The UK deficit-reduction strategy: evidence from 1979-2012

Name of student: Tim Williamson. *Programme*: BA Business Economics. *Year of study*: 3
Mentored by: Denise Hawkes

Abstract

This paper examines the current financial crisis and the various tax-and-spend policies that affect the government's deficit-reduction strategy. The theory surrounding this is the Ricardian Equivalence Theorem, as set out by Robert Barro. The data is from various government sources between 1979 and 2017 and used in regression analysis and comparative cash analysis. The results indicate that, whilst tax and net public spending have contributed materially to levels of net borrowing and budget deficits, the most controversial issue of VAT has very little impact. The findings show that the underpinning theory does not hold in the UK under normal boom-and-bust circumstances but that this unusual financial crisis might prove the exception to the rule. The conclusion from all of the regressions run show that the key driver to reducing the deficit is economic growth, counteracting the major political parties' traditional views of spending cuts or tax-and-spend policies.

Key words: Budget, deficit, economy, politics, VAT, research

Introduction

The 2008 financial crisis has had a devastating effect on the global economy and particularly on individual economies in the developed world. What started as a credit crunch soon developed into a banking crisis and has now established into a full-blown sovereign debt crisis. Following the 2010 general election, the new Conservative-Liberal Democrat coalition government issued an emergency budget with the aim of reducing the current budget deficit to zero. However, as a result of the crisis in the Eurozone, the attempt to reduce the deficit to zero has had a severe setback with the Office for Budgetary Responsibility and the International Monetary Fund both revising UK economic growth downwards. In 2010, the IMF anticipated 0.2% growth in 2012. However, in their latest figures, they predicted 0.4% contraction. (Source: IMF World Economic Outlook, 2012) This paper will look at the plan for the government to balance the budget. It will examine regressions that take into account the main receipts and expenditure of the government. The central argument is surrounded by the Ricardian Equivalence theory, which will be tested through regression analysis.

The Labour Opposition, as well as various business leaders and union leaders suggest that the quickest way to encourage the public to increase spending in the shops is to temporarily reduce VAT back to 17.5%. The claim is that, because alterations in income tax, national insurance and other direct taxes take too long to administer, VAT can be altered quickly and more effectively. As a result, there will be a focus on the impact of VAT on the deficit-reduction strategy. Finally, as well as regression analysis, the paper will look at the progress of the first two years of the deficit-reduction strategy by looking at specific cash receipts of the key components of the deficit, namely net borrowing and VAT. It will compare the 2011-12 receipts with the previous year to examine whether the government are on target to achieve their goal. The conclusion will sum up the results from the regressions and the cash analysis and look at the government's options to achieve their targets. Whilst there are a number of policies being introduced to affect tax and spending, VAT appears to be the one most challenged by politicians, unions and businesses. As a result, this paperwill hope to answer the over-arching question: *What impact does a change in VAT have on the deficit-reduction strategy?*

Literature Review

The theory underpinning the coalition government's desire to eliminate the fiscal deficit can be attributed to the Ricardian Equivalence theorem. Robert Barro is a major contributor to Ricardo's theory, which assumes that individuals who benefit from a reduction in taxes would save the extra money in anticipation of further tax increases. (Barro, 1974 &1989) Like many economic theories, Ricardian equivalence is dependent on all relevant variables in the model holding steady and requires an accurate prediction of a country's economy. Seater (1993) believes that it is mainly used as a political tool, rather than an economic resolution. He surmises that "[t]he philosophy of the political right leads to a general suspicion of government intervention, whereas that of the left concludes that intervention often is desirable." (Seater, 1993, p184)

Assuming Seater's belief holds true, how can the problem of a Conservative-Liberal coalition be solved? The Emergency Budget in June 2010, compiled of a blend of Conservative and Liberal policies planned to reduce the budget deficit to zero by 2015-16. Part of the plan was to reduce Government departmental budgets by around 25%. (HM Treasury, 2010, p17) The main focus for this extensive reduction was to reduce the size of the civil service, a common feature of Conservative governments. Tavares (2004) discusses this in his paper on political economy. By examining 19 countries in the OECD between 1960-1995, heidentifies differences between left- and right-wing differences on fiscal adjustments, suggesting "left- and right-wing cabinets have different success rates when they cut the deficit in different ways, i.e. despite the fact that the left tends not to cut spending during adjusting, *when it does*, it gains in credibility." (Tavares, 2004, p2464). If this is the case, then Labour's plans would have been more favourable and could explain why, despite the deep unpopularity of the last Labour administration, voters were not keen to welcome an overall Conservative majority Government.

Possibly the most controversial tax rise was the jump in VAT from 17.5% to 20% in January 2011. (HM Treasury, 2010) The newly-created Office of Budget Responsibility predicted that this would increase VAT receipts by 37% by 2015-16. This increase has been argued over since it was introduced with those against claiming that it would increase inflation and reduce private consumption, thereby reducing the benefit of extra revenue; and those for arguing that the resulting inflation would be temporary and that it would help reduce net borrowing.

The recent adjustment in Budget 2012 suggests that, although other revenues will decrease from the original Emergency Budget proposals, VAT will largely stay the same, with a

possible mild increase over the six year period.The effect of this will be examined in the results section.

Whilst there is a reliance on economic growth to provide increased tax receipts and a reduction in benefits payments, any regressions run would not include it as an explicit variable because unlike tax and spend figures, growth estimates can vary wildly, particularly in the current economic climate. The next section will outline the methodology of the economic model used in the regressions as well as a separate model to assess the impact of a VAT rate rise.

Empirical Methodology

Public sector net borrowing is a function of income tax receipts, national insurance receipts, VAT receipts, net government investment and public sector net expenditure. The selection of these variables was based on annual budgets from HM Treasury and monthly public sector finances from the Office for National Statistics. Possible omitted variables are discussed in the critique section.

Net Borrowing = f (income tax, national insurance, value added tax, government investment, net expenditure)

This function has been converted into three empirical models. The first will be using data from 1979-2011, which is income and expenditure confirmed by the ONS. The second is the same model extended to include official OBR estimates from 2012-2017. The third is the same model excluding net expenditure and based on monthly statistics from 2005-2012.

Equation 1: $logBorr_t = \alpha + \beta_1 logINC_t + \beta_2 logNIC_t + \beta_3 logVATR_t + \beta_4 logINV_t + \beta_5 logPUB_t + \mu_t$

where:

subscript t = is individual variable at time t
logBorr = natural log of net borrowing figures
logINC = natural log of income tax receipts
logNIC = natural log of national insurance contributions
logVATR = natural log of VAT receipts
logINV = natural log of net government investment
logPUB = natural log of public expenditure net of investment

These regressions have been tested for robustness to reduce the possibility of error in the statistics. There is, however, a possibility of omitted variables. There will be more of this in the critique section. To test the validity of the Ricardian Equivalence theorem, analternative model will be used to capture the rate of gross national savings in the UK.

Equation 2: $GNSR_t = \alpha + \beta_1 logINC_t + \beta_2 logNIC_t + \beta_3 logVATR_t + \mu_t$

where:

$GNSR_t$ = Gross National Savings Rate as a % of GDP

Gross National Savings is a combination of private and public savings and give a marker as to the total level of savings throughout the country. The regression from this model will test what happens when different policy decisions are taken to encourage people to save.

Data

The data used in this paper has been taken from a number of sources. Given that this is time-series data, the sources vary and are as follows:

- 1979-2002 Institute of Fiscal Studies Revenue Composition Table
- 2002-2012 Office for National Statistics Public Sector Finance Series
- 2012-2016 Office for Budgetary Responsibility/Budget 2012
- Gross National Savings EconomyWatch. Information taken from the IMF.

All data has been drawn from official government statistics, which in themselves are re-affirmed by the National Audit Office and submitted to the IMF on a regular basis.
The deficit-reduction strategy is based on the current budget deficit not net borrowing, which includes gross capital investment and depreciation. However, these are calculated at the end of each financial year. Figures released by the ONS on a monthly and quarterly basis are of net borrowing and is inclusive of all income and expenditures and gives a full indication of the nation's finances. Therefore, it is net borrowing (*logBorr)* that will be used as the dependent variable. Each of the independent variables has been selected because of their relevance with regard to income and expenditure. Income tax *(logINC)* represents approximately 26% of government receipts with national insurance *(logNIC)* adding an extra

18%. Income tax receipts are made up of PAYE and self-assessment and are **net** of tax credits. For all the controversy surrounding the rate of VAT, the receipts into government *(logVATR)* represent a total of around 16% of total government income, yet it currently stands as the third highest revenue stream behind income tax and national insurance. VAT refunds are calculated on an annual basis. Therefore, for consistency between annual and monthly regressions, VAT receipts are gross of refunds. These three dependent variables identified so far represent almost 61% of total government receipts.

The main driver of the deficit reduction strategy is to focus more on government departmental cuts. As a result, two additional variables have been included. Public sector expenditure *(logPubSec)* is the sum of all departmental expenditure in a year such as social security payments, tax credits etc. This expenditure stream represents almost 93% of total managed expenditure and on its own, overtakes total government receipts. This is calculated on an annual basis and only features in annual regressions.

The final key variable is public sector net investment *(logGovInv)*. This is made up of all investment the government are undertaking. These figures are net of depreciation and represent a small but significant 4% to total expenditure.

To assess the impact of the theory underpinning the Equivalence theorem, another independent variable used in the later regression is gross national savings rate *(GNSR)* as a % of GDP. Whilst this does not isolate private savings, it does give a good indication of the nation's desire to save.

All data except Gross National Savings Rates have had their natural logs calculated and used in regressions to assess percentage changes in data. As well as regressions, the same data will be used in graphical form to highlight cash differences between the beginning of the coalition government and March 2012.

The next section highlights all the regression results and assesses the impact of the results on the overarching theory and policy decisions.

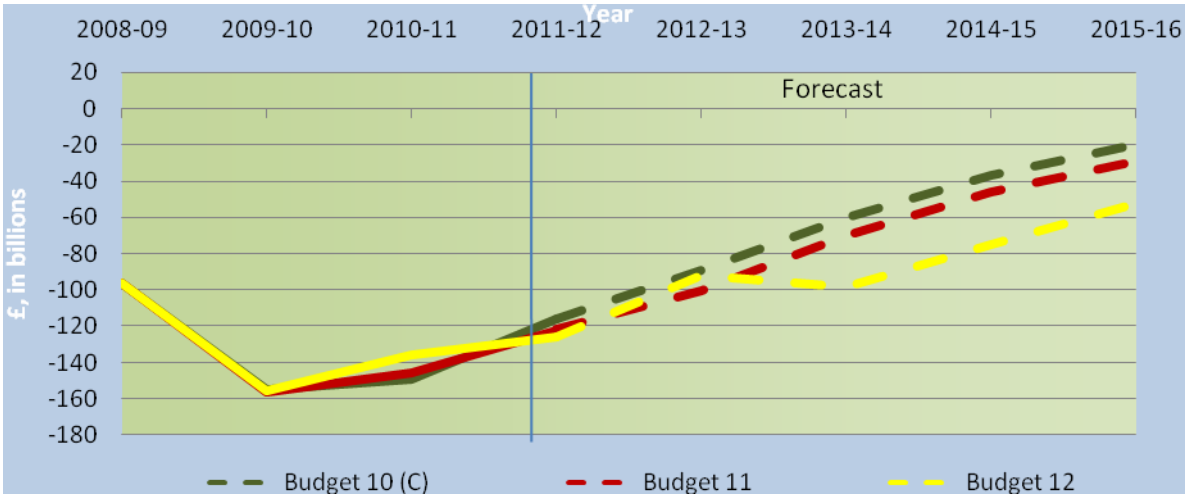
Results

As mentioned previously, the data in this paper is time-series data. This data is current and is often revised on a regular basis. Annual borrowing statistics can be revised up to five years after initial publications and monthly data can often be revised when the next data set is released. This will be discussed in detail in the critique section. However, it is important to consider the implications of this when analysing the regression results.

Data Analysis

As mentioned in the introduction, the government's initial plan has had to be changed. This can be evidenced in the following graph

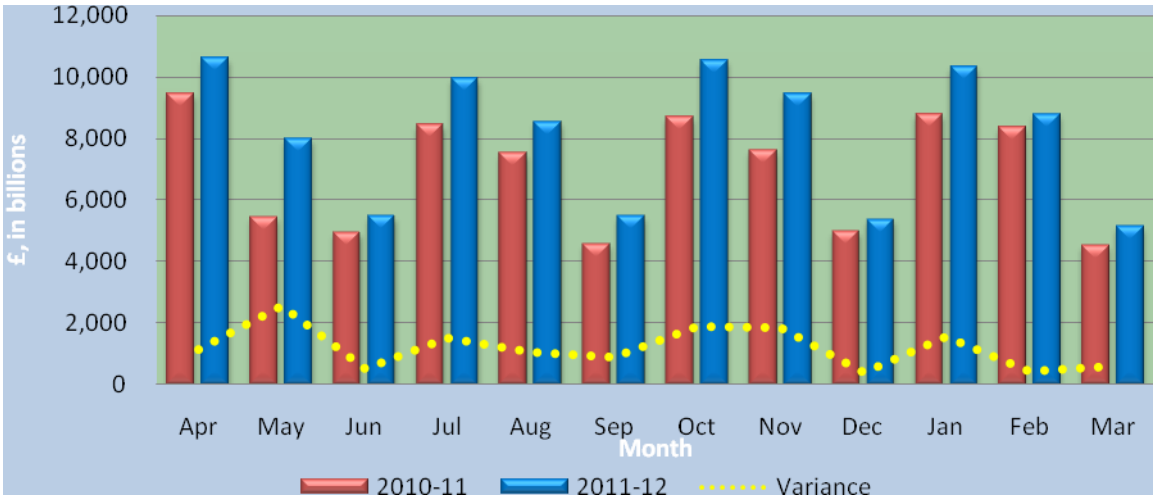
Graph A: Net Borrowing Forecast



(Source: HM Treasury, 2012)

This graph shows the progress of the budget deficit with comparisons between the Treasury's forecasts in 2010, 2011 and 2012. Close observation of this graph shows that there is a big difference between the first coalition Budget (Budget 10(C)) and the 2012 Budget, with forecasts declining with every statement.

Graph B: VAT



(Source: ONS, 2012)

This graph shows the effect of the increase of VAT to 20%. The revised increase anticipated 13% uplift in receipts between 2010-11 and 2011-12. Receipts came in at an increase of 17%, improving government income by an extra £652m on the revised figure.

Regression Analysis

All annual regressions contain less than 50 observations. As mentioned in the Methodology section, there is a greater possibility of statistical error. Each regression has been checked for robustness. The most significant results are starred.

Table 1: Coefficients & Converted Percentages Table

logBorr	1979-2017	1979-2012	2005-2012	1979-2017	1979-2012	2005-2012
logIncRec	-6.820448	-7.911486*	-5.561434*	-6.56%	-7.57%	-5.38%
logNIRec	-6.100137	-3.637765	4.239721*	-5.89%	-3.55%	4.31%
logVATR	-5.006052*	-0.5144575	-0.6587227	-4.86%	-0.51%	-0.65%
logPubSecExp	20.05717*	11.18844*	-	22.09%	11.78%	-
logGovtInv	0.5857222	2.194922*	0.8351702*	0.58%	2.21%	0.83%

* = t > 2.064 (accounting for 7 degrees of freedom @ 5% significance level)

By examining the three regression results, we can see there is a clear disparity between actual receipts (1979-2012) and actual plus estimated (1979-2017) receipts.

1979-2017 Receipts: The regressions show that, of the 5 independent variables identified, only two are the most significant: VAT and public sector spending. A 1% increase in VAT would decrease the budget deficit of 4.86%. Conversely, as expected, an increase in public spending would increase the deficit by a substantial 22%. This would underline the government's determination to focus on spending cuts.

1979-2012 Receipts: By using only actual receipts gained until March 2012, there is a significant shift in the coefficients and the percentage change of each variable. Income tax replaces VAT as the more significant income variable, with a 1% increase in income tax receipts improving the deficit by 7%. Public spending remains the most statistically

significant variable but the deficit increase is very different compared to actual and estimate receipts.

This comparison gives the assumption that the OBR expect the combined employment tax to be relatively stable when including their estimates. The difference in coefficients appear to show that the OBR are more optimistic in their estimates from 2012-2017 than perhaps is justified, particularly when estimating VAT and public spending.

2005-2012 Receipts: The monthly receipts show an interesting alternative view. The regression shows that VAT has little impact on monthly net borrowing but there should be a significant reliance on the employment taxes and government investment. This would back up the government's continued argument that a reduction in VAT would have very little effect on the deficit reduction strategy

Gross National Savings Regressions

Table 2: Model 5 Annual Regression (1979-2012)

GNSR	Coef.	Robust Std. Err.	t	P>¦t¦	[95% Conf. Interval]	
logIncRec	-0.0090582	0.0173941	-0.52	0.607	-0.044748	0.0266315
logNIRec	-0.0145723	0.0372935	-0.39	0.699	-0.0910922	0.0619477
logVATR	0.0010757	0.0291038	0.04	0.971	-0.0586403	0.0607917
_cons	0.2491568	0.0219544	11.35	0.000	0.2041101	0.2942036

$R^2 = 0.5930$; Adj-$R^2 = 0.5478$

The original theory behind this paper was the Ricardian Equivalence theorem, as described in the literature review. So, having examined the influences on net borrowing and VAT, what impact would a change in government receipts affect the gross national savings rate? By looking at the outturns table only (1989-2011), a 1% decrease in income tax or national insurance would represent a 0.01% increase in gross national saving. The result of these regressions is that in the UK, the Equivalence theorem does not hold true. Through the regressions, there is little evidence to suggest that, when given a tax relief, consumers will save the extra money. This will be discussed further in the conclusion.

Critique

Examining the main model, the borrowing figures have been taken from historical data from the Office for National Statistics and the current and predicted values from the Office of Budgetary Responsibility. However, even historical data can often be inaccurate. Revisions can take place many years, and sometimes decades after the event, which results in inaccurate figures. This would increase the possibility of measurement error substantially.

The figures for VAT do not reflect refunds. The estimated figures taken from the OBR reflect the level of fraudulent activity, legal loopholes and other issues that are calculated centrally. However, because this is taken from a central source, there is a possibility that these have not been anticipated fully and there is a reliance on the assumption that measures taken to combat tax avoidance is effective. Another issue with VAT is that because it is gross of refunds, there is the possibility of "double-counting". Net expenditure includes refunds in its breakdown and therefore, the accuracy of the VAT result can be challenged to a small extent. Refunds amount to around 0.01% of VAT income so the risk of double-counting is minimal.

Net expenditure represents the vast majority of spending in the UK budget. However, the accuracy of this can be debated. The figures used reflect the actual spending over the past 3 decades. They do not, however, reflect Treasury reserve spending. Likewise, the money lent to Ireland and the IMF is not counted fully in the budget.

The model as a whole is limited in the number of variables that have been included, which has resulted in Omitted Variable Bias. The concept of net borrowing is not just dependent on the variables included and, given more time, there could have been a greater focus on measuring the effect of inflation and employment on borrowing. The results section touches on the anticipation of higher employment, which leads to higher GDP. GDP was included in earlier regressions but had no impact on the other variables or on borrowing and so was discarded.Omitted variable bias is not just endogenous. The actions of the banks, the Eurozone debt crisis and such issues as oil shocks could all be included as variables. Given time, these could have been added and measured against the existing variables.

Finally, the very timing of this paper can be doubted. The UK returned to recession and there is little doubtthe countryis still in the middle of a financial crisis so serious that predicting what will happen in three months' time is proving impossible. The result of this lack of growth will have an implicit effect on the data used in this paper. In later years, after the crisis has been stabilised and is managed effectively, the same regressions can be run and

there is a greater chance of the results being different to those run here. It is a reasonable assumption to make that the assessment of the government's deficit-reduction strategy is too soon to draw an accurate conclusion.

Conclusion

This paper has identified that the most significant reduction in the budget deficit would come from a reduction in public expenditure and that, theoretically at least, the government are correct to progress with their deficit-reduction strategy. However, the caveat to achieving their targets relies heavily on economic growth. Economics dictates that growth results in higher employment, leading to increased income tax and national insurance receipts and an increase in VAT receipts as consumers begin to show confidence in spending their wages, leading to steady inflation as demand increases.

Unemployment has been reducing in the last year and a half but there appears to be no significant increase in consumer spending, suggesting that those that are in work are using their disposable income to pay off existing debt, thereby confirming the Ricardian Equivalence Theorem – a rare occurrence in the UK.

Since the 2012 Budget announcement in March, the government have announced a number of projects. However, these announcements, whilst they will inevitably provide employment, will take a number of years to begin and, with the impact of the Olympics building programme now at an end, there is a significant gap between existing and new projects, which will hamper growth for some time.

The government are attempting to encourage growth at the same time as instigating quite severe cuts. The result would show that, so far at least, this is the wrong route to go down. There is clear evidence that a reduction of public sector spending as a % of GDP will be beneficial to the economy, resulting in little or ideally no net borrowing. There is currently no evidence to support the calls for a VAT reduction. The last temporary reduction to 15% resulted in lower tax receipts and both the regressions and the cash analysis show that an increase in VAT leads to an increase in receipts.

The regressions show the government are correct to undertake the public sector cuts. It is the timing of the cuts that are in doubt. The government assert that waiting for the economy to grow would result in increased borrowing and increased national debt, which would be true. However, by incentivising employment and investing in more short- to medium-term projects, this would begin to decrease unemployment and benefit payments quicker than at the current rate and would result in higher consumption, which in turn would

improve growth.The most attractive option for the government may be to allow growth to increase to a minimum level before instigating cuts. A 2% growth level may be enough to sustain the current programme of spending cuts. The caveat to this idea, however, is that it is an idea that will only be known to work after the event. Only long after this government ends will anyone know whether the deficit reduction plan has worked.

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