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# **Causes and Consequences of the Greek Current Account Crisis and Estimates of the Current Account Balance**

Research Methods in Economics

Zachary Derrera

May 5, 2016

## Abstract

In this paper I examine the role Greece has played in the recent global financial crisis, specifically as it relates to their own current account predicament. I will identify the causes of the Greek debt crisis, as well as analyze empirically several main components of the decline in the current account. I will also put to use some basic econometric models to forecast potential long-run outcomes of the situation. Greece has been at the forefront of the global financial crisis since it became evident in 2009 that the country's public debt was not sustainable. In the years leading up to the global recession, Greece borrowed heavily to finance the government budget. However, because of weak enforcement of revenue collection, inflexible economic structures and a number of other issues, the debt began to accumulate. In addition, the European Union's (EU) weak enforcement of rules concerning deficit ceilings has also contributed to what has become a serious sovereign debt crisis involving other Eurozone countries. After several attempted bailouts by the EU and IMF, numerous other rescue plans have been proposed, all with varying degrees of success. I will study these policy adjustments to identify the potential consequences the Greek crisis will have on other Eurozone countries, the United States, and the rest of the world.

## Introduction

Since November 2009, Greece has been at the forefront of the global financial crisis when it became evident that the country's public debt could not be supported any longer. However, the public debt crisis that has now morphed into the current account crisis we see today began long before 2009. Historically, Greece has had high levels of inflation and low economic policy credibility. In 2001, they were among the first countries to start using the euro, but the last to join the Eurozone. By aligning their own monetary policy goals with those of the European Central Bank (ECB), they were able to reduce inflation and subsequently the nominal interest rates, which, in turn, increased their ability to borrow and lend. This led to an increase in private investment, further stimulating the real growth rate. However, during this period, the government failed to take advantage of the low inflation, increasing the share of government spending and running fiscal deficits of 6% of GDP on average (see Kouretas, 2012).

In order to join the Eurozone, a country had to demonstrate "economic convergence". One of the requirements for the economic convergence was the budget deficit could not exceed 3% of GDP. Greece hid its economic problems from fellow Eurozone members, and as the 2004 Olympics approached more problems were uncovered. After a new government came to power under Prime Minister Konstantinos Karamanlis, they realized the budget deficit was 8.3% of GDP, five and a half times larger than the 1.5% originally reported (see Melvin, 2015). The Olympics came and went and the government continued to hide their troubles from the EU. With the global recession originating in the United States in 2008, it spread quickly to Europe where countries like Spain, Ireland, and

Portugal were hit especially hard, but none were as ill prepared to deal with an economic disaster as Greece.

By 2009 Greece's budget deficit was estimated to be about 13% of GDP. This sudden increase in public debt can mostly be attributed to the government's excessive borrowing to finance the growing private debt that was accumulated during the turmoil of the early 2000's. Another main contributing factor was the fact that the Greek tax collection system completely collapsed. People stopped paying taxes and the government stopped enforcing the laws. Additionally, investor confidence was rattled and the country's credit rating was downgraded which increased the cost of borrowing. In turn, the IMF, European Commission, and ECB intervened to prevent the situation from getting out of control. In May 2010 a three year 110 billion euro bailout plan was announced, with conditions that Greece create their own three year plan to cut its budget deficit (see Nelson, 2011). Part of this plan to save money involved laying off many government workers. As unemployment rose tax revenue continued to fall.

In 2012, with unemployment hovering around 30% and amount owed to international lenders a startling 135% of GDP, an austerity program was put in place and the government accepted another 246 billion euro loan (see Melvin, 2015). Debt relief was needed badly but negotiations were going nowhere as the international lenders and Alexis Tsipras's finance minister, Yanis Varoufakis, were not getting along. By June of 2015 negotiations came to a complete halt with Greece on the verge of leaving the Eurozone. In July capital controls were implemented to prevent the banks from running out of money after the ECB ended its emergency funding to Greece. Most recently, in August, Greece and its creditors agreed to a third bailout that included spending cuts to avoid

bankruptcy and an exit from the Eurozone. A Greek exit from the Eurozone could have drastic consequences for other Eurozone members, as well as the United States.

## Literature Review

In the following several pages I draw on existing literature to help explain the causes of the gradual deterioration of Greece's current account position. As mentioned before, by adopting the euro, Greece was able to reduce inflation and trim down the nominal interest rate. The euro reduced any uncertainty associated with the exchange rate, as well as cutting costs of financing the public debt linked to the nominal interest rate. Following the euro adoption, many households perceived an increase in their disposable incomes due to wider fiscal deficits, which ultimately boosted private consumption and reduced private saving. As Kouretas (2012) points out in his study of the ECB Quarterly Euro accounts from 1999 – 2010, there were times when the private deficit increased by a large margin in the Eurozone, and other times when it actually fell at an increasing rate.

Typically, the periods of rising deficits coincided with economic growth, in particular between 2005 and 2007, during which time the average annual increase in private debt in most Eurozone countries was around 35% of GDP. On the whole, he observes the increase in private debt compared to public debt was substantial.

Greece's inability to reduce the budget deficit to below 3% of GDP meant they were to be put under fiscal control by the EU in 2004, with a small reprieve in 2007. A major source of the economic shocks was simply the fact that the fiscal policy of the Greek government was pro-cyclical in nature. Greek households were overly optimistic about rising future incomes which led to more borrowing and consumption, eventually pushing

the government and private consumption to over 90% of GDP by 2009 (see Kouretas, 2012). The strange thing about this is that by joining the Eurozone Greece gave up a lot of control of their monetary policy, especially regarding exchange rates. This was expected to act as a sort of stabilizer but it never happened. Part of the problem with the pro-cyclicality of the fiscal policy, in addition to the increased government spending, was lower taxation. That, coupled with the perceived permanent rise in household incomes, created what is called the twin-deficits (see Monokroussos, 2012). This comes from the Keynesian hypothesis that a higher fiscal deficit generally goes hand in hand with a rising current account deficit.

In their study of the recent fiscal imbalances and competitiveness of Greece, Monokroussos and Thomakos (2012) point to several major factors that have contributed to Greece's current account deterioration. One such factor has been a lack of economic competitiveness with their main trade partners, a problem that is fundamentally related to the real exchange rate. When the real exchange rate appreciates the domestic currency is worth more in terms of foreign goods. Therefore, it increases the domestic country's level of consumption leading to an increase in exports. Conversely, the domestic currency is worth less in foreign markets, so exports will decrease. When Greece adopted the euro it amplified this problem because now it was one of many countries using the same currency. If the euro suddenly appreciates then all of the countries in the Eurozone (those that use the euro) will experience a decrease in their current account position. The effect is then magnified.

Some of the loss of competitiveness can also be attributed to a reallocation of capital and labor away from the public sector, especially the export sector. An increase in public

sector wages drew many people away from the private sector, and because the government provided most of the business contracts the private sector became too dependent on the government for funding of projects. Rather than doing their own research, development and innovation, Greece became more import oriented. Imports reduce the current account.

Other components of the declining Greek current account include increasing financial integration, financial liberalization, and convergence. When a country becomes more involved in the world financial markets there is greater capital mobility, meaning capital moves from the more advanced, well-developed countries to those that are more capital scarce. Greece was one such country that capitalized on the financial liberation created by the euro in order to attract foreign savings to finance their domestic investments. This translated to an increase in domestic investment and a decrease in domestic saving for Greece (and other developing countries), but an increase in savings for most other core Eurozone countries. Again, lower savings means a higher current account deficit, but prior to the onset of the global recession, this was not seen as a major problem because of the convergence factors referred to above. It was believed that Greece, by reaching a higher level of economic development, would be able to repay these growing foreign liabilities through an increase in exports. Due to the unrealistic expectations about future incomes, and neglect by core Eurozone lenders, the situation got out of control (Monokroussos).

A further reduction in the private savings rate can also partially be explained simply by macroeconomic uncertainty. High inflation volatility should theoretically reduce future

consumption in favor of current consumption. Recent empirical evidence and the high inflation environment of Greece back up this claim.

In the IMF Working Paper by Medina, Prat and Thomas they use the IMF's Consultative Group on Exchange Rate Issues (CGER) to calculate equilibrium current account balances for a sample of 33 emerging market economies mostly in South America and Southeast Asia. In their model they include the net stock of foreign assets and ratio of foreign direct investment to output as variables, in addition to an Asian crisis dummy where they look at the countries seriously affected by the 1997 crisis. Their definition of equilibrium consists of both internal and external balance, where internal balance is associated with a zero output gap for the economy and external balance is associated with a current account balance and a sustainable net foreign asset/liability position (see Medina, 2010). They find that two-thirds of the countries estimated have a current account deficit, due to structural changes in their savings behavior. Unlike this paper, I am focused solely on the current account balance of Greece, and I neglect to include financial variables such as stocks of foreign assets or foreign direct investment. However, I also include a dummy variable to account for the effects of a time period of interest, and I fully expect Greece's savings behavior to affect their current account balance.

The studies by Kouretas, Monokroussos and Thomakos all attribute the decline of the Greek current account mainly to various fiscal or monetary policies, but there seems to be a deeper problem. In my study I look at certain demographic and social factors, such as age dependency ratio, population growth and tax evasion, as the main driving force of the falling current account position of Greece. A large aging population in a country like

Greece is likely to have a significant negative effect on the private savings rate. Elderly people and other dependents that consume more than they produce contribute to dissaving in the economy. A greater portion of the country's population depends on the more productive members of the economy for the goods they consume. As more of the working population ages and exits the workforce there will be a reduction in private investment, as well as a decline in the current account. It seems that this increase in consumption is directly related to the large increase in public debt that occurred in the early 2000's and now into the current decade.

Tax evasion in Greece from the mid 90's and on has been a major problem. Part of this is due to the negative attitude many Greek's have toward entrepreneurs. In a study published in 2009 by the European Commission Entrepreneurship's Survey, according to Kouretas (2012),

*“Based on the answers of the people questioned it is shown that the positive answers on the questions “Entrepreneurs think only about their wallet” and “Entrepreneur exploit other people's work” were more than those given in communist China.”*

The Greek political landscape over the last 3 or 4 decades has seen a rise in highly conservative socialist parties that tend to put a high value on public sector work. The average person now looks for work there rather than the private sector, as payment has no bearing on productivity and vice versa. Trade off of votes for jobs has had a negative effect on the economy's competitiveness. The World Bank ranks Greece 109<sup>th</sup> out of all countries in terms of difficulty for entrepreneurs to start a business (Kouretas). The best way to understand the magnitude of the tax evasion is to simply look at the change in tax revenue over time.

Greece was also one of the countries that suffered from the rising oil prices in the late 90's and early 2000's. They are one of the world's largest oil importers, and consequently one of the most energy dependent nations in the world. Much of their export revenue comes from shipping, so large fluctuations in oil and shipping prices will have adverse effects on the current account.

In the following section I empirically analyze the current account situation in Greece by seeing how the aforementioned demographic and social factors such as dependency ratios and population growth, and important financial factors such as tax revenue, energy usage (in particular the world oil prices), GDP per capita growth and central government debt, all interact to affect the current account. By seeing how these different elements change over time I hope to better understand the Greek situation and help determine potential long-term solutions.

## Empirical Analysis

Before going too much further, a formal description of the current account should be provided. The current account constitutes one half of the balance of payments, with the other half being the capital account. The balance of payments is a record of all payments between one nation and the rest of the world. The current account tracks all payments for goods and services, and all factor payments. More specifically it tracks exports and imports of goods, which is known as the balance of trade, and it also tracks exports and imports of services, also called the balance of services. The current account and capital accounts must always balance, hence the balance of payments. Therefore we have,

$$BOP = CA + KA = 0$$

where CA is current account and KA is capital account.

There are two approaches to defining the current account: 1) the absorption approach, and 2) the savings-investment balance approach. To derive these equations one should recall the national expenditure approach to GDP,

$$Y = C + I + G + X - M$$

where Y is the total output of a country (GDP), C is consumption spending, I is investment spending, G is government spending, X is total exports and M is total imports.  $X - M$  is net exports, also known as the balance of trade. Solving for net exports in the national expenditure equation we get  $X - M = Y - (C + I + G)$ . This is the absorption approach to defining the current account, where Y is output and  $(C + I + G)$  is expenditure.

In the savings-investment balance approach we must recall that disposable income is  $Y - T = C + S$ , where T is taxes, C is again consumption spending and S is savings. Solving for Y we see that output is equivalent to the sum of consumption spending, savings and taxes  $Y = C + S + T$ . We know that Y is equal to  $C + I + G + (X - M)$ , and as we see above, it is also equal to  $C + S + T$ . We can now set these two equal to each other and simplify. We are left with

$$I + G + (X - M) = S + T \text{ or } \square(X - M) = (S - I) + (T - G)$$

This is our savings-investment balance approach to the current account. This approach tells us that the balance of trade is equivalent to net private saving  $(S - I)$  plus net public saving  $(T - G)$ , together that make up national saving. As these two approaches relate to the Greek crisis, we will be mostly concerned with the savings-investment balance approach. A lower private savings rate due to a perceived rise in permanent income

mentioned before, coupled with tax evasion and ever increasing government spending has lead to a rapid decline in the current account over the last three and a half decades.

I will now introduce the explanatory variables used in my empirical analysis and discuss how they relate to the current account. In my model I focus on Greece from the period 1980 to the present. I am mostly concerned with 2008 to 2014, the years coinciding with the global recession. I provide estimation results with graphs and tables that follow in the appendices. My sample comes from data collected by the World Bank and used in their World Development Indicators. In the model I use seven explanatory variables: population growth by annual percentage of the population, age dependency ratio by percentage of the working age population, per capita GDP growth as an annual percentage, tax revenue as a percentage of GDP, oil rents as a percentage of GDP, and central government debt as a percentage of GDP. I also include a dummy variable to account for different time periods. The dummy equals 1 if it is during the global financial crisis (2008 to 2014) and 0 for 1980 to 2007, the decades before the recession.

I first look at population growth as a fundamental variable in my model. A country with high population growth is expected to run higher current account deficits because it should have a larger future workforce. This population growth accounts for all residents regardless of legal status or citizenship, except for refugees who are not permanently settled.

A second demographic variable used is the dependency ratio, of which there are actually two: the old-age dependency ratio and the young-age dependency ratio. The old ratio is for members of the population over the age of 65, while the young ratio is used for

members under the age of 16. In my model I combine the two into a single dependency ratio, shown as a proportion of dependents per 100 working-age persons. With a larger population of elderly people we can expect to see a reduction in national savings, and through the savings-investment balance approach, also a reduction in the current account balance. A larger population of young people should theoretically enhance future productivity, but we should still see a rising current account deficit in the present.

Per capita GDP growth is the GDP divided by the total population. This is a sum of the value of all products created and sold by a country's residents, including taxes but not including subsidies. A country like Greece should expect to see a lower current account because a higher GDP per capita generally indicates the potential for higher income, meaning there should be a lower level of savings in the present.

I also want to look at tax revenue as a percentage of GDP. In a country like Greece where tax evasion is a major problem we should expect to see a lower revenue rate as a percentage of GDP. According to the savings-investment balance approach this should reduce public savings at an increasing rate because the government is not getting any money from the population, but they continue to spend money as if they were. The sign on tax revenue should be positive, however, because as revenue increases, the current account balance should rise.

The fifth explanatory variable I look at is the central government's debt as a percentage of GDP. This is the entire stock of outstanding contractual obligations to other nations, including foreign and domestic liabilities. We should expect to see Greece have a very high government debt as a percentage of GDP. The government continues to spend money and invest abroad but foreign countries are not necessarily doing the same in

Greece. Couple that with tax evasion and the government debt should be at least over 100% of GDP and rising.

Another two factors I am interested in are oil rents and ease of doing business. Oil rents are the difference between the value of the oil produced and sold at world oil prices versus the total cost of producing that oil. For an oil importing country like Greece we should see the current account balance fall, especially with the higher world oil prices seen during the global recession. It simply will not be as efficient at producing oil as some of the major oil exporters of the world, implying production costs will exceed the revenue generated from selling at world prices.

Ease of doing business is tracked using the ease of doing business index. Countries are ranked from 1 to 189, with 1 having regulations that are most conducive to starting and running a business. The rankings are determined by finding a country's average percentile rank across a range of several indicators, including registering property, paying taxes, dealing with construction permits and getting credit. Until recently, Greece did not report this data on a regular basis, so the sample of their rankings would not warrant enough significance to be put in the regression model. However, it is worth mentioning because it is tied to politics and tax revenue. In a country like Greece that has a very negative attitude towards entrepreneurship, along with a historically tumultuous political landscape, we would expect a ranking in the lower half of this index.

When it is difficult to start private businesses, most of the working age population gravitates towards the public sector for work. This will reduce the current account because there will be less innovation and development done when there are fewer workers in the private sector, making the country more import oriented. Additionally,

when there are fewer private businesses that are paying taxes, there can only be an adverse effect on the current account. We find from the data most recently reported that in 2013 Greece was ranked 65<sup>th</sup> out of 189 countries. They moved up to 61<sup>st</sup> by 2014, so despite their negative attitude towards entrepreneurs and private business, they are still ranked in the top third of all the countries surveyed (see, Greece Improves in World Bank's "Doing Business" Report, 2014).

Using a multiple linear regression model with ordinary least squares for our estimators, most of the variables in the model have the expected signs predicted above. Logs were not necessary in this model, as the data collected for each variable is already given in percentage terms. The results are shown in the Appendix. Based on the goodness-of-fit measures I find the correlation coefficient to be .681, indicating a relatively strong relationship between the chosen variables and the current account balance. The R squared value tells us that 46.42% of the total variation in the current account balance is explained by a combination of the seven variables. Adjusting the R squared for the number of variables, however, we find that it actually falls to 31.99%. There are 7 variables and 34 observations in the model, one for each year from 1980 to 2014. The standard error of the regression is 3.841, indicating that the average distance from the data points to the fitted regression line is approximately 3.841%.

In interpreting the coefficients, the coefficient on population growth is found to be -3.059, meaning that for each additional percentage increase per year in the population of Greece, we can expect the current account to fall by about 3%. The error was 3.107.

Based on the p-value of 0.333 and the t-statistic of  $-0.985$ , I find the population growth to be not significant at the 1%, 5% or 10% levels.

The coefficient on the age-dependency ratio is  $-0.406$ , indicating that a 1% increase in the dependency ratio as a percentage of the working age population will reduce the current account by 0.406%. Error on this coefficient is  $.393$ . Again, this result is found to be not significant at the 1%, 5% or 10% levels based on the t-statistic and the p-value.

GDP per capita growth was the third variable analyzed. It has a coefficient of  $-0.195$ , meaning a 1% annual increase in the per capita GDP should reduce the current account by slightly less than 0.2%. It has a standard error of  $.341$ . This variable is also not significant at the 1%, 5% or 10% levels.

The coefficient on tax revenue as a percentage of GDP is also negative at  $-0.109$ . A 1% increase in tax revenue, according to the model, should reduce the current account balance by about a tenth of a percent. Standard error is  $.464$ . This is not the sign that was predicted, and it is not found to be significant at the 1%, 5% or 10% levels.

The next variable is total government debt as a percentage of GDP. This has the expected negative sign, but the coefficient is quite small, at  $-0.0195$  with an error of  $.076$ . A 1% increase in government debt should decrease the current account by approximately 0.2%.

This is not significant at the 1%, 5%, or 10% levels.

The last two variables are oil rents and years. The coefficient on oil rents is positive  $0.153$ , which is not the sign that was predicted. Since it is positive, this indicates that Greece is making more money from selling its oil than it is using to produce it.

Interpreting the coefficient, this means for every 1% increase in oil rents as a percentage

of GDP, the Greek current account balance will increase by 0.153%. Standard error was high at 7.034. Again, this is not significant at the 1%, 5% or 10% levels.

Years is the dummy variable where if the year falls between 1980 to 2007 it takes the value of zero, and if it falls during the global recession from 2008 to 2013 it takes the value of 1. The coefficient of the dummy is -7.735, meaning that if the year is between 2008 and 2013 then the current account balance is expected to be 7.735% lower on average than it was in the period 1980 to 2007, prior to the recession. This is the sign we expect. The dummy variable is significant at the 10% level but not at 1% or 5%.

## Conclusion

The regression results were not what I expected. The overall effect of my chosen variables on the current account balance was not as significant as I originally had predicted. In the original model none of the variables were statistically significant at the 1%, 5%, 10% or even the 33% levels, save for the dummy variable Years, which was significant at the 10% level. To obtain at least one significant variable I tried running several more regressions. The first type was a general-to-specific model where I started with all of the variables in the regression and one-by-one eliminated them until I found one that was significant at the 1% or 5% levels. In the model where I leave out central government debt, oil rents and the dummy, tax revenue returned a p-value of .0105, indicating significance at the 1% level. As I eliminated more variables from the model, population growth continued to be significant at the 1% level.

The second type of regression I tried was a specific-to-general model. Here, I started by regressing the dummy, Years, on the current account balance and then adding in more

variables to check which ones were significant. The dummy was significant at the 5% level the less variables that were in the model. One of these specific-to-general models is of particular interest. I regressed the dummy, oil rents and central government debt on the current account balance (results are shown in Table 4 of the Appendix). Both the dummy and the government debt variable were found to be significant at the 5% level, with p-values of .006 and .036 respectively. The coefficient of government debt was  $-.029$ , the coefficient of oil rents was  $-1.286$ , and the coefficient of the dummy was  $-5.234$ . This tells us that the current account balance declined by about 5.234% per year after 2008 when the global recession occurred. Additionally, for every 1% increase in government debt, the current account balance fell by .029% per year, and for every 1% increase in oil rents as a percentage of GDP, the Greek current account decreased by 1.286%. The sign on oil rents was as I had predicted before running the original model. As I added more variables to the model, the effect on the current account was not as great and they were no longer significant. These results indicate that, prior to these corrections, my original model suffered from multicollinearity. This is a phenomenon in which some of the explanatory variables are correlated with the response variable, as well as with other explanatory variables. I also attempted to correct for autocorrelation and heteroskedasticity by running both the White Test and the Breusch-Pagan Test. For the Breusch-Pagan Test I regressed the squared residuals on all of the explanatory variables. After doing this we get an R-squared of .9623 and p-value of .00006, which tells us we can reject the null of homoskedastic error terms and conclude that the error terms are heteroskedastic and incorrectly specified (TABLE 4). To confirm this we use the White Test, which involves regressing the predicted Y and predicted Y squared values on

the residuals squared. We get a p-value of .0764 telling us we have significant results at the 10% level, therefore we can reject the null again and conclude we have heteroskedasticity (TABLE 5).

The three variables: oil rents, the dummy and government debt are the three variables from my original model that were not associated with any kind of demographic measurement. They had more to do with shifts in economic policy, fiscal responsibility of the Greek government, and time. In a rather intuitive sense, this model can be explained by the simple fact that the longer the global recession goes on, the more debt the Greek government is likely to accumulate, and therefore the decline in the current account will be greater.

Two numbers from the original model stand out: adjusted and unadjusted R squared values. The adjusted R squared indicated only 32% of the variation in the current account is determined by the variation in the combination of the chosen variables. Evidently demographic factors such as population growth and dependency ratio are not as impactful as I originally thought. On the other hand, after changing the regression as outlined above, population growth and the dummy variable were both consistently found to be significant at the 5% level (and in certain cases at the 1% level as well).

A comparison to other countries affected during the recession may have yielded more interesting results. Spain, Ireland and the United States were all greatly impacted by the global recession, and factors chosen for the model may have had a larger impact on those countries than they did on Greece. Several data points were missing for a few of the variables, and the results would likely have been different, though how much different would be difficult to say.

Looking at the data we can see that starting in the 1980's the current account balance was actually negative until 1985 and then it hit a high point in 1987. It remained positive, though at a decreasing rate until 1995 when it suddenly turned negative. It continued to decrease, finally hitting its low point in 2008, coinciding with the onset of the global recession. Since then the current account balance has begun to increase slowly, which can do doubt be explained by the numerous bailouts and a recent austerity program put in place.

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## Appendix

*TABLE 1: Basic regression statistics (original regression)*

| <b>Regression Statistics</b> |         |
|------------------------------|---------|
| <i>R</i>                     | 0.68129 |
| <i>R-square</i>              | 0.46416 |
| <i>Adjusted R-square</i>     | 0.3199  |
| <i>S</i>                     | 3.84111 |
| <i>N</i>                     | 34      |

*TABLE 2: Model variables, including standard errors, upper and lower confidence levels, t-statistics, p-values and whether or not the null was rejected at the 5% level*

| <i>Variables</i>  | <i>Standard Error</i> | <i>LCL</i> | <i>UCL</i> | <i>t Stat</i> | <i>p-level</i> | <i>H0 (5%)</i>  |
|---|-----------------------|------------|------------|---------------|----------------|-----------------|
| <b>Intercept</b>  | 20.3329               | -18.6391   | 64.9508    | 1.1388        | 0.2651         | <i>accepted</i> |
| <b>Year (Dummy)</b>                                       | 4.2117                | -16.3929   | 0.9218     | -1.8366       | 0.0777         | <i>accepted</i> |
| <b>Population growth (annual %)</b>                       | 3.1065                | -9.4448    | 3.3262     | -0.9848       | 0.3337         | <i>accepted</i> |
| <b>Oil rents (% of GDP)</b>                               | 7.0341                | -14.3055   | 14.6123    | 0.0218        | 0.9827         | <i>accepted</i> |
| <b>Age dependency ratio (% of working-age population)</b> | 0.3928                | -1.2133    | 0.4018     | -1.0327       | 0.3112         | <i>accepted</i> |
| <b>Central government debt, total (% of GDP)</b>          | 0.0763                | -0.1765    | 0.1375     | -0.2552       | 0.8005         | <i>accepted</i> |
| <b>Tax revenue (% of GDP)</b>                             | 0.4640                | -1.0624    | 0.8450     | -0.2342       | 0.8166         | <i>accepted</i> |
| <b>GDP per capita growth (annual %)</b>                   | 0.3407                | -0.8957    | 0.5050     | -0.5732       | 0.5713         | <i>accepted</i> |
| <i>T (5%)</i>   |                       |            |            |               |                |                 |

*FIGURE 1: Estimated multiple linear regression model*

$$\widehat{CA} = 23.15584 - 7.73558Year(Dummy) - 3.05933popgrowth + 0.15338oil - 0.40576dependency - 0.0195debt - 0.10869taxes - 0.19533GDPgrowth$$

FIGURE 2: Residual vs. Predicted values of regressor in regression model

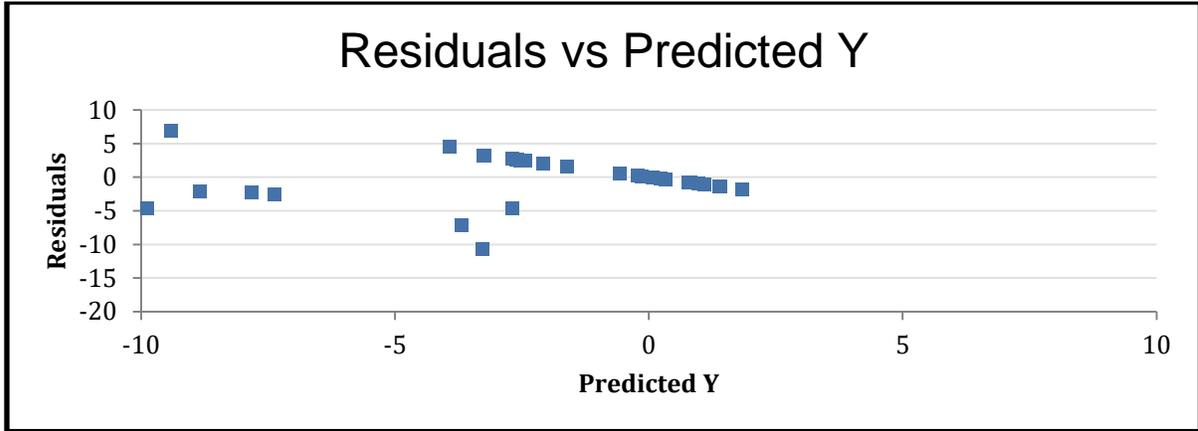


TABLE 3: New specific-to-general model with government debt, oil rents and the dummy variable. Significant estimators are debt and year.

| Variable   | Standard Error | LCL      | UCL      | t Stat   | p-level | H0 (5%)         |
|--|----------------|----------|----------|----------|---------|-----------------|
| <b>Intercept</b>                                 | 1.36338        | -2.23677 | 3.332    | 0.40166  | 0.69078 | <i>accepted</i> |
| <b>Central government debt, total (% of GDP)</b> | 0.01331        | -0.05649 | -0.0021  | -2.20009 | 0.03564 | <i>rejected</i> |
| <b>Oil rents (% of GDP)</b>                      | 5.75944        | -13.0485 | 10.47617 | -0.22331 | 0.8248  | <i>accepted</i> |
| <b>Year (Dummy)</b>                              | 1.77859        | -8.86711 | -1.60238 | -2.9432  | 0.00621 | <i>rejected</i> |

TABLE 4: Results of Breusch-Pagan Test

| Variable                |           | Coefficient | Standard Error | t Stat   | p-level | H0 (5%)         |
|-------------------------|-----------|-------------|----------------|----------|---------|-----------------|
|                         | Intercept | -5.2377     | 13.02593       | -0.4021  | 0.69814 | <i>accepted</i> |
| CA Balance (%GDP)       | 56.0332   | 0.13054     | 0.16267        | 0.80247  | 0.44546 | <i>accepted</i> |
| Population Growth       | -0.3068   | -0.35051    | 0.10333        | -3.39199 | 0.00947 | <i>rejected</i> |
| Age Dependency Ratio    | ..        | 0.13597     | 1.69552        | 0.08019  | 0.93805 | <i>accepted</i> |
| GDP per capita growth   | ..        | 0.03553     | 0.29281        | 0.12135  | 0.90641 | <i>accepted</i> |
| Tax revenue             | 0         | -5.21119    | 3.04054        | -1.7139  | 0.12489 | <i>accepted</i> |
| Central government debt | 0.9822    | -1.93977    | 1.10969        | -1.74803 | 0.11859 | <i>accepted</i> |
| Oil rents               | 17.9837   | -0.01324    | 0.23248        | -0.05695 | 0.95598 | <i>accepted</i> |
| Year (Dummy)            | 104.8106  | 0.01865     | 0.04469        | 0.4173   | 0.68743 | <i>accepted</i> |

TABLE 5: Results of White Test

|                          | <i>Coefficient</i> | <i>Standard Error</i> | <i>t Stat</i> | <i>p-level</i> | <i>H0 (5%)</i>  |
|--------------------------|--------------------|-----------------------|---------------|----------------|-----------------|
| <b>Intercept</b>         | 5.05343            | 4.59475               | 1.09982       | 0.28016        | <i>accepted</i> |
| <b>-2.52534689360782</b> | -5.22082           | 2.71189               | -1.92516      | 0.06374        | <i>accepted</i> |
| <b>6.377376933054666</b> | -0.37346           | 0.32315               | -1.15567      | 0.25694        | <i>accepted</i> |