -1 in order to produces Primary Surplus/Deficit

This model has been tested to see the relation between the following:

1- Debt in function of Primary Surplus/Deficit

$$B_t = \alpha + \beta P_t + \varepsilon_t$$

2- External Debt in function of Primary Surplus/Deficit

$$ED_t = \alpha + \beta P_t + \varepsilon_t$$

3- Domestic Debt in function of Primary Surplus/Deficit

$$DD_t = \alpha + \beta P_t + \varepsilon_t$$

a. Debt in function of Primary Surplus/Deficit

LBP (Nominal numbers)

- ***Vector Error Correction Regression***

Specifications	Number of Lags	Restrictions	Deterministic Trend Specification
	2	No	Intercept (No Trend) in CE & VAR

Cointegrating Equation

Variable	Coefficient	Std. Error	T-Statistic
Primary Surplus/Deficit (Nominal – LBP)	-13.2890	0.6410	-20.7316

- For every 1.00 LBP increase in primary surplus/deficit, the debt is increasing by 13.28 LBP
- Schwarz Criterion: 33.35

Specifications	Number of Lags	Restrictions	Deterministic Trend Specification
	1	No	Intercept (No Trend) in CE & VAR

Cointegrating Equation

Variable	Coefficient	Std. Error	T-Statistic

Primary Surplus/Deficit (Nominal – LBP)	-13.4302	1.0927	-12.2898

- For every 1.00 LBP increase in primary surplus/deficit, the debt is increasing by 13.43 LBP
- Schwarz Criterion: 33.28
- We took the result that showed lower Schwarz Criterion and impose restrictions

Specifications	**Number of Lags**	**Restrictions**	**Deterministic Trend Specification**
	1	Yes B(1,1)=1, B(1,2)=-10.65476*	Intercept (No Trend) in CE & VAR

- * Is the inverse of the mean of Interest on LBP deposits for the period under study
- Chi Square: 4.02
- Probability: 0.044 is lower than 5% level → Coefficient is different than +1 → Fiscal policy is sustainable with coefficient close to the inverse of interest rate.
    - ***Johansen Cointegration Test***

Type	**Trace Statistic**	**0.05 Critical Value**	**Probability**

Unrestricted Cointegration Rank Test (Trace)	29.644	15.4947	0.0002

There is cointegration between Debt and Primary Surplus/Deficit at 1% level → the variables are not drifting too far→ Reject the null hypothesis of no co-integration

Type	**Trace Statistic**	**0.05 Critical Value**	**Probability**
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)	26.3261	14.2646	0.0004

There is cointegration between Debt and Primary Surplus/Deficit at 1% level → the variables are not drifting too far→ Reject the null hypothesis of no co-integration

- ***Auto-Regressive Distributed Lag Model***

Level Equation

Restricted Constant and No Trend

Variable	**Coefficient**	**Std. Error**	**T-Statistic**	**Probability**
Primary Surplus/Deficit (LBP)	12.9568	1.2281	10.5502	0.0000

- For every 1.00 LBP increase in Primary surplus/deficit, the debt is decreasing by 12.95 LBP

Maximum Dependent Variable Lags: **4**

Model Selection Criteria: **Schwarz Criterion**

Type	**Value**	**Significance**	**I (0)**	**I (1)**
F-Bound Test	85.01	10%	3.02	3.51
		5%	3.62	4.16
		2.5%	4.18	4.79
		1%	4.94	5.58

Conclusion: The F-value is 85.01, which is higher than the upper bound value 4.16 and the lower bound value 3.62 at 5% significance level → We reject the null hypothesis→ There is Long-term cointegration relationship between Debt & Primary Surplus/Deficit→ Fiscal policy is sustainable.

Summary:

- ***Vector Error Correction Regression*** – Fiscal policy is sustainable with coefficient close to the inverse of interest rate
- ***Johansen Cointegration Test*** – Fiscal policy is sustainable
- ***Auto-Regressive Distributed Lag Model -*** Fiscal policy is sustainable

LBP or USD (In Terms of GDP)

- ***Vector Error Correction Regression***

Specifications	Number of Lags	Restrictions	Deterministic Trend Specification
	2	No	Intercept (No Trend) in CE & VAR

Cointegrating Equation

Variable	Coefficient	Std. Error	T-Statistic
Primary Surplus/Deficit (LBP or USD in terms of GDP)	-6.6064	1.4074	-0.4940

- Schwarz Criterion: 15.69

Specifications	Number of Lags	Restrictions	Deterministic Trend Specification
	1	No	Intercept (No Trend) in CE & VAR

- Schwarz Criterion: 15.51
- We took the result that showed lower Schwarz Criterion and impose restrictions

Specifications	Number of Lags	Restrictions	Deterministic Trend Specification
	1	Yes B(1,1)=1, B(1,2)=-10.65476	Intercept (No Trend) in CE & VAR

- * Is the inverse of the mean of Interest on LBP deposits for the period under study
- Chi Square: 9.38
- Probability: 0.0021 is lower than 1% level → Coefficient close but different from the inverse of interest rate → Fiscal policy is not sustainable.

- ***Johansen Cointegration Test***

Type	**Trace Statistic**	**0.05 Critical Value**	**Probability**
Unrestricted Cointegration Rank Test (Trace)	12.03171	15.49471	0.1554

There is no cointegration between Debt & Primary Surplus/Deficit at 5% level → the variables are drifting too far→ Failed to reject the null hypothesis of no-cointegration

Type	**Trace Statistic**	**0.05 Critical Value**	**Probability**
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)	10.8897	14.2646	0.1598

There is no cointegration between Debt & Primary Surplus/Deficit at 5% level → the variables are drifting too far→ Failed to reject the null hypothesis of no-cointegration

- ***Auto-Regressive Distributed Lag Model***

Level Equation

Restricted Constant and No Trend

Variable	Coefficient	Std. Error	T-Statistic	Probability
Primary Surplus/Deficit (In Terms of GDP)	-0.9502	11.1864	-0.0849	0.9327

Maximum Dependent Variable Lags: **4**

Model Selection Criteria: **Schwarz Criterion**

Type	Value	Significance	I (0)	I (1)
F-Bound Test	0.8848	10%	3.02	3.51
		5%	3.62	4.16
		2.5%	4.18	4.79
		1%	4.94	5.58

Conclusion: The F-value is 0.8848, which is lower than the upper bound value 4.16 and the lower bound value 3.62 at 5% significance level → We failed to reject the null hypothesis→ No Long-term cointegration relationship between Debt & Primary Surplus/Deficit→ Fiscal policy is not sustainable.

Summary:

- ***Vector Error Correction Regression*** – Fiscal policy is not sustainable
- ***Johansen Cointegration Test*** – Fiscal policy is not sustainable
- ***Auto-Regressive Distributed Lag Model -*** Fiscal policy is not sustainable

USD (Nominal numbers)

- ***Vector Error Correction Regression***

Specifications	Number of Lags	Restrictions	Deterministic Trend Specification
	2	No	Intercept (No Trend) in CE & VAR

Cointegrating Equation

Variable	Coefficient	Std. Error	T-Statistic
Primary Surplus/Deficit (Nominal - USD)	-11.6760	1.8401	-6.3453

- For every 1.00 USD increase in primary surplus/deficit, the debt is increasing by 11.67 USD
- Schwarz Criterion: 5.32

Specifications	Number of Lags	Restrictions	Deterministic Trend Specification

	1	No	Intercept (No Trend) in CE & VAR

Cointegrating Equation

Variable	Coefficient	Std. Error	T-Statistic
Primary Surplus/Deficit (Nominal - USD)	-11.7044	1.9339	-6.0520

- For every 1.00 USD increase in primary surplus/deficit, the debt is increasing by 11.70 USD
- Schwarz Criterion: 4.98
- We took the result that showed lower Schwarz Criterion and impose restrictions

Specifications	Number of Lags	Restrictions	Deterministic Trend Specification
	1	Yes B(1,1)=1, B(1,2)=-24.0608	Intercept (No Trend) in CE & VAR

- * Is the inverse of the mean of Interest on USD deposits for the period under study
- Chi Square: 7.46
- Probability: 0.0062 is lower than 1% level → Coefficient is different than +1 → Fiscal policy is not sustainable

- ***Johansen Cointegration Test***

Type	**Trace Statistic**	**0.05 Critical Value**	**Probability**
Unrestricted Cointegration Rank Test (Trace)	17.1611	15.4947	0.0278

There is cointegration between Debt & Primary Surplus/Deficit at 5% level → the variables are not drifting too far→ Reject the null hypothesis of no co-integration

Type	**Trace Statistic**	**0.05 Critical Value**	**Probability**
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)	12.3730	14.2646	0.0974

There is no cointegration between Debt & Primary Surplus/Deficit at 5% level → the variables are drifting too far→ Failed to reject the null hypothesis of no co-integration

- ***Auto-Regressive Distributed Lag Model***

Level Equation

Restricted Constant and No Trend

Variable	**Coefficient**	**Std. Error**	**T-Statistic**	**Probability**
Primary Surplus/Deficit (USD)	4.5911	4.6103	0.9958	0.3252

- For every 1.00 USD increase in primary surplus/deficit, the debt is decreasing by 4.59 USD

Maximum Dependent Variable Lags: **4**

Model Selection Criteria: **Schwarz Criterion**

Type	**Value**	**Significance**	**I (0)**	**I (1)**
F-Bound Test	32.60	10%	3.02	3.51
		5%	3.62	4.16
		2.5%	4.18	4.79
		1%	4.94	5.58

Conclusion: The F-value is 32.60, which is higher than the upper bound value 4.16 and the lower bound value 3.62 at 5% significance level → We rejected the null hypothesis→ There is Long-term cointegration relationship between Debt & Primary Surplus/Deficit→ Fiscal policy is sustainable.

Summary:

- ***Vector Error Correction Regression*** – Fiscal policy is <u>not</u> sustainable
- ***Johansen Cointegration Test*** –
    - (Trace) - Fiscal policy is sustainable
    - (Maximum Eigenvalue) - Fiscal policy is <u>not</u> sustainable
- ***Auto-Regressive Distributed Lag Model*** - Fiscal policy is sustainable

b. External Debt as function of Primary Surplus

LBP (Nominal numbers)

- ***Vector Error Correction Regression***

Specifications	Number of Lags	Restrictions	Deterministic Trend Specification
	2	No	Intercept (No Trend) in CE & VAR

Cointegrating Equation

Variable	Coefficient	Std. Error	T-Statistic
Primary Surplus/Deficit (Nominal - LBP)	-9.5818	1.2229	-7.8352

- For every 1.00 LBP increase in primary surplus/deficit, the external debt is increasing by 9.58 LBP
- Schwarz Criterion: 33.30

Specifications	Number of Lags	Restrictions	Deterministic Trend Specification
	1	No	Intercept (No Trend) in CE & VAR

Cointegrating Equation			
Variable	**Coefficient**	**Std. Error**	**T-Statistic**
Primary Surplus/Deficit (Nominal - LBP)	-8.7847	0.7731	-11.3628

- For every 1.00 LBP increase in primary surplus/deficit, the external debt is increasing by 8.78 LBP
- Schwarz Criterion: 33.17
- We took the result that showed lower Schwarz Criterion and impose restrictions

Specifications	**Number of Lags**	**Restrictions**	**Deterministic Trend Specification**
	1	Yes B(1,1)=1, B(1,2)=-10.65476*	Intercept (No Trend) in CE & VAR

- * Is the inverse of the mean of Interest on LBP deposits for the period under study
- Chi Square: 2.52
- Probability: 0.111 is higher than 5% level → Coefficient is not different than +1 → Fiscal policy is sustainable.

- ***Johansen Cointegration Test***

Type	Trace Statistic	0.05 Critical Value	Probability
Unrestricted Cointegration Rank Test (Trace)	11.8210	15.4947	0.1657

There is no cointegration between External Debt and Primary Surplus/Deficit at 5% level → the variables are drifting too far→ Failed to reject the null hypothesis of no co-integration

Type	Trace Statistic	0.05 Critical Value	Probability
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)	10.2071	14.2646	0.1987

There is no cointegration between External Debt and Primary Surplus/Deficit at 5% level → the variables are drifting too far→ Failed to reject the null hypothesis of no co-integration

- ***Auto-Regressive Distributed Lag Model***

Level Equation

Restricted Constant and No Trend

Variable	Coefficient	Std. Error	T-Statistic	Probability
Primary Surplus/Deficit (LBP)	8.0865	4.2211	1.9157	0.0641

- For every 1.00 LBP increase in primary surplus/deficit, the external debt is decreasing by 8.08 LBP

Maximum Dependent Variable Lags: **4**

Model Selection Criteria: **Schwarz Criterion**

Type	**Value**	**Significance**	**I (0)**	**I (1)**
F-Bound Test	0.7458	10%	3.02	3.51
		5%	3.62	4.16
		2.5%	4.18	4.79
		1%	4.94	5.58

Conclusion: The F-value is 0.7458, which is lower than the upper bound value 4.16 and the lower bound value 3.62 at 5% significance level → We failed to reject the null hypothesis→ There is no Long-term cointegration relationship between External Debt & Primary Surplus/Deficit→ Fiscal policy is not sustainable.

Summary:

- ***Vector Error Correction Regression*** – Fiscal policy is sustainable
- ***Johansen Cointegration Test*** – Fiscal policy is not sustainable
- ***Auto-Regressive Distributed Lag Model*** **-** Fiscal policy is not sustainable

LBP or USD (In Terms of GDP)

- ***Vector Error Correction Regression***

Specifications	Number of Lags	Restrictions	Deterministic Trend Specification
	2	No	Intercept (No Trend) in CE & VAR

Cointegrating Equation

Variable	Coefficient	Std. Error	T-Statistic
Primary Surplus/Deficit (LBP or USD in terms of GDP)	-3.5514	0.5274	-6.7336

- Schwarz Criterion: 14.53

Specifications	Number of Lags	Restrictions	Deterministic Trend Specification
	1	No	Intercept (No Trend) in CE & VAR

- Schwarz Criterion: 14.32
- We took the result that showed lower Schwarz Criterion and impose restrictions

Specifications	Number of Lags	Restrictions	Deterministic Trend Specification
	1	Yes B(1,1)=1, B(1,2)=-10.65476	Intercept (No Trend) in CE & VAR

- * Is the inverse of the mean of Interest on LBP deposits for the period under study
- Chi Square: 5.66
- Probability: 0.0173 is lower than 1% level → Coefficient is different than +1 → Fiscal policy is not sustainable.

- ***Johansen Cointegration Test***

Type	**Trace Statistic**	**0.05 Critical Value**	**Probability**
Unrestricted Cointegration Rank Test (Trace)	11.8826	15.49471	0.1626

There is no cointegration between External Debt & Primary Surplus/Deficit at 5% level → the variables are drifting too far→ Failed to reject the null hypothesis→ Failed to reject the null hypothesis of no co-integration

Type	**Trace Statistic**	**0.05 Critical Value**	**Probability**

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)	11.1833	14.2646	0.1453

There is no cointegration between External Debt & Primary Surplus/Deficit at 5% level → the variables are drifting too far→ Failed to reject the null hypothesis→ Failed to reject the null hypothesis of no co-integration

- ***Auto-Regressive Distributed Lag Model***

Level Equation

Restricted Constant and No Trend

Variable	**Coefficient**	**Std. Error**	**T-Statistic**	**Probability**
Primary Surplus/Deficit (In Terms of GDP)	1.9837	1.6599	1.1950	0.2389

Maximum Dependent Variable Lags: **4**

Model Selection Criteria: **Schwarz Criterion**

Type	**Value**	**Significance**	**I (0)**	**I (1)**
F-Bound Test	0.8401	10%	3.02	3.51
		5%	3.62	4.16
		2.5%	4.18	4.79
		1%	4.94	5.58

Conclusion: The F-value is 0.8401, which is lower than the upper bound value 4.16 and the lower bound value 3.62 at 5% significance level → We failed to reject the null hypothesis→ No Long-term cointegration relationship between External Debt and Primary Surplus/Deficit→ Fiscal policy is not sustainable.

Summary:

- ***Vector Error Correction Regression*** – Fiscal policy is not sustainable
- ***Johansen Cointegration Test*** – Fiscal policy is not sustainable
- ***Auto-Regressive Distributed Lag Model -*** Fiscal policy is not sustainable

USD (Nominal numbers)

- ***Vector Error Correction Regression***

Specifications	Number of Lags	Restrictions	Deterministic Trend Specification
	2	No	Intercept (No Trend) in CE & VAR

Cointegrating Equation

Variable	Coefficient	Std. Error	T-Statistic
Primary Surplus/Deficit (Nominal - USD)	-8.5588	0.6528	-13.1095

- For every 1.00 USD increase in primary surplus/deficit, the external debt is increasing by 8.55 USD
- Schwarz Criterion: 4.22

Specifications	Number of Lags	Restrictions	Deterministic Trend Specification
	1	No	Intercept (No Trend) in CE & VAR

-

Cointegrating Equation

Variable	Coefficient	Std. Error	T-Statistic
Primary Surplus/Deficit (Nominal - USD)	-8.5137	0.7381	-11.5332

- For every 1.00 USD increase in primary surplus/deficit, the external debt is increasing by 8.51 USD
- Schwarz Criterion: 4.1476
- We took the result that showed lower Schwarz Criterion and impose restrictions

Specifications	Number of Lags	Restrictions	Deterministic Trend Specification
	1	Yes B(1,1)=1, B(1,2)=-24.0608	Intercept (No Trend) in CE & VAR

- * Is the inverse of the mean of Interest on USD deposits for the period under study

- Chi Square: 6.14
- Probability: 0.0131 is lower than 5% level → Coefficient is different than +1 → Fiscal policy is not sustainable

- ***Johansen Cointegration Test***

Type	**Trace Statistic**	**0.05 Critical Value**	**Probability**
Unrestricted Cointegration Rank Test (Trace)	10.7704	15.4947	0.2260

There is no cointegration between External Debt & Primary Surplus/Deficit at 5% level → the variables are drifting too far→ Failed to reject the null hypothesis of no co-integration

Type	**Trace Statistic**	**0.05 Critical Value**	**Probability**
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)	9.33604	14.2646	0.2593

There is no cointegration between External Debt & Primary Surplus/Deficit at 5% level → the variables are drifting too far→ Failed to reject the null hypothesis of no co-integration

- ***Auto-Regressive Distributed Lag Model***

Level Equation

Restricted Constant and No Trend

Variable	Coefficient	Std. Error	T-Statistic	Probability
Primary Surplus/Deficit (USD)	9.8302	6.4633	1.5209	0.1378

- For every 1.00 USD increase in primary surplus/deficit, the external debt is decreasing by 9.58 LBP

Maximum Dependent Variable Lags: **4**

Model Selection Criteria: **Schwarz Criterion**

Type	Value	Significance	I (0)	I (1)
F-Bound Test	0.83	10%	3.02	3.51
		5%	3.62	4.16
		2.5%	4.18	4.79
		1%	4.94	5.58

Conclusion: The F-value is 0.83, which is lower than the upper bound value 4.16 and the lower bound value 3.62 at 5% significance level → We failed to reject the null hypothesis→ There is no Long-term cointegration relationship between External Debt and Primary Surplus/Deficit→ Fiscal policy is not sustainable.

Summary:

- ***Vector Error Correction Regression*** – Fiscal policy is not sustainable
- ***Johansen Cointegration Test*** – Fiscal policy is not sustainable
- ***Auto-Regressive Distributed Lag Model -*** Fiscal policy is not sustainable

c. Domestic Debt as function of Primary Surplus/Deficit

LBP (Nominal numbers)

- ***Vector Error Correction Regression***

Specifications	Number of Lags	Restrictions	Deterministic Trend Specification
	1	No	Intercept (No Trend) in CE & VAR

Cointegrating Equation

Variable	Coefficient	Std. Error	T-Statistic
Primary Surplus/Deficit (Nominal - LBP)	-7.3272	2.0202	-3.6269

- For every 1.00 LBP increase in primary surplus/deficit, the domestic debt is increasing by 7.32 LBP
- Schwarz Criterion: 34.26

Specifications	Number of Lags	Restrictions	Deterministic Trend Specification
	1	No	Intercept (No Trend) in CE & VAR

Cointegrating Equation

Variable	Coefficient	Std. Error	T-Statistic
Primary Surplus/Deficit (Nominal - LBP)	-5.9717	2.7910	-2.1395

- For every 1.00 LBP increase in primary surplus/deficit, the domestic debt is increasing by 5.97 LBP
- Schwarz Criterion: 34.00
- We took the result that showed lower Schwarz Criterion and impose restrictions

Specifications	Number of Lags	Restrictions	Deterministic Trend Specification
	1	Yes B(1,1)=1, B(1,2)=-10.65476*	Intercept (No Trend) in CE & VAR

- * Is the inverse of the mean of Interest on LBP deposits for the period under study
- Chi Square: 0.944

- Probability: 0.3311 is higher than 5% level → Coefficient is not different than +1 → Fiscal policy is sustainable.

- ***Johansen Cointegration Test***

Type	**Trace Statistic**	**0.05 Critical Value**	**Probability**
Unrestricted Cointegration Rank Test (Trace)	8.6010	15.4947	0.4036

There is no cointegration between Domestic Debt and Primary Surplus/Deficit at 5% level → the variables are drifting too far→ Failed to reject the null hypothesis of no co-integration

Type	**Trace Statistic**	**0.05 Critical Value**	**Probability**
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)	5.2384	14.2646	0.7115

There is no cointegration between Domestic Debt and Primary Surplus/Deficit at 5% level → the variables are drifting too far→ Failed to reject the null hypothesis of no co-integration

- ***Auto-Regressive Distributed Lag Model***

Level Equation

Restricted Constant and No Trend

Variable	Coefficient	Std. Error	T-Statistic	Probability
Primary Surplus/Deficit (LBP)	2.7938	3.2679	0.8549	0.3976

- For every 1.00 LBP increase in primary surplus/deficit, the domestic debt is decreasing by 2.79 LBP

Maximum Dependent Variable Lags: **4**

Model Selection Criteria: **Schwarz Criterion**

Type	Value	Significance	I (0)	I (1)
F-Bound Test	16.3969	10%	3.02	3.51
		5%	3.62	4.16
		2.5%	4.18	4.79
		1%	4.94	5.58

Conclusion: The F-value is 16.3969, which is higher than the upper bound value 4.16 and the lower bound value 3.62 at 5% significance level → We rejected the null hypothesis→ There is Long-term cointegration relationship between Domestic Debt & Primary Surplus/Deficit→ Fiscal policy is sustainable.

Summary:

- ***Vector Error Correction Regression*** – Fiscal policy is sustainable
- ***Johansen Cointegration Test*** – Fiscal policy is not sustainable
- ***Auto-Regressive Distributed Lag Model -*** Fiscal policy is sustainable

LBP or USD (In Terms of GDP)

- ***Vector Error Correction Regression***

Specifications	Number of Lags	Restrictions	Deterministic Trend Specification
	2	No	Intercept (No Trend) in CE & VAR

Cointegrating Equation

Variable	Coefficient	Std. Error	T-Statistic
Primary Surplus/Deficit (LBP or USD in terms of GDP)	-3.0556	1.0392	-2.9402

- Schwarz Criterion: 15.38

Specifications	Number of Lags	Restrictions	Deterministic Trend Specification
	1	No	Intercept (No Trend) in CE & VAR

- Schwarz Criterion: 15.09
- We took the result that showed lower Schwarz Criterion and impose restrictions

Specifications	Number of Lags	Restrictions	Deterministic Trend Specification
	1	Yes B(1,1)=1, B(1,2)=-10.65476	Intercept (No Trend) in CE & VAR

- * Is the inverse of the mean of Interest on LBP deposits for the period under study
- Chi Square: 4.22
- Probability: 0.039 is lower than 5% level → Coefficient is different than +1 → Fiscal policy is not sustainable.

- ***Johansen Cointegration Test***

Type	Trace Statistic	0.05 Critical Value	Probability
Unrestricted Cointegration Rank Test (Trace)	11.5197	15.49471	0.1815

There is no cointegration between Domestic Debt & Primary Surplus/Deficit at 5% level → the variables are drifting too far→ Failed to reject the null hypothesis of no-cointegration

Type	Trace Statistic	0.05 Critical Value	Probability
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)	10.3032	14.2646	0.1928

There is no cointegration between Domestic Debt & Primary Surplus/Deficit at 5% level → the variables are drifting too far→ Failed to reject the null hypothesis of no-cointegration

- ***Auto-Regressive Distributed Lag Model***

Level Equation

Restricted Constant and No Trend

Variable	Coefficient	Std. Error	T-Statistic	Probability
Primary Surplus/Deficit (In Terms of GDP)	-3.6837	8.1868	-0.4499	0.6552

Maximum Dependent Variable Lags: **4**

Model Selection Criteria: **Schwarz Criterion**

Type	Value	Significance	I (0)	I (1)
F-Bound Test	0.9633	10%	3.02	3.51
		5%	3.62	4.16

		2.5%	4.18	4.79
		1%	4.94	5.58

Conclusion: The F-value is 0.9633, which is lower than the upper bound value 4.16 and the lower bound value 3.62 at 5% significance level → We failed to reject the null hypothesis→ No Long-term cointegration relationship between Domestic Debt and Primary Surplus/Deficit→ Fiscal policy is not sustainable.

Summary:

- ***Vector Error Correction Regression*** – Fiscal policy is not sustainable
- ***Johansen Cointegration Test*** – Fiscal policy is not sustainable
- ***Auto-Regressive Distributed Lag Model -*** Fiscal policy is not sustainable

USD (Nominal numbers)

- ***Vector Error Correction Regression***

Specifications	**Number of Lags**	**Restrictions**	**Deterministic Trend Specification**
	2	No	Intercept (No Trend) in CE & VAR

Cointegrating Equation

Variable	Coefficient	Std. Error	T-Statistic
Primary Surplus/Deficit (Nominal - USD)	-7.3728	2.2303	-3.3057

- For every 1.00 USD increase in primary surplus/deficit, the domestic debt is increasing by 7.37 USD
- Schwarz Criterion: 5.375

Specifications	Number of Lags	Restrictions	Deterministic Trend Specification
	1	No	Intercept (No Trend) in CE & VAR

Cointegrating Equation

Variable	Coefficient	Std. Error	T-Statistic
Primary Surplus/Deficit (Nominal - USD)	-17.2048	4.5809	-3.7557

- For every 1.00 USD increase in primary surplus/deficit, the domestic debt is increasing by 17.20 USD
- Schwarz Criterion: 5.025
- We took the result that showed lower Schwarz Criterion and impose restrictions

Specifications	Number of Lags	Restrictions	Deterministic Trend Specification

	1	Yes B(1,1)=1, B(1,2)=-24.0608	Intercept (No Trend) in CE & VAR

- * Is the inverse of the mean of Interest on USD deposits for the period under study
- Chi Square: 0.0725
- Probability: 0.7886 is higher than 5% level → Coefficient is not different than +1 → Fiscal policy is sustainable

- ***Johansen Cointegration Test***

Type	**Trace Statistic**	**0.05 Critical Value**	**Probability**
Unrestricted Cointegration Rank Test (Trace)	8.2116	15.4947	0.4430

There is no cointegration between Domestic Debt & Primary Surplus/Deficit at 5% level → the variables are drifting too far→ Failed to reject the null hypothesis of no co-integration

Type	**Trace Statistic**	**0.05 Critical Value**	**Probability**

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)	4.9808	14.2646	0.7443

There is no cointegration between Domestic Debt & Primary Surplus/Deficit at 5% level → the variables are drifting too far→ Failed to reject the null hypothesis of no co-integration

- ***Auto-Regressive Distributed Lag Model***

Level Equation

Restricted Constant and No Trend

Variable	**Coefficient**	**Std. Error**	**T-Statistic**	**Probability**
Primary Surplus/Deficit (USD)	-6.9470	26.5795	-0.2613	0.7952

- For every 1.00 USD increase in primary surplus/deficit, the domestic debt is increasing by 6.94 USD

Maximum Dependent Variable Lags: **4**

Model Selection Criteria: **Schwarz Criterion**

Type	**Value**	**Significance**	**I (0)**	**I (1)**
F-Bound Test	2.8381	10%	3.02	3.51
		5%	3.62	4.16
		2.5%	4.18	4.79
		1%	4.94	5.58

Conclusion: The F-value is 2.8381, which is lower than the upper bound value 4.16 and the lower bound value 3.62 at 5% significance level → We failed to reject the null hypothesis→ There is no Long-term cointegration relationship between Domestic Debt & Primary Surplus/Deficit→ Fiscal policy is not sustainable.

Summary:

- ***Vector Error Correction Regression*** – Fiscal policy is sustainable
- ***Johansen Cointegration Test*** – Fiscal policy is not sustainable
- ***Auto-Regressive Distributed Lag Model -*** Fiscal policy is not sustainable

C. Cointegration Regression results of Azar and Asrwai Model

Furthermore, this research applied the model of Azar and Asrawi by testing the cointegration regression relationship between the following fiscal variables:

- Debt as a function of Revenues and Expenditures excluded the service on debt (In terms of Deposits LBP interest rates) – LBP Data

$$B_t = \alpha + \beta_1 \frac{R_t}{r^*_t} - \beta_2 \frac{G^*_t}{r^*_t} + \varepsilon_t$$

- External Debt as a function of Revenues and Expenditures excluded the service on debt (In terms of Deposits LBP interest rates) – LBP Data

$$ED_t = \alpha + \beta_1 \frac{R_t}{r^*_t} - \beta_2 \frac{G^*_t}{r^*_t} + \varepsilon_t$$

- Domestic Debt as a function of Revenues and Expenditures excluded the service on debt (In terms of Deposits LBP interest rates) – LBP Data

$$DD_t = \alpha + \beta_1 \frac{R_t}{r^*_t} - \beta_2 \frac{G^*_t}{r^*_t} + \varepsilon_t$$

A. Cointegration Regression results, Debt as function of Revenues & Expenditures excluded service on debt (In terms of Deposits Interest rates)

LBP (Nominal numbers)

- ***Vector Error Correction Regression***

Specifications	Number of Lags	Restrictions	Deterministic Trend Specification
	2	No	Intercept (No Trend) in CE & VAR

Cointegrating Equation

Variable	Coefficient	Std. Error	T-Statistic
Revenues in terms of Deposits Interest Rate (Nominal – LBP)	-0.8695	0.0881	-9.8634
Expenditures Excluded the Service on Debt in terms of Deposits Interest Rate (Nominal – LBP)	0.7438	0.1296	5.7359

- For every 1.00 LBP increase in revenues in terms of deposit interest rates, the debt is increasing by 0.86 LBP
- For every 1.00 LBP increase in expenditures excluded the service on debt in terms of deposit interest rates, the debt is decreasing by 0.74 LBP

- Schwarz Criterion: 59.81

Specifications	Number of Lags	Restrictions	Deterministic Trend Specification
	1	No	Intercept (No Trend) in CE & VAR

- Schwarz Criterion: 59.90
- We took the result that showed lower Schwarz Criterion and impose restrictions

Specifications	Number of Lags	Restrictions	Deterministic Trend Specification
	2	Yes B(1,1)=1,B(1,2)=-1	Intercept (No Trend) in CE & VAR

- Chi Square: 1.3730
- Probability: 0.2412 is higher than 5% level → Coefficient is not different than +1 → Fiscal policy is sustainable.

Specifications	Number of Lags	Restrictions	Deterministic Trend Specification
	2	Yes B(1,1)=1,B(1,3)=+1	Intercept (No Trend) in CE & VAR

- Chi Square: 2.2461
- Probability: 0.1342 is higher than 5% level → Coefficient is not different than +1 → Fiscal policy is sustainable.

Specifications	**Number of Lags**	**Restrictions**	**Deterministic Trend Specification**
	2	Yes B(1,1)=1,B(1,2)=-1, B(1,3)=+1	Intercept (No Trend) in CE & VAR

- Chi Square: 7.1718
- Probability: 0.0277 is lower than 5% level → Coefficient is different than +1, but each coefficient is not different than +1 in absolute terms → Fiscal policy is weakly sustainable

- ***Johansen Cointegration Test***

Type	**Trace Statistic**	**0.05 Critical Value**	**Probability**
Unrestricted Cointegration Rank Test (Trace)	79.4662	29.7970	0.0000

There is cointegration between Debt and Revenues & Expenditures excluded the service on debt at 5% level → the variables are not drifting too far→ Reject the null hypothesis of no co-integration

Type	**Trace Statistic**	**0.05 Critical Value**	**Probability**
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)	51.4511	21.1316	0.0000

There is cointegration between Debt and Revenues & Expenditures excluded the service on debt at 5% level → the variables are not drifting too far→ Reject the null hypothesis of no co-integration

- ***Auto-Regressive Distributed Lag Model***

Level Equation

Restricted Constant and No Trend

Variable	**Coefficient**	**Std. Error**	**T-Statistic**	**Probability**
Revenues in terms of Deposits Interest Rates (LBP)	1.1783	0.1802	6.5356	0.0000
Expenditures excluded the service on debt in terms of Deposits Interest Rates (LBP)	-1.3038	0.2732	-4.7723	0.0000

- For every 1.00 LBP increase in revenues in terms of deposit interest rates, the debt is decreasing by 1.17 LBP
- For every 1.00 LBP increase in expenditures excluded the service on debt in terms of deposit interest rates, the debt is increasing by 1.13 LBP

Maximum Dependent Variable Lags: **4**

Model Selection Criteria: **Schwarz Criterion**

Type	**Value**	**Significance**	**I (0)**	**I (1)**
F-Bound Test	7.8773	10%	2.63	3.35
		5%	3.1	3.87
		2.5%	3.55	4.38
		1%	4.13	5.00

Conclusion: The F-value is 7.8773, which is higher than the upper bound value 4.16 and the lower bound value 3.62 at 5% significance level → We rejected the null hypothesis→ There is Long-term cointegration relationship between Debt in function of Revenues/deposits interest rate & Expenditures excluded the service on debt/deposits interest rate.

Summary:

- ***Vector Error Correction Regression*** –
  - Restrictions: B (1,1) =1, B (1,2) =-1 → Fiscal policy is sustainable
  - Restrictions: B (1,1) =1, B (1,3) =+1 → Fiscal policy is sustainable

- Restrictions: B (1,1) =1, B (1,2) =-1, B(1,3) =+1 → Fiscal policy is weakly sustainable

- ***Johansen Cointegration Test*** – Fiscal policy is sustainable
- ***Auto-Regressive Distributed Lag Model*** **-** Fiscal policy is sustainable

B. Cointegration Regression results, External Debt as function of Revenues & Expenditures excluded service on debt (In terms of Deposits Interest rates)

LBP (Nominal numbers)

- ***Vector Error Correction Regression***

Specifications	Number of Lags	Restrictions	Deterministic Trend Specification
	2	No	Intercept (No Trend) in CE & VAR

Cointegrating Equation

Variable	Coefficient	Std. Error	T-Statistic
Revenues in terms of Deposits Interest Rate (Nominal – LBP)	-0.4568	0.0980	-4.6620
Expenditures Excluded the Service on Debt in terms of Deposits Interest Rate (Nominal – LBP)	0.3132	0.1388	2.2565

- For every 1.00 LBP increase in revenues in terms of deposit interest rates, the external debt is increasing by 0.4568 LBP

- For every 1.00 LBP increase in expenditures excluded the service on debt in terms of deposit interest rates, the external is decreasing by 0.31 LBP
- Schwarz Criterion: 59.43

Specifications	**Number of Lags**	**Restrictions**	**Deterministic Trend Specification**
	1	No	Intercept (No Trend) in CE & VAR

- Schwarz Criterion: -59.70
- We took the result that showed lower Schwarz Criterion and impose restrictions

Specifications	**Number of Lags**	**Restrictions**	**Deterministic Trend Specification**
	2	Yes B(1,1)=1,B(1,2)=-1	Intercept (No Trend) in CE & VAR

- Chi Square: 9.2842
- Probability: 0.0043 is lower than 5% level → Coefficient is different than +1 → Fiscal policy is not sustainable.

Specifications	**Number of Lags**	**Restrictions**	**Deterministic Trend Specification**

	2	Yes B(1,1)=1,B(1,3)=+1	Intercept (No Trend) in CE & VAR

- Chi Square: 10.6304
- Probability: 0.0011 is lower than 5% level → Coefficient is different than +1 → Fiscal policy is not sustainable.

Specifications	**Number of Lags**	**Restrictions**	**Deterministic Trend Specification**
	2	Yes B(1,1) =1,B(1,2)=-1, B(1,3)=+1	Intercept (No Trend) in CE & VAR

- Chi Square: 11.2575
- Probability: 0.0035 is lower than 5% level → Coefficient is different than +1 → Fiscal policy is not sustainable

- ***Johansen Cointegration Test***

Type	**Trace Statistic**	**0.05 Critical Value**	**Probability**
Unrestricted Cointegration Rank Test (Trace)	44.6278	29.7970	0.0005

There is cointegration between External Debt and Revenues & Expenditures excluded the service on debt at 5% level → the variables are not drifting too far→ Reject the null hypothesis of no co-integration

Type	**Trace Statistic**	**0.05 Critical Value**	**Probability**
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)	35.8632	21.13162	0.0002

There is cointegration between External Debt and Revenues & Expenditures excluded the service on debt at 5% level → the variables are not drifting too far→ Reject the null hypothesis of no co-integration

- ***Auto-Regressive Distributed Lag Model***

Level Equation

Restricted Constant and No Trend

Variable	**Coefficient**	**Std. Error**	**T-Statistic**	**Probability**
Revenues in terms of Deposits Interest Rates (LBP)	1.1200	0.3289	3.4052	0.0018
Expenditures excluded the service on debt in terms of Deposits Interest Rates (LBP)	-1.2964	0.4498	-2.8819	0.0071

- For every 1.00 LBP increase in revenues in terms of deposit interest rates, the external debt is decreasing by 1.12 LBP
- For every 1.00 LBP increase in expenditures excluded the service on debt in terms of deposit interest rates, the external debt is increasing by 1.29 LBP

Maximum Dependent Variable Lags: **4**

Model Selection Criteria: **Schwarz Criterion**

Type	**Value**	**Significance**	**I (0)**	**I (1)**
F-Bound Test	5.4103	10%	2.63	3.35
		5%	3.1	3.87
		2.5%	3.55	4.38
		1%	4.13	5.00

Conclusion: The F-value is 5.4103, which is higher than the upper bound value 4.16 and the lower bound value 3.62 at 5% significance level → We reject the null hypothesis→ There is Long-term cointegration relationship between External Debt in function of Revenues/deposits interest rate & Expenditures excluded the service on debt/deposits interest rate.

Summary:

- ***Vector Error Correction Regression*** –
  - Restrictions: B (1,1) =1, B (1,2) =-1 → Fiscal policy is not sustainable

- Restrictions: B (1,1) =1, B (1,3) =+1 → Fiscal policy is not sustainable
- Restrictions: B (1,1) =1, B (1,2) =-1, B (1,3) =+1 → Fiscal policy is not sustainable

- ***Johansen Cointegration Test*** – Fiscal policy is sustainable
- ***Auto-Regressive Distributed Lag Model -*** Fiscal policy is sustainable

C. Cointegration Regression results, Domestic Debt as function of Revenues & Expenditures excluded service on debt (In terms of Deposits Interest rates)

LBP (Nominal numbers)

- ***Vector Error Correction Regression***

Specifications	Number of Lags	Restrictions	Deterministic Trend Specification
	2	No	Intercept (No Trend) in CE & VAR

Cointegrating Equation

Variable	Coefficient	Std. Error	T-Statistic
Revenues in terms of Deposits Interest Rate (Nominal – LBP)	-0.0212	0.0946	-0.2247

Expenditures Excluded the Service on Debt in terms of Deposits Interest Rate (Nominal – LBP)	-0.3360	0.1320	-2.5450

- For every 1.00 LBP increase in revenues in terms of deposit interest rates, the domestic debt is increasing by 0.021 LBP
- For every 1.00 LBP increase in expenditures excluded the service on debt in terms of deposit interest rates, the domestic debt is increasing by 0.33 LBP
- Schwarz Criterion: 60.34

Specifications	**Number of Lags**	**Restrictions**	**Deterministic Trend Specification**
	1	No	Intercept (No Trend) in CE & VAR

- Schwarz Criterion: 60.41
- We took the result that showed lower Schwarz Criterion and impose restrictions

Specifications	**Number of Lags**	**Restrictions**	**Deterministic Trend Specification**
	2	Yes B(1,1)=1,B(1,2)=-1	Intercept (No Trend) in CE & VAR

- Chi Square: 20.511

- Probability: 0.000 is lower than 5% level → Coefficient is different than +1 → Fiscal policy is not sustainable.

Specifications	Number of Lags	Restrictions	Deterministic Trend Specification
	2	Yes B(1,1)=1,B(1,3)=+1	Intercept (No Trend) in CE & VAR

- Chi Square: 21.2318
- Probability: 0.0000 is lower than 5% level → Coefficient is different than +1 → Fiscal policy is not sustainable.

Specifications	Number of Lags	Restrictions	Deterministic Trend Specification
	2	Yes B(1,1)=1,B(1,2)=-1, B(1,3)=+1	Intercept (No Trend) in CE & VAR

- Chi Square: 22.339
- Probability: 0.0000 is lower than 5% level → Coefficient is different than +1 → Fiscal policy is not sustainable

- ***Johansen Cointegration Test***

Type	Trace Statistic	0.05 Critical Value	Probability
Unrestricted Cointegration Rank Test (Trace)	52.8944	29.7970	0.0000

There is cointegration between Domestic Debt and Revenues & Expenditures excluded the service on debt at 5% level → the variables are not drifting too far→ Reject the null hypothesis of no co-integration

Type	Trace Statistic	0.05 Critical Value	Probability
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)	40.2547	21.13162	0.0000

There is cointegration between Domestic Debt and Revenues & Expenditures excluded the service on debt at 5% level → the variables are not drifting too far→ Reject the null hypothesis of no co-integration

- ***Auto-Regressive Distributed Lag Model***

Level Equation

Restricted Constant and No Trend

Variable	Coefficient	Std. Error	T-Statistic	Probability

Revenues in terms of Deposits Interest Rates (LBP)	0.2010	1.6838	0.1193	0.9056
Expenditures excluded the service on debt in terms of Deposits Interest Rates (LBP)	0.9562	4.2753	0.2236	0.8242

- For every 1.00 LBP increase in revenues in terms of deposit interest rates, the domestic debt is decreasing by 0.20 LBP
- For every 1.00 LBP increase in expenditures excluded the service on debt in terms of deposit interest rates, the debt is decreasing by 0.95 LBP

Maximum Dependent Variable Lags: **4**

Model Selection Criteria: **Schwarz Criterion**

Type	**Value**	**Significance**	**I (0)**	**I (1)**
F-Bound Test	2.85	10%	2.63	3.35
		5%	3.1	3.87
		2.5%	3.55	4.38
		1%	4.13	5.00

Conclusion: The F-value is 2.85, which is lower than the upper bound value 4.16 and the lower bound value 3.62 at 5% significance level → We failed to reject the null hypothesis→ There is no Long-term cointegration relationship

between Domestic Debt in function of Revenues/deposits interest rate & Expenditures excluded the service on debt/deposits interest rate.

If we compared it with the results of 10% significance level → the F-value of 2.85 is higher than the lower bound value 2.63, based on this result we can consider the fiscal policy as weakly sustainable

Summary:

- ***Vector Error Correction Regression*** –
  - Restrictions: B (1,1) =1, B (1,2) =-1 → Fiscal policy is not sustainable
  - Restrictions: B (1,1) =1, B (1,3) =+1 → Fiscal policy is not sustainable
  - Restrictions: B (1,1) =1, B (1,2) =-1, B (1,3) =+1 → Fiscal policy is not sustainable
- ***Johansen Cointegration Test*** – Fiscal policy is sustainable
- ***Auto-Regressive Distributed Lag Model -*** Fiscal policy is weakly sustainable

3. Accounting Approach

			COLUMN #1			COLUMN #2					COLUMN #3	COLUMN #4
Lebanon	**GDP Growth Rate**	**Short Term Interest Rate**	**(r-g)**	**GDP (Billions of LBP)**	**Debt (Billions of LBP)**	**(r-g) *B/Y**	**Revenues (Billions of LBP)**	**Expenditures (Billions of LBP)**	**Interest of Debt (Billions of LBP)**	**Primary Surplus/ Deficit (Billions of LBP)**	**P/Y**	**(r-g) *B/Y - P/Y**
	g	**R**		**Y**	**B**		**R**	**G**	**rB**	**P**		
1971	9.23	0.00	-9.230	5.310	0.317	-0.551	0.672	0.970	0.025	-0.273	-0.05	(0.50)
1972	12.15	0.00	-12.150	6.366	0.346	-0.661	0.722	1.075	0.027	-0.325	-0.05	(0.61)
1973	4.71	0.00	-4.710	7.132	0.363	-0.240	0.985	1.023	0.024	-0.014	0.00	(0.24)
1974	2.4	0.00	-2.400	7.885	0.433	-0.132	1.286	1.235	0.024	0.075	0.01	(0.14)
1975	-30.3	0.00	30.300	7.561	0.277	1.109	0.809	1.029	0.022	-0.198	-0.03	1.14
1976	-56.99	0.00	56.990	4.019	0.931	13.196	0.150	0.633	0.048	-0.435	-0.11	13.30
1977	83.28	0.00	-83.280	8.379	1.613	-16.036	1.101	1.690	0.066	-0.523	-0.06	(15.97)
1978	-3.05	0.00	3.050	6.815	3.757	1.681	1.415	2.279	0.097	-0.767	-0.11	1.79
1979	9.41	0.00	-9.410	10.107	1.845	-1.718	1.883	2.910	0.145	-0.882	-0.09	(1.63)

1980	1.47	0.00	-1.470	15.033	3.823	-0.374	2.531	3.915	0.284	-1.100	-0.07	(0.30)
1981	0.55	0.00	-0.550	18.029	7.940	-0.242	3.107	5.084	1.032	-0.945	-0.05	(0.19)
1982	-36.79	10.07	46.855	10.438	15.543	69.771	2.775	7.620	1.867	-2.979	-0.29	70.06
1983	22.71	6.65	-16.056	19.837	13.192	-10.678	4.320	9.236	1.583	-3.333	-0.17	(10.51)
1984	44.48	11.75	-32.730	37.429	26.997	-23.608	2.413	13.018	3.244	-7.361	-0.20	(23.41)
1985	24.3	14.05	-10.250	65.413	65.739	-10.301	4.344	25.557	12.942	-8.272	-0.13	(10.17)
1986	-6.77	16.27	23.040	177.471	78.372	10.175	4.410	24.822	17.136	-3.276	-0.02	10.19
1987	16.73	40.75	24.020	1517.080	565.340	8.951	20.240	144.900	24.840	-99.820	-0.07	9.02
1988	-28.21	17.97	46.180	1759.734	452.943	11.886	31.329	276.120	80.181	-164.610	-0.09	11.98
1989	-42.45	5.00	47.450	1201.356	798.694	31.546	40.222	445.978	133.042	-272.714	-0.23	31.77
1990	26.53	17.92	-8.614	2014.980	1726.720	-7.382	106.500	669.530	134.900	-428.130	-0.21	(7.17)
1991	38.20	14.08	-24.117	3917.760	3149.520	-19.388	522.720	1197.680	210.320	-464.640	-0.12	(19.27)
1992	4.50	11.33	6.833	10038.260	5440.860	3.704	1120.390	2184.670	510.420	-553.860	-0.06	3.76
1993	7.00	6.60	-0.404	12899.920	6652.832	-0.208	1855.808	3018.256	784.096	-378.352	-0.03	(0.18)
1994	8.03	7.33	-0.697	16097.523	10811.619	-0.468	2282.397	5299.320	1514.331	-1502.592	-0.09	(0.37)
1995	6.49	34.88	28.385	18713.646	14165.390	21.486	3034.300	5859.393	1876.475	-948.618	-0.05	21.54

1996	4.04	11.19	7.147	21493.300	20422.560	6.791	3574.890	7308.350	2683.130	-1050.330	-0.05	6.84
1997	10.16	13.00	2.840	24445.552	23885.280	2.775	3814.816	7536.512	3433.024	-288.672	-0.01	2.79
1998	3.90	11.23	7.329	26353.416	28339.816	7.881	4033.485	6730.235	3396.744	699.994	0.03	7.85
1999	-0.80	7.46	8.258	26260.410	33789.270	10.626	4471.365	7212.245	3631.550	890.670	0.03	10.59
2000	1.10	7.58	6.483	26028.080	37647.220	9.377	4191.368	8390.023	4198.272	-0.383	0.00	9.38
2001	3.90	9.67	5.766	26605.868	42695.415	9.253	4290.964	7748.258	4311.450	854.156	0.03	9.22
2002	3.40	7.65	4.245	28871.640	46316.430	6.810	5398.940	8486.953	4621.995	1533.982	0.05	6.76
2003	1.70	4.00	2.300	30273.615	50284.472	3.820	6218.603	8809.828	4845.105	2253.880	0.07	3.75
2004	5.06	3.94	-1.123	31746.825	54315.780	-1.920	7094.745	8773.365	4040.505	2361.885	0.07	(1.99)
2005	2.70	5.15	2.446	32230.032	58233.436	4.419	7014.336	7835.857	3548.816	2727.295	0.08	4.33
2006	1.60	3.71	2.108	32858.978	60855.966	3.905	6305.114	7827.879	4552.650	3029.885	0.09	3.81
2007	9.40	3.65	-5.754	37160.424	63550.570	-9.841	8117.786	10100.396	4953.312	2970.702	0.08	(9.92)
2008	9.10	3.58	-5.517	43590.960	71150.184	-9.004	10264.968	11964.456	5322.240	3622.752	0.08	(9.09)
2009	10.30	3.38	-6.925	52745.140	76779.452	-10.081	11984.575	12972.263	6064.040	5076.352	0.10	(10.18)
2010	8.00	2.81	-5.188	57091.020	79006.702	-7.179	11974.644	15131.580	6188.240	3031.304	0.05	(7.23)
2011	0.90	2.79	1.892	60178.619	80564.034	2.532	13299.628	15958.576	6006.000	3347.051	0.06	2.48

2012	2.80	2.75	-0.050	64858.210	86582.934	-0.067	13415.144	15242.782	5733.820	3906.182	0.06	(0.13)
2013	2.50	2.75	0.250	66702.400	95486.704	0.358	13353.992	16020.363	5985.920	3319.549	0.05	0.31
2014	2.00	3.29	1.292	68732.190	100062.375	1.880	14698.047	18434.499	6583.140	2846.688	0.04	1.84
2015	1.00	2.88	1.875	70978.697	105948.137	2.799	13630.556	18101.428	7052.660	2581.788	0.04	2.76

Based on the results of the accounting approach above, the column #4 figures sign (- or +) will determine if there is fiscal sustainability. The negative sign is an indicator of sustainable path, the positive sign is an indicator of explosive fiscal path.

Mean Test

Variable	Coefficient	Std. Error	T-Statistic	Probability
$\frac{\boldsymbol{B}}{\boldsymbol{Y}} = \frac{\frac{\boldsymbol{P}}{\boldsymbol{Y}}}{(\boldsymbol{r}-\boldsymbol{g})}$	2.6232	2.1191	1.2378	0.2223

The mean test probability showed that the fiscal policy isn't sustainable for the period of 1971-2015, however, applying a test for long years with all the fluctuations of expenses and revenues before, during and after the two civil wars had an immediate effect on this result. Overall, the result showed good enough prospect on average over this hectic period.

Cointegration Regression Tests Summary

Fiscal Policy is Sustainable	*Fiscal Policy is not Sustainable*	*Fiscal Policy is weakly Sustainable*

Revenue in function of Expenditures (Included the service on debt)	**LBP**	**LBP/Y or USD/Y**	**USD**
Vector Error Correction Regression			
Johansen Cointegration Test –Trace			
Johansen Cointegration Test – Maximum Eigenvalue			
Auto-Regressive Distributed Lag Model			
Debt in function of Primary Surplus	**LBP**	**LBP/Y or USD/Y**	**USD**
Vector Error Correction Regression			
Johansen Cointegration Test –Trace			
Johansen Cointegration Test – Maximum Eigenvalue			
Auto-Regressive Distributed Lag Model			

External Debt in function of Primary Surplus	**LBP**	**LBP/Y or USD/Y**	**USD**
Vector Error Correction Regression			
Johansen Cointegration Test			
Auto-Regressive Distributed Lag Model			
Domestic Debt in function of Primary Surplus	**LBP**	**LBP/Y or USD/Y**	**USD**
Vector Error Correction Regression			
Johansen Cointegration Test			
Auto-Regressive Distributed Lag Model			
LBP	**Debt in function of Rev. and Exp. (Excl. the service on debt)**	**External Debt in function of Rev. and Exp. (Excl. the service on debt)**	**Domestic Debt in function of Rev. and Exp. (Excl. the service on debt)**
Vector Error Correction Regression			
Restrictions: B (1,1) = 1, B (1,2) = -1			
Restrictions: B (1,1) = 1, B (1,3) = +1			

Restrictions: B (1,1) =1, B (1,2) =-1, B (1,3) =+1			
Johansen Cointegration Test			
Auto-Regressive Distributed Lag Model			

Cointegration Regression Results Interpretation:

1- **Hakkio & Rush Model:** Based on ARDL, this model showed that the fiscal policy isn't sustainable for LBP, USD & LBP/Y – USD/Y data

2- **Variant of Azar and Asrawi Model:**

- Debt in function of Primary Surplus:

  Based on ARDL, this model showed that the fiscal policy is sustainable for LBP & USD data.

  Based on ARDL, this model showed that the fiscal policy isn't sustainable for LBP/Y & USD/Y data.

- External Debt in function of Primary Surplus:

  Based on ARDL, this model showed that the fiscal policy is sustainable for LBP, USD & LBP/Y – USD/Y data

- Domestic Debt in function of Primary Surplus:

  Based on ARDL, this model showed that the fiscal policy is sustainable for LBP data.

  Based on ARDL, this model showed that the fiscal policy isn't sustainable for USD & LBP/Y - USD/Y data.

3- **Azar and Asrawi Model:**

- Debt in function of Rev. and Exp. (Excl. the service on debt)

  Based on ARDL, this model showed that the fiscal policy is sustainable for LBP data.

- External Debt in function of Rev. and Exp. (Excl. the service on debt)

  Based on ARDL, this model showed that the fiscal policy is sustainable for LBP data.

- Domestic Debt in function of Rev. and Exp. (Excl. the service on debt)

  Based on ARDL, this model showed that the fiscal policy is weakly sustainable for LBP data.

X. Conclusion

The accounting approach showed mixed results for the Lebanese Fiscal Policy. The economy showed evidence of strong sustainable fiscal policy in three different periods (1983-1985,1990-1991, 2007-2010). Other than those periods, the economy showed either weak sustainability or not sustainable path. After the civil war, the situation was the worst for a period of 17 years, the economy generated promising results only in 5 years. The reconstruction and rehabilitation cost, the electricity sector transfers and the services on debt had a massive effect on the ability to perform sustainably. In the last 10 years, the authorities succeeded to keep the fiscal policy sustainable, however, it reverted to the not sustainable path during the last three years due to the Syrian Refugees crisis and the direct effect of the unstable regional situation on the economy of Lebanon.

This study examined the fiscal developments throughout the period of 1971-2015, using several approaches to test the sustainability of the Lebanese fiscal policy.

ADF and PP Unit root tests in LBP and USD data of the various fiscal variables showed non-stationarity results at level as nominal and in terms of GDP except the following:

- Expenditures included the service on debt in terms of GDP that showed stationarity at 5% significance level.
- Expenditures excluded the service on debt in terms of GDP that showed stationarity at 10% significance level.

- Deficit in terms of GDP showed stationarity at 10% significance level.

ADF and PP were applied the tests on the fiscal variables by taking first difference, both LBP and USD data showed stationarity results as nominal and in terms of GDP at 5% significance level.

The study tested the stationarity of LBP data in terms of various interest rates (Interbank rate, Deposit rate and Loans Rate) for both Revenues and Expenditures excluded the service on debt. All showed in level non-stationarity results at 5% significance level.

By taking the first difference of the variables, the results turned to be stationarity at 5% significance level except for the following:

- Revenues in terms of deposits interest rate in LBP (ADF)
- Revenues in terms of deposits interest rate in LBP (PP) (Stationarity at 10% significance level)
- Revenues in terms of interbank interest rate in LBP (PP) (Stationarity at 10% significance level)
- Expenditures excluded the service on debt in terms of loans interest rate in LBP (ADF) (Stationarity at 10% significance level)

While running the cointegration regression, Vector Error Correction model won't be informative enough because it requires same order of integration and the results showed some variables are stationary without taking the first difference, the ARDL will eliminate the problem of integration of different orders. For example, the Expenditures included the

service on debt in terms of GDP is integrated of order zero and most of the other variables are integrated of order one. The research will consider the result of ARDL test and make the recommendations based on it.

Cointegration regression for Revenues in function of Expenditures included the service on debt (LBP data) showed that based on Vector Error Correction Regression test, for every increase in Expenditures with 1 LBP, the revenues are increasing with 0.76 LBP only. After imposing the restrictions, the coefficient showed that it isn't different than +1 → Fiscal policy is weakly sustainable. The Johansen cointegration test showed that there isn't cointegration between revenues and expenditures included the service on debt at both trace and maximum eigenvalue → the variables are drifting too far. The ARDL test failed to reject the null hypothesis and showed no long-term relationship between revenues and expenditures included the service on debt.

Cointegration regression for Revenues in function of Expenditures included the service on debt (USD data) showed that based on Vector Error Correction Regression test, for every increase in Expenditures with 1 USD, the revenues are increasing with 0.80 USD only. After imposing the restrictions, the coefficient showed that it is different than +1 → Fiscal policy is weakly sustainable. The Johansen cointegration test showed that there isn't cointegration between revenues and expenditures included the service on debt at both trace and maximum eigenvalue → the variables are drifting too far. The ARDL test failed to reject the null hypothesis and showed no long-term relationship between revenues and expenditures included the service on debt.

Cointegration regression for Revenues in function of Expenditures included the service on debt (LBP over GDP data and USD over GDP data) showed that based on Vector Error Correction Regression and after imposing the restrictions, the coefficient showed that it is different than +1 → Fiscal policy is not sustainable. The Johansen cointegration test showed that there isn't cointegration between revenues and expenditures included the service on debt at both trace and maximum eigenvalue → the variables are drifting too far. The ARDL test failed to reject the null hypothesis and showed no long-term relationship between revenues and expenditures included the service on debt.

The study stated before that based on the data size and the stationarity tests results, the ARDL tests results will be the most reliable while concluding the outcome of each cointegration regression analysis of different fiscal variables.

The research literature review confirmed that when the series are cointegrated then there will be fiscal sustainability, **based on the results of cointegration of Revenues in function of Expenditures included the service on debt (LBP – USD – LBP/Y or USD/Y), the ARDL showed no long-term relationship → Failed to reject the null hypothesis of no-cointegration → Fiscal policy isn't sustainable.**

Cointegration regression for Debt in function of Primary Surplus (LBP data) showed that based on Vector Error Correction Regression test and after imposing the restrictions, the coefficient showed that it is different than +1 → Fiscal policy is sustainable with coefficient close to the inverse of interest rate. The Johansen cointegration test showed that there is cointegration between Debt and Primary Surplus at both trace and maximum eigenvalue →

the variables are not drifting too far. The ARDL test rejected the null hypothesis and showed long-term relationship between debt and primary surplus.

Cointegration regression for Debt in function of Primary Surplus (USD data) showed that based on Vector Error Correction Regression test and after imposing the restrictions, the coefficient showed that it is different than +1 → Fiscal policy is not sustainable. The Johansen cointegration test showed that there is cointegration between Debt and Primary Surplus at trace → the variables are not drifting too far, but at maximum eigenvalue it showed no cointegration between Debt and Primary Surplus→ the variables are drifting too far. The ARDL test rejected the null hypothesis and showed long-term relationship between debt and primary surplus.

Cointegration regression for Debt in function of Primary Surplus (LBP over GDP data and USD over GDP data) showed that based on Vector Error Correction Regression test and after imposing the restrictions, the coefficient showed that it is different than +1 → Fiscal policy is not sustainable. The Johansen cointegration test showed that there is no cointegration between Debt and Primary Surplus at both trace and maximum eigenvalue → the variables are drifting too far. The ARDL test failed to reject the null hypothesis and showed no long-term relationship between debt and primary surplus.

The research literature review confirmed that when the series are cointegrated then there will be fiscal sustainability, **based on the results of cointegration of Debt in function of Primary Surplus (LBP – USD), the ARDL showed long-term relationship → Rejected the null hypothesis of no-cointegration → Fiscal policy is sustainable.**

Based on the results of cointegration of Debt in function of Primary Surplus (LBP/Y or USD/Y), the ARDL showed no long-term relationship → Failed to reject the null hypothesis → Fiscal policy isn't sustainable.

Cointegration regression of External Debt in function of Primary Surplus (LBP data) showed that based on Vector Error Correction Regression test and after imposing the restrictions, the coefficient showed that it is not different than +1 → Fiscal policy is sustainable. The Johansen cointegration test showed that there is no cointegration between External Debt and Primary Surplus at both trace and maximum eigenvalue → the variables are drifting too far. The ARDL test failed to reject the null hypothesis and showed no long-term relationship between External Debt and Primary Surplus.

Cointegration regression of External Debt in function of Primary Surplus (USD data) showed that based on Vector Error Correction Regression test and after imposing the restrictions, the coefficient showed that it is different than +1 → Fiscal policy is not sustainable. The Johansen cointegration test showed that there is no cointegration between External Debt and Primary Surplus at both trace and maximum eigenvalue → the variables are drifting too far. The ARDL test failed to reject the null hypothesis and showed no long-term relationship between External Debt and Primary Surplus.

Cointegration regression of External Debt in function of Primary Surplus (LBP over GDP data and USD over GDP data) showed that based on Vector Error Correction Regression test and after imposing the restrictions, the coefficient showed that it is different than +1 → Fiscal policy is not sustainable. The Johansen cointegration test showed that

there is no cointegration between External Debt and Primary Surplus at both trace and maximum eigenvalue → the variables are drifting too far. The ARDL test failed to reject the null hypothesis and showed no long-term relationship between External Debt and Primary Surplus.

The research literature review confirmed that when the series are cointegrated then there will be fiscal sustainability, **based on the results of cointegration of External Debt in function of Primary Surplus (LBP – USD – LBP/Y or USD/Y), the ARDL showed no long-term relationship → Failed to reject the null hypothesis → Fiscal policy isn't sustainable.**

Cointegration regression of Domestic Debt in function of Primary Surplus (LBP data) showed that based on Vector Error Correction Regression test and after imposing the restrictions, the coefficient showed that it is not different than +1 → Fiscal policy is sustainable. The Johansen cointegration test showed that there is no cointegration between Domestic Debt and Primary Surplus at both trace and maximum eigenvalue → the variables are drifting too far. The ARDL test rejected the null hypothesis and showed long-term relationship between Domestic Debt and Primary Surplus.

Cointegration regression of Domestic Debt in function of Primary Surplus (USD data) showed that based on Vector Error Correction Regression test and after imposing the restrictions, the coefficient showed that it is not different than +1 → Fiscal policy is sustainable. The Johansen cointegration test showed that there is no cointegration between Domestic Debt and Primary Surplus at both trace and maximum eigenvalue → the variables

are drifting too far. The ARDL test failed to reject the null hypothesis and showed no long-term relationship between Domestic Debt and Primary Surplus.

Cointegration regression of Domestic Debt in function of Primary Surplus (LBP over GDP data and USD over GDP data) showed that based on Vector Error Correction Regression test and after imposing the restrictions, the coefficient showed that it is different than +1 → Fiscal policy is not sustainable. The Johansen cointegration test showed that there is no cointegration between Domestic Debt and Primary Surplus at both trace and maximum eigenvalue → the variables are drifting too far. The ARDL test failed to reject the null hypothesis and showed no long-term relationship between Domestic Debt and Primary Surplus.

The research literature review confirmed that when the series are cointegrated then there will be fiscal sustainability, **based on the results of cointegration of Domestic Debt in function of Primary Surplus (LBP), the ARDL showed long-term relationship → Rejected the null hypothesis → Fiscal policy is sustainable.**

Based on the results of cointegration of Domestic Debt in function of Primary Surplus (USD - LBP/Y or USD/Y), the ARDL showed no long-term relationship → Failed to reject the null hypothesis → Fiscal policy isn't sustainable.

Cointegration regression of Debt as function of Revenues and Expenditures excluded the service on debt (In terms of deposits interest rate) (LBP data) showed that based on Vector Error Correction Regression test and after imposing the restrictions, the coefficient showed that it is not different than +1 → Fiscal policy is sustainable. The Johansen

cointegration test showed that there is cointegration between Debt as function of Revenues and Expenditures excluded the service on debt at both trace and maximum eigenvalue → the variables are not drifting too far. The ARDL test rejected the null hypothesis and showed long-term relationship between Debt in function of Revenues and Expenditures excluded the service on debt.

Cointegration regression of External Debt as function of Revenues and Expenditures excluded the service on debt (In terms of deposits interest rate) (LBP data) showed that based on Vector Error Correction Regression test and after imposing the restrictions, the coefficient showed that it is different than +1 → Fiscal policy is not sustainable. The Johansen cointegration test showed that there is cointegration between External Debt as function of Revenues and Expenditures excluded the service on debt at both trace and maximum eigenvalue → the variables are not drifting too far. The ARDL test rejected the null hypothesis and showed long-term relationship between External Debt in function of Revenues and Expenditures excluded the service on debt.

Cointegration regression of Domestic Debt as function of Revenues and Expenditures excluded the service on debt (In terms of deposits interest rate) (LBP data) showed that based on Vector Error Correction Regression test and after imposing the restrictions, the coefficient showed that it is different than +1 → Fiscal policy is not sustainable. The Johansen cointegration test showed that there is cointegration between Domestic Debt as function of Revenues and Expenditures excluded the service on debt at both trace and maximum eigenvalue → the variables are not drifting too far. The ARDL test

failed to reject the null hypothesis and showed no long-term relationship between Domestic Debt in function of Revenues and Expenditures excluded the service on debt. However, the result was too close to be sustainable.

The study gave contradicting results due to the differences in the approaches applied and the use of different combinations of data. Hakkio and Rush model included the service on debt in the expenditures variables, while Azar and Asrawi model excluded the service on debt and took the Revenues and Expenditures in terms of LBP deposits interest rates.

The LBP data showed better results "sustainable fiscal policy" for Modified Azar and Asrawi model. Debt in function of Primary Surplus & Domestic Debt in function of Primary Surplus showed sustainable path, while by taking the USD data, only the Domestic Debt in function of Primary Surplus showed sustainable path based on ARDL approach.

This research concluded that with the current policy in place, it is still possible to consider sustainable and there is ability to survive based on the results. Our study applied Azar & Asrawi test on the Lebanese economy for the first time on the following fiscal variables:

1- Debt as function of Revenues and Expenditures excluded the service on debt
2- External Debt as function of Revenues and Expenditures excluded the service on debt
3- Domestic Debt as function of Revenues and Expenditures excluded the service on debt

The interest rates have been taken into consideration, and the result showed strong fiscal sustainability for both “Debt as function of Revenues and Expenditures excluded the service on debt” and “External Debt as function of Revenues and Expenditures excluded the service on debt.” As stated in the results above, “Domestic Debt as function of Revenues and Expenditures excluded the service on debt” can be considered weakly sustainable based on 10% significance level.

I. Discussion of the future prospects of Lebanon

Lebanon’s ability to keep this fiscal policy sustainable depends on several important factors:

- The recently confirmed public sector salaries series increase contribution to the growth of the economy
- The new package of taxes
- The privatization of the Electricity sector
- Investment spending
- Marine natural resources
- The region’s political situation

Lebanon never had national budget since 2005 due to political unstable situation that led to extra spending in billions of dollars. Recently, the government proposed 2017 budget and the main part of it is the wage raise that was demanded for long years from different public sectors. This increase has been promised for Lebanon’s public-sector workforce to

provide balanced life to everyone. The parliamentary ratification of annual budget would give a positive sign from Lebanon because of improvement in transparency and public finances predictability.

The government forced new taxes implemented as further income sources to fund this raise, the following are the main increases in taxes:

- VAT increased from 10% to 11%
- Phone bills Judicial records stamps increase
- Receipts stamps increase from 100LL to 250LL
- Doubling the public notaries fees
- Cement production and construction licenses taxes increase
- Modifying taxes on income & revenues for private businesses
- Enforcing taxes on passengers leaving the country

The recently implemented reforms are the first revenues reforms since Paris III 2007 conference to assist Lebanon. The government plan showed that these salaries raise will offset the new revenues sources which is through the mentioned taxes and it may decrease the fiscal deficit in 2018.

Moody's rating agency said *"A normalized budget process would allow the government to curb the fiscal deficit. Weak revenue collection and continued delays in tax reforms have eroded the government's revenues base. Meanwhile, after a period of decrease, expenditures have begun to rise as a result of higher debt servicing costs and transfers to utility company Electricite du Liban and an increase in capital expenditures".*

Based on the current modifications, Moody's expected that the government debt burden to increase more at the end of 2017.

One of the advantages of the new budget normalization that will make easier for Lebanon to tap donor financing. If the government can confirm consistent policy agenda, then additional funding may be available and this can improve the weak growth of the economy. It is expected to see fiscal deficit decrease in 2017 and 2018 based on revenues that will be generated from the new taxes revenues.

The 2017 confirmed budget may help Lebanon to improve their reputation among the international lenders and rating agencies who firmly blamed the successive governments for failing to ratify the budget.

Recent Gas and Oil exploration in the Lebanese Basin opened the door to enter the club of oil producing countries, Lebanon should reap the first crops of the available reserves, this could worth billions of dollars that would be invested in development projects, upgrade the crumbling infrastructure and decrease the public debt burden. The expected date to start oil production is 2018 and the right holder companies will pay royalties equal to 4% of the gas production and 5-12% of the oil produced. At least 80% of the workers should be Lebanese citizens which will decrease the unemployment rate.

With the sharp decrease of oil prices, some of the Lebanese politicians think that there is risk of nothing to be found. The continuing war in Syria may discourage the investors and specially after political paralysis which left Lebanon without president for more than two years and this was the reason to postpone the licensing process three years.

By 2020, Canada, United States and Russia will start planning to export gas to Asia. If the production is delayed or mismanaged, then the corruption only will increase and that would miss out the radically shift possibility in the economy of Lebanon.

One of the prequalified companies offers will be approved by the end of 2017 and start quickly generating revenues.

Overall, "Asrawi and Azar original model" showed the best results to support the fiscal policy sustainability, while the most of "Asrawi and Azar modified model" and "Hakkio and Rush model" showed unsuitable path. In the light of this mixed results, there are lots of challenges awaiting the Lebanese economy in the upcoming future.

- When the fight against corruption will save the government considerable amount of money that will help to keep the expenditures balanced and provide room for investment opportunities without borrowing?
- When there will be serious efforts to keep the expenditures within limits and cut down the service on debt burden?
- How the recently imposed taxes will cover the salary raise of public sector and not being burden on the accumulated debt?
- When and how the oil and gas prospects in the Mediterranean Sea will increase the revenues of Lebanon?

II. Main Recommendation

Based on the contradicting results of the thesis, this research will recommend the following:

- Azar and Asrawi model showed strong sustainable results for the fiscal policy of Lebanon when we applied External Debt in function of Revenues and Expenditures (Excluded the service on debt), while Domestic Debt in function of Revenues and Expenditures (Excluded the service on debt) showed weak sustainable results. Based on above, the government of Lebanon should depend more on external borrowing since it showed strong sustainability and depend less on domestic borrowing since it showed only weak sustainability.

III. Limitations

The major limitation is the sample size and the hectic period covered, which was volatile before, during and after the civil wars. The research period wasn't enough to give consistent cointegration results because of the small sample bias, sampling error, and that is why the tests didn't provide the same conclusion.

The socond limitation is the unavailability of long-term interest rates, which was going to give us more robust results.

The last limitation is the unavailability of USD deposit interest rates.

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