

The Impact of Government Debt Levels on GDP Growth: A Panel Data Analysis

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Abstract

This paper analyzes the impact of government debt-to-GDP levels on GDP growth in 6 European Union Nations and 5 Middle Eastern countries. While government debt levels shot up in the EU as a result of massive fiscal stimulus following the Great Recession, debt levels have been steadily decreasing in certain Middle Eastern countries. Several variables are observed to determine the relationship between debt and growth, including real interest rates, unemployment, inflation, population growth, trade, and consumption. For the EU nations studied, panel least squares analysis indicates that every 10% increase in government debt-to-GDP costs 30 basis points of GDP growth. Results were found to be insignificant for the Middle Eastern Nations, which is in line with prior studies which conclude that the relationship is often inconclusive in countries with weak political institutions.

JEL Classification: F34

Keywords: GDP growth, debt, government

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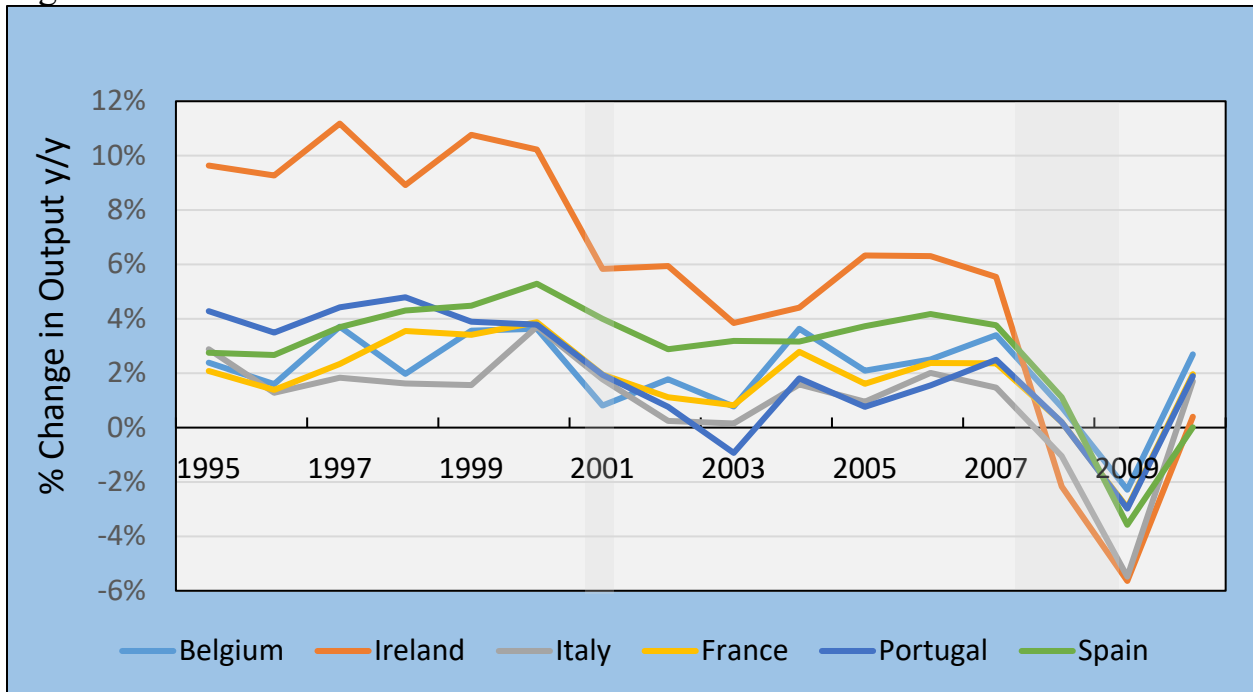
The author thanks Professors Ramesh Mohan and Aziz Berdiev for their extensive support and guidance throughout the research and technical parts of this publication.

Introduction/Trends

Since the onset of the Great Recession, governments around the world initiated different responses to keep their economies afloat. Many nations drastically increased public spending to make up for the significant decline in household consumption. In particular, this policy was used extensively in Europe directly after the crisis. Eventually though, EU governments prioritized deleveraging as a means of controlling debt levels. Countries attempted to reduce their deficit spending levels through austerity measures. This had a major impact on growth however, and went in stark contrast with the actions of global central banks. Many economists as a result believe that a cut in government spending post-recession was counter-productive to the recovery and seriously hurt growth. This paper will examine the relationship between government debt levels and GDP growth in countries with a high debt-to-GDP ratio. While some governments may opt to cut funding in a time of high debt, this high level of government spending may have spurred on steady GDP growth in years passed. This raises the very important question of whether governments can serve as permanent major contributors to GDP growth. According to the IMF, an accumulation of deficits, even in good times, reduces fiscal space and limits the ability of government to sustain demand as the economy slows down.

This paper also analyzes what occurs when governments reduce their debt-to-GDP levels, as occurred in several Middle Eastern countries in recent years. Deleveraging may appear to hurt growth, yet it can also reduce reliance on government as the major source of growth, instead directing focus on consumption and investment.

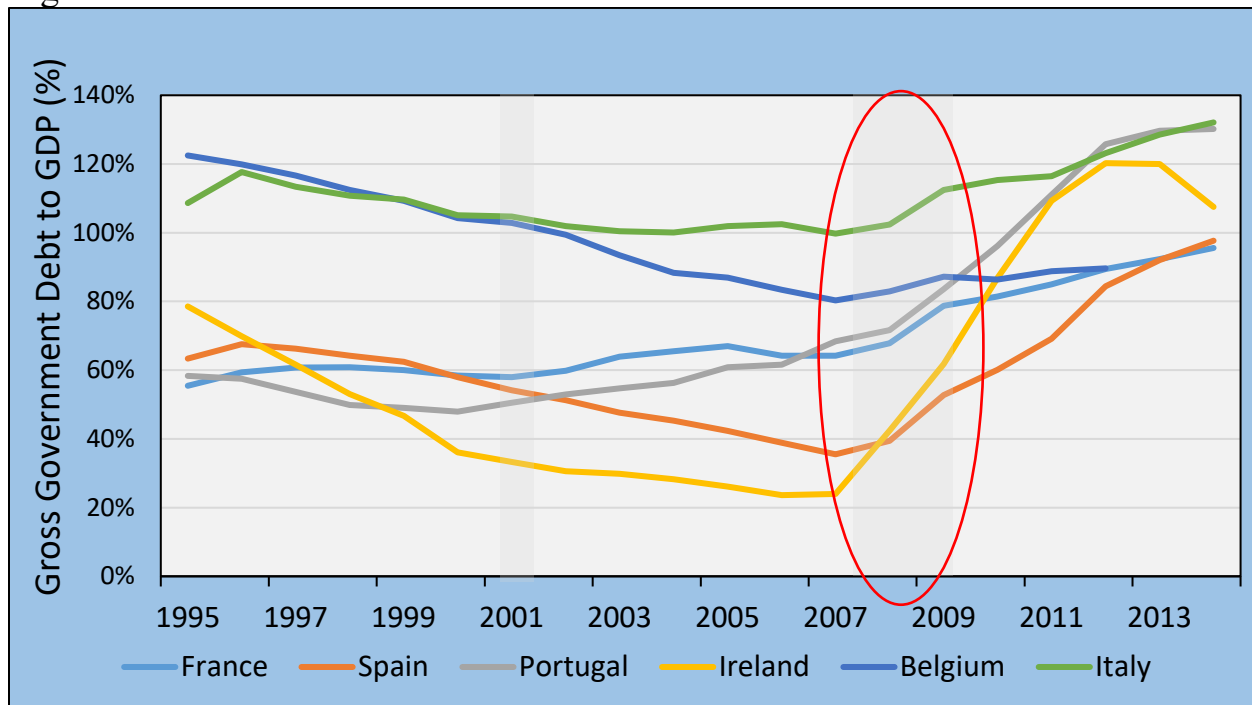
Figure 1: Real GDP Growth EU Nations



Source: World Bank

Figure 1 illustrates EU GDP growth levels from 1995 to 2010. Prior to the Great Recession, the EU was growing around 3-4% annually, a healthy level for economically mature countries. The Recession dented this growth however, and these nations have yet to see their growth levels recover. In fact, the EU is expected to grow at just 1.5% this year, an abysmal rate. Portugal, Spain, Italy, and Ireland have all been forced to implement strict austerity measures to qualify for additional loans. This has further hurt growth prospects, as government spending accounts for a much larger part of these economies. Slow growth in China and emerging markets has also hurt the Eurozone, despite a weaker Euro over the past few years.

Figure 2: EU Nations Government Debt Levels

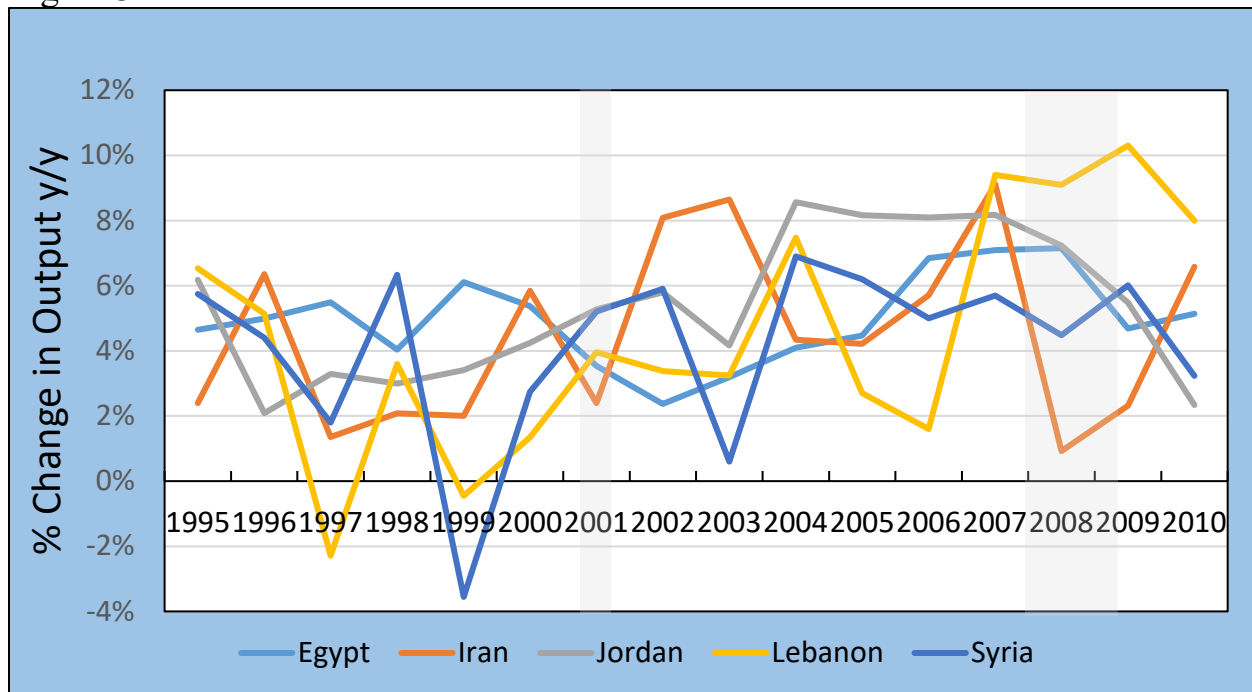


Source: World Bank

Figure 2 illustrates the notable increase in EU government debt-to-GDP levels post-recession.

While Ireland has made strides towards reducing their debt levels, other nations have continued with deficit spending. It is also worth noting that for the EU, 40% of GDP comes from the government, as a result of the wealth of social programs offered. Greater government debt has several notable effects on the economy and the financial sector. Theoretically, higher levels of government debt are associated with higher interest rates, as it crowds out other investment avenues. The government must therefore pay higher interest rates to attract capital. This has not been the case in the Eurozone however, with government bond yields so incredibly low as a result of quantitative easing, a low global interest rate environment, and flights to quality during times of economic uncertainty.

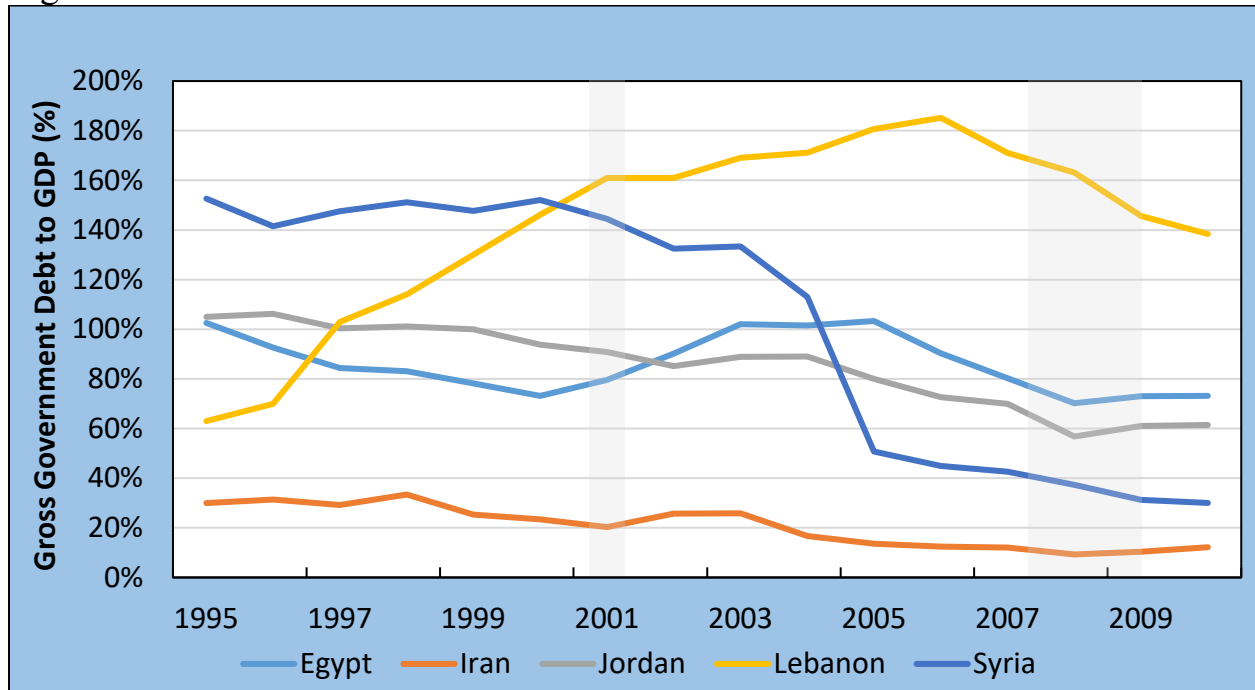
Figure 3: Real GDP Growth Middle East Nations



Source: World Bank

Real GDP growth in these Middle Eastern nations has varied, with several countries experiencing solid growth in times of global recession. Despite long term economic sanctions, Iran's economy has been able to perform quite well through 2010. Lebanon, devastated with a 15-year civil war which ended in 1990, has continued to be mired in political problems and continued violence, including a war between Hezbollah and Israel in 2006. This has hurt growth prospects but the economy has shown to be particularly resistant to these factors. Syria and Egypt trudged along at relatively slow rates of growth under autocratic systems of government and high levels of corruption. Jordan has also witnessed slowing growth stemming from uncertainties associated with regional conflicts, low public investment, and slow structural reforms. This particular set of countries is particularly interesting to look at as they all have economies in which the government plays a strong role.

Figure 4: Middle East Nations Government Debt Levels



Source: World Bank

Figure 4 illustrates government debt-to-GDP levels for 5 Middle Eastern countries, demonstrating that for the most part, debt levels have been steadily declining. Lebanon and Syria have both significantly reduced their debt levels, following massive war time spending.

The last 20 years have been a witness to dramatic changes in the global economy, notably growing economic interconnectedness, greater access to debt markets for developing nations, and two recessions. This makes it a particular interesting time period to study, as governments are struggling to decide what they must do regarding their significant debt burdens. Increasing government debt levels has frequently been regarded as a necessary evil in difficult economic times, but bringing these levels back down is always the greater challenge. Scaling down government spending can have major political implications that may overshadow the potentially negative effects on growth of not doing so.

Literature Review

The relationship between debt and growth has drawn much controversy in past years, drawing numerous academics to study this topic. A number of papers find a negative relationship between gov't debt and GDP growth when debt-to-GDP is above 90% (Reinhart & Rogoff 2010; Kumar & Woo 2010; Checchetti et al. 2011). Reinhart & Rogoff (2010), in their widely criticized study, point out that debt levels above 90% take away approximately 1 percent from median growth rates, while average growth falls considerably more. These findings were widely used to support austerity policies, to the chagrin of a wide array of critics. In an attempt to counter the study, other academics cited that the paper used flawed methodology and that the results did not reflect the underlying data. Herndon et al. (2013) was one such study that challenged the Reinhart and Rogoff findings, arguing that when correcting for a coding error and using a different weighting for the data, the debate on appropriate debt levels remains open. Subsequent papers by Reinhart and Rogoff and the International Monetary Fund countered these points however, and proved that the methodology and results were indeed sound.

Building on the findings of Reinhart and Rogoff (2010), Swamy (2015) attempted to break down the analysis to countries within certain debt thresholds and political systems. Controlling for these factors, it was concluded that overall, every 10% rise in debt-to-GDP costs 10-30 basis points in GDP growth. Not all the literature supports these findings however, and some academics have proposed that reverse causality may also exist.

Krugman (2010) takes this position, arguing that low growth leads to higher government debt, citing the example of Japan. Decades of economic stagnation have led the Japanese government to engage in massive stimulus efforts, pushing public debt to unprecedented levels in an effort to jump start inflation and growth. This has proven largely unsuccessful in fueling

sustained growth or even inflation, as the effects of an aging and declining population take their toll. Japan is also a unique example, with some of the highest public and private debt levels in the world.

Other studies, such as Pescatori et al. (2014) conclude that the effect of debt on growth is much more muted than other studies suggest and that the effect is actually more on the volatility of output. Interestingly enough though, Minea & Parent (2012) find that the negative correlation between government debt-to-GDP and growth reverses when public debt surpasses 115% of GDP. While these findings appear surprising, the authors do acknowledge however, that further evidence is needed before making policy recommendations and that the relationship between debt and growth is subject to complex nonlinearities. Generally though, it is accepted within the academic community that too much debt hinders long term growth prospects.

Observing this relationship in emerging economies, Reinhart and Rogoff (2010) find that the debt thresholds are much lower and that as debt levels rise, so does inflation. Kourtellos et al. (2013) however, find that public debt and economic growth are weakly correlated in countries with weak political institutions. This may render studying emerging economies in the Middle East a challenge in terms of drawing real conclusions. Output volatility may be more associated with political factors than higher levels of government debt.

Baum et al. (2013) drew a particularly interesting conclusion focusing on the Euro Area alone, finding that debt has a non-linear effect on growth, resulting in typically lower growth when debt-to-GDP levels exceed 95%. This goes in line with multiple aforementioned studies and renders the EU Area a good case example given its high level of public debt.

This paper aims to contribute to the ongoing debate on this important issue. Given the profound policy implications of this issue, the discourse on the subject will likely continue. As

debt levels continue to rise in the world's industrialized nations, debt containment strategies will be fiercely debated. Such debate will be especially pronounced, given the global economy remains in a period of prolonged recessionary hangover and is subject to financial market volatility.

Data

This paper uses panel data from the World Development Indicators between the years of 1995 to 2010 for 6 EU nations: Italy, France, Belgium, Spain, Portugal, and Ireland, and 5 Middle Eastern nations: Egypt, Iran, Syria, Lebanon, and Jordan. During this time period, two recessions occurred, making it an interesting time horizon to analyze. Furthermore, data for those years is quite complete, resulting in few omitted observations. The dependent variable is GDP growth, and the independent variable of focus is gross government debt-to-GDP. Other variables include unemployment, inflation, real interest rate, trade as a % of GDP, sum of household and government consumption expenditures, GDP per capita, and population growth.

Changes in total government and household consumption expenditures capture growth quite effectively, as they are two major factors of GDP. As such, a rise in FCE should have a positive impact on GDP growth.

GDP per capita provides a picture of a nation's income levels. A higher level of national income, up to a certain level, should be positively correlated with growth.

Higher levels of inflation can subtract from growth yet deflationary periods are of much more worry. Europe has experienced relatively low levels of inflation over the past few years, in contrast to relatively high levels in the Middle East. Inflation that is too low sparks fears of

deflation, which indicates an economy is in contraction. Inflation that is too high is also bad for growth as it can be tough to reign in and it hurts consumers with higher prices.

Population growth has an interesting relationship with economic growth. Generally, measured population growth allows for a steady increase in both workers and consumers. When population growth outpaces productivity though, this trend can reverse. Additionally, population growth that is too high can put a strain on resource availability and can hurt growth. The EU has long been an epicenter for immigration and it has wrestled with how much of it is conducive to growth. In the Middle East, 50 years of rapid population growth has been coming to an end over the past decade as a result of a declining fertility rate. At the same time, many of these countries have a large youth population, which has been associated with high youth unemployment. As a result, the relationship between population growth and growth is particularly interesting in this region.

Higher real interest rates are typically correlated with better performing economies, as central banks lower interest rates in times of economic distress. Following the economic crisis, central banks around the world slashed interest rates in an attempt to stimulate borrowing.

Trade as a percentage of GDP is important to look at for these two sets of these countries as they are all mostly dependent on trade. Export driven economies will be impacted by changes in trade volumes.

Unemployment has been a major issue in both the EU and the Middle East affecting GDP growth. High levels of youth unemployment have been a major problem in both regions. The labor market in the EU continues to suffer from the recessionary hangover and sustained high levels of unemployment. In the Middle East, political instability and poor education have contributed to both unemployment and underemployment, holding back growth prospects.

Data limitations include some omitted variables for the Middle East, mostly in terms of real interest rate. Quality of data for the Middle East may also pose problems, as these countries typically have a large informal economy that is not officially measured and government resource limitations can affect growth calculations.

Model

The model used resembles the one used by Swamy (2015). Panel least-squares method is used to run regression on the data.

$$\text{GDPgrowth} = b_0 + \beta_1 \text{GovDebt} + \beta_2 \text{fce} + \beta_3 \text{GDPpercapita} + \beta_4 \text{infl} + \beta_5 \text{pg} + \beta_6 \text{rir} + \beta_7 \text{tgdp} + \beta_8 \text{ulf} + \varepsilon$$

<u>Symbol</u>	<u>Description and Expected Sign</u>
ggdDEBT	Gross government debt-to-GDP (-)
fce	Total government and household consumption expenditures (+)
GDP per capita	GDP divided by population (+/-)
infl	Growth rate of implicit GDP deflator (-)
pg	Annual population growth (+)
rir	Real interest rate measured by the GDP deflator (+)
tgdp	Trade (exports-imports) as a % of GDP (+/-)
ulf	Unemployed persons as a % of total labor force (-)
ε	Standard error term

Results

Figure 5: EU Nations regression results:

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.055403	0.024905	2.22462	0.0302
FCE**	3.77E-14	1.44E-14	2.618686	0.0113
GDP_PER_CAPITA***	-3.23E-06	1.06E-06	-3.061253	0.0034
INFL	0.040449	0.2352	0.171977	0.8641
PG	-0.750089	1.401623	-0.535157	0.5947
RIR***	-0.412887	0.145374	-2.840171	0.0063
TGDP***	0.103647	0.025452	4.072232	0.0001
ULF	0.110712	0.076068	1.455439	0.1511
DEBT_TO_GDP***	-0.037163	0.013667	-2.719282	0.0087
<i>R-squared</i>	<i>0.581377</i>	<i>Mean dependent var</i>		<i>0.031879</i>
<i>Adjusted R-squared</i>	<i>0.521573</i>	<i>S.D. dependent var</i>		<i>0.028915</i>

*, **, *** denote significance at the 10%, 5%, and 1% levels respectively

The regression results show that several variables are significant, notably debt-to-GDP. In the EU, for every 10% increase in government debt-to-GDP, 37 basis points are shaved off of GDP growth. Real interest rates, trade, government and household consumption expenditures, and GDP per capita are also found to be significant.

Government and household total consumption expenditures were found to have a very small, yet statistically significant, positive impact on GDP growth. Such a small coefficient may

be a result of the relatively small amount of countries included in the study and the limited time period. Additionally, it is an indicator that other variables have a much greater impact on growth.

Higher real interest rates were surprisingly associated with lower rates of growth, with a high coefficient of -0.41. This can be a result of lags between economic growth and monetary policy actions, indicating they may not be directly correlated. Central banks will typically wait until after there are serious improvements in the economy before beginning to gradually raise rates. Extremely low interest rates in the EU post Great Recession may also skew the results. The ECB slashed interest rates to near zero following the crisis and growth responded little. This is a possible explanation for the unexpected sign of the coefficient and its significance.

An important consideration when observing these results is the effect of Great Recession, which resulted in notable reductions in GDP and tax revenues, naturally causing debt-to-GDP levels to rise. This could make the effect of higher debt on growth appear larger than it actually is if we excluded this time period. Analyzing the relationship over a longer period of time could yield more credible results. At the same time however, studying the effect of the recession is key to understanding the effects of higher debt on fiscal policy outcomes which affect growth.

Trade as a % of GDP has a strong positive relationship with GDP growth, which is to be expected in Europe's export driven economies. Every 1% increase in trade as a % of GDP adds 10 basis points to GDP growth. As a result, the ECB keeps a close eye on not only inflation, but on the Euro. During the early parts of the recession, the Euro plunged relative to the dollar before mounting a comeback throughout 2009. In 2014, the Euro fell once again and has remained weak relative to the US dollar. This has stirred hopes that growth in trade can positively impact the Eurozone and lead to sustained economic growth.

Figure 6: Middle East Nations regression results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.001313	0.031103	0.042207	0.9665
FCE***	5.11E-13	1.83E-13	2.789174	0.0074
GDP_PER_CAPITA	2.15E-06	3.10E-06	0.693359	0.4912
INFL	-0.0073	0.0929	-0.07856	0.9377
PG	0.165613	0.400305	0.413717	0.6808
RIR	-0.04867	0.07962	-0.61133	0.5437
TGDP***	0.058621	0.020763	2.823378	0.0068
ULF	-0.18247	0.239988	-0.76033	0.4506
DEBT_TO_GDP	-0.00456	0.011242	-0.40563	0.6867
<i>R-squared</i>	<i>0.325847</i>	<i>Mean dependent var</i>		<i>0.047845</i>
<i>Adjusted R-squared</i>	<i>0.220097</i>	<i>S.D. dependent var</i>		<i>0.026694</i>

*, **, *** denote significance at the 10%, 5%, and 1% levels respectively

Results are found to be statistically insignificant for the Middle East countries, which is consistent with Kourtellos et al. (2010), which finds that the correlation between debt and GDP growth is inconclusive in countries with weak political institutions. Only trade and government and household consumption expenditures are found to be statistically significant. Data availability issues resulted in some omitted variables. In addition, the data is not entirely reliable.

FCE and trade as a % of GDP were both found to have a small, yet statistically significant impact on GDP growth. An extremely low r-squared value of just 0.32 also indicates

the model fails to explain changes in the data. Multiple regressions were attempted yet none yielded any decent results.

The lack of a significant relationship between government debt-to-GDP and growth may not be entirely surprising for this set of countries though. Out of these 5 countries, only 1 has a debt-to-GDP level above 90% through 2010. While some of the countries dabble above the 90% range, the majority of debt-to-GDP observations remain below the 90% threshold for the entire time period. This is consistent with the findings of Reinhart and Rogoff (2010), who found that there is no definable relationship between debt and growth below the 90% level.

Discussion of Results and Policy Implications

Results for Euro area countries are consistent with expectations, that higher levels of government debt, when government debt levels are at least above 90% of GDP, hurt economic growth. Governments in the Eurozone have responded to calls for austerity, dampening growth in recent years. The wealth of social programs offered have also forced governments to find ways to fund them, including raising taxes and increased deficit spending.

Ultimately, government cannot be a permanent source of growth. Certainly, when consumers cut their spending during a recession, the government can play a role in stimulating growth by increasing fiscal spending, but this is temporary. Consumption and investment are the backbone of economic growth. When the government steps in, it is simply redistributing spending from consumers to the government. Higher levels of government debt also theoretically increase interest rates due to crowding out and eventually result in calls to cut deficits.

The debate between stimulus and austerity post-recession has proven highly controversial. Monetary stimulus in the form of quantitative easing in both the EU and the US

has further thrown fiscal policy into the spotlight, as policies pursued by governments and central banks have often diverged. While most EU governments have attempted to slash deficits in recent years, often with little success, the ECB has been steadfast in its commitment to pursue additional monetary easing. In March, ECB President Mario Draghi announced further monetary stimulus, owing to persistently low inflation and growth in the EU and concerns over financial market volatility.

At the same time however, concerns over Eurozone debt levels continue to generate much debate as to the path forward for governments in the bloc. In the summer of 2015, the Greek debt crisis raised concerns over the future of the EU, yet it was eventually resolved after a new debt deal was negotiated. Austerity has been the most popular policy pushed forward by the IMF and donor countries in the EU, a policy that has hurt growth. As government spending decreases, a significant portion of the economy is affected, dampening growth prospects. As GDP contracts, debt-to-GDP levels appear even higher, leading to stronger demands for austerity. This is indeed a vicious circle for debt-riddled countries to attempt to get out of.

As for the Middle East, political realities continue to pose a major threat to growth. Lebanon neighbors war-torn Syria and has been overwhelmed with an influx of refugees. Terrorist attacks also continue to occur in Lebanon and Egypt, hurting tourism and driving uncertainty. Instability can be devastating for growth as it detracts from investment, consumption, and other growth drivers. Government debt-to-GDP levels do not appear to be a major concern in these countries. Rather, the major objective is to stimulate sustainable economic growth and address demographic challenges (youth unemployment and dissatisfaction).

Governments will continue to be seen by their constituents as the spender of last resort in a time of recession. While this can be important to stimulate near-term growth, governments must have an effective plan to jumpstart economic recovery when needed then scale back spending to acceptable levels. To add to this, fiscal policy is rendered more effective if it goes along with monetary stimulus. Over the last few years however, policies have not always synced up, hurting growth. Given the adverse effects of high levels of debt found within the EU, it is important that countries with growing levels of debt act quickly and decisively to address their fiscal problems. Not doing so can result in greater output volatility and ultimately, slower long-term economic growth.

Bibliography

Baum, Anja, Cristina Checherita-Westphal, and Philipp Rother. "Debt And Growth: New Evidence For The Euro Area". *Journal of International Money and Finance* 32 (2013): 809-821. Web.

Cecchetti, Stephen, Madhusudan Mohanty, and Fabrizio Zampolli. "The Real Effects Of Debt". *Bank for International Settlements Working Papers* 352 (2011): n. pag. Print.

Clawson, Patrick. "Demography In The Middle East:". *Washingtoninstitute*. N.p., 2009. Web. 19 Apr. 2016.

Federal Reserve Economic Data. Accessed 2016.

Herndon, T., M. Ash, and R. Pollin. "Does High Public Debt Consistently Stifle Economic Growth? A Critique Of Reinhart And Rogoff". *Cambridge Journal of Economics* 38.2 (2013): 257-279. Web.

Kourtellos, Andros, Thanasis Stengos, and Chih Ming Tan. "The Effect Of Public Debt On Growth In Multiple Regimes". *SSRN Electronic Journal* n. pag. Web.

Minea, Alexandru and Antoine Parent. "Is High Public Debt Always Harmful To Economic Growth? Reinhart And Rogoff And Some Complex Nonlinearities". *CERDI* 18 (2012): n. pag. Print.

Pescatori, Andrea, Damiano Sandri, and John Simon. "Debt And Growth: Is There A Magic Threshold?". *IMF Working Papers* 14.34 (2014): n. pag. Web.

Reinhart, Carmen M and Kenneth S Rogoff. "Growth In A Time Of Debt". *American Economic Review* 100.2 (2010): 573-578. Web.

Swamy, Vighneswara. "The Dynamics Of Government Debt And Economic Growth". *SSRN Electronic Journal* n. pag. Web.

Woo, Jaejoon and Manmohan S. Kumar. "Public Debt And Growth". *Economica* 82.328 (2015): 705-739. Web.

World Development Indicators Databank. World Bank. Accessed 2016