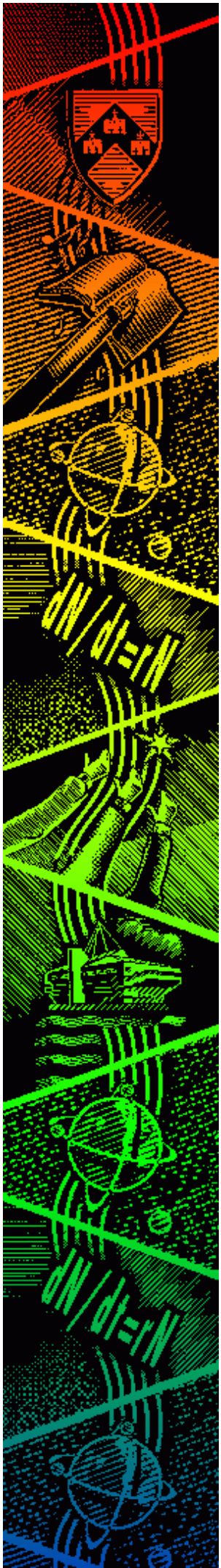

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Abstract

There is widespread evidence that procyclical fiscal policies have been prevalent in developing countries and often in some industrial nations. It is therefore surprising that, in contrast to the wealth of studies on the sources of procyclical policy, potential consequences of such seemingly sub-optimal policies have been largely ignored in the existing literature. By utilizing a comprehensive set of indicators from 114 countries for 1950-2010, we aim to address the following important question: does it matter whether a country adopts a procyclical fiscal policy stance rather than a countercyclical one? Our results produce a resounding yes to this question. We find that fiscally procyclical countries have lower rates of economic growth, higher rates of output volatility and higher rates of inflation.

Key words: cyclicality of fiscal policy; inflation; growth.

JEL Classification: E62, H20, H30.

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I Introduction

The recent global financial crisis and the subsequent downturn in the world economy has prompted policymakers in a large number of countries to enact substantial fiscal stimulus packages. Most of these recovery packages entailed provisions for bailing out the financial sector that was subject to massive losses following the onset of the crisis in 2008, raising the overall fiscal cost of intervention to unprecedented levels in most industrialized countries, especially in the US and the UK. This, in turn, led many countries to reverse the course of policy and opt for fiscal retrenchment. Others such as Greece, Ireland, Italy and Spain were forced to follow suit due to sovereign risk considerations. Such policy actions in the form of fiscal stimulus followed by fiscal austerity revitalized the debate on the desirability of countercyclical fiscal policy.

A central question underlying this policy debate is whether countercyclical policy actions, expansionary in bad times and contractionary in good times, as was sought by the fiscal stimulus packages, are likely to be effective. Although there are counter arguments against the active use of fiscal policy as a stabilization tool, such as tax smoothing arguments based on Ricardian equivalence, once fiscal policy is deemed to be among the policy tool box, the case for countercyclical policy is clear.[1] A countercyclical fiscal policy stance with policy actions against the cycle aims to act as a stabiliser by reducing output volatility and keeping growth on a steady, non-fluctuating path.

Yet, the current return to fiscal procyclicality - austerity during the severest downturn in the post-war era - is not an isolated case. Indeed, there is widespread evidence that procyclical fiscal policies have been the norm in many developing and emerging market countries (see for example Gavin & Perotti 1997, Kaminsky et al. 2004, Talvi & Végh 2005, Woo 2009). Such evidence has been considered 'puzzling' and hence led to an active research agenda on the sources of procyclical fiscal policy. Potential explanations that have been put forward include: borrowing constraints that restrict policymakers ability to follow countercyclical fiscal policy in bad times (see, for example, Gavin & Perotti 1997); the procyclicality of capital flows that also act as borrowing constraints in bad times (Kaminsky et al. 2004); political constraints such that fiscal pressures from multiple

[1] See, for example, Barro (1979) and Schmitt-Grohe & Uribe (2004) on the tax smoothing argument.

power groups for higher public spending in good times resulting in contractionary fiscal policy in bad times due to insufficient savings (Lane & Tornell 1998, Lane 2003, Talvi & Végh 2005, Woo 2009); and political distortions such as corruption leading to public pressure for greater public spending in good times to reduce the rents available to corrupt governments (Alesina et al. 2008).

A key aspect of the observed cyclical pattern of fiscal policy is related to its consequences for economic outcomes. It is therefore surprising that, in contrast to the wealth of studies on the sources of procyclical policy, potential consequences of such seemingly sub-optimal policies have been largely ignored in the existing literature. Although procyclical fiscal policies are widely viewed to be detrimental to macroeconomic outcomes, to the best of our knowledge, there is no systematic study of the economic costs of following such policies.[2] Given the prevalence of procyclical fiscal policy in many countries this is clearly of key relevance for both researchers and policymakers.

Motivated by the current debate on fiscal stimulus versus fiscal austerity in response to the global downturn in economic activity, representing countercyclical versus procyclical policies respectively, this paper attempts to address the following important policy question: does the cyclicality of fiscal policy have any systematic impact on economic outcomes? Put differently, does it matter whether a country adopts a procyclical fiscal policy stance rather than a countercyclical one? In trying to answer this question, we move beyond the sources of fiscal procyclicality and examine the potential consequences of such policies. We utilize an annual dataset for a large sample of 114 countries over the period 1950 - 2010 to construct a comprehensive set of indicators to measure the cyclical properties of fiscal policies. After establishing the direction of fiscal cyclicality, we examine the implications of the cyclicality of fiscal policy on three important indicators; output growth, volatility of output growth and inflation.

Our results are clear and compelling. First, we establish that procyclical fiscal policies have indeed been a norm for the majority of countries in our sample. We do not find much evidence for the so-called graduation hypothesis (Frankel et al. 2012) that many countries have 'graduated' from fiscal procyclicality recently; this only holds for a restricted set of observations in our sample.

[2]Two exceptions to this are Aghion & Marinescu (2007) and Woo (2009) both of whom find a negative correlation between economic growth and fiscal procyclicality. However, for both of these papers this is not the main focus and in the case of the former the analysis is performed only upon 19 OECD countries and in the case of the latter the analysis is based on whole sample averages.

Furthermore, our findings clearly indicate that the cyclicality of fiscal policies matters. We find that fiscally procyclical countries have lower rates of economic growth, higher rates of output volatility and higher rates of inflation. Having formally linked inferior macroeconomic outcomes to fiscal procyclicality, our results point to the importance of moving from procyclical to countercyclical fiscal policy. When combined with the scale of fiscal procyclicality our findings on the consequences of procyclical fiscal policy suggest that establishing fiscal institutions to ensure countercyclical fiscal policy should be a policy priority.

The rest of the paper is organized as follows. Section 2 discusses the methodology and the data, derives measures of fiscal cyclicality and presents descriptive statistics. Section 3 relates macroeconomic outcomes in the form of output growth, output volatility and inflation to the derived cyclicality measures. Robustness checks and extensions to the benchmark estimations are presented in Section 4. Finally, Section 5 provides concluding remarks.

II Methodology

Identifying Fiscal Procyclicality

This paper aims to explore the consequences of procyclical fiscal policy on macroeconomic outcomes. The first necessary step in any such study is to identify the cyclical properties of fiscal policy for individual countries. Although debate exists around the choice of fiscal procyclicality statistics, there is, in general, agreement on which fiscal variable should be used in calculations. The cyclicality of fiscal policy is commonly measured by fiscal instruments such as government consumption and tax rates rather than outcomes such as fiscal balances. For example, Kaminsky et al. (2004) demonstrate that only government consumption and tax rates provide unambiguous results on the cyclical properties of fiscal policy, and given the data availability issues regarding the latter (tax rates) the former (government consumption) has been the preferred choice in existing studies.

There are two country specific procyclicality statistics widely used in the literature: the first is a composite measure (henceforth referred to as CM) which detrends data in order to focus only on the cyclical components of both government consumption and output; the discretionary reaction of fiscal authorities to the business cycle. Using a Hodrick-Prescott filter to perform this detrending

the following statistic can be obtained:

$$CM = \left(\frac{1}{2}HPCorr\right) + \left(\frac{1}{2}AMP\right) \tag{1}$$

where $HPCorr$ is the pairwise correlation of the cyclical components of real government consumption and real GDP, and AMP is the amplitude of government consumption measured as the difference between the average growth rate of real government consumption in good and bad times, where good and bad times are defined as years with above and below trend growth, respectively.[3] The amplitude is converted into a $[-1, 1]$ measure by normalising both the positive and negative results separately; this keeps the two components of the composite measure on the same scale. This statistic is calculated using government consumption and GDP data over a number of years for an individual country and provides an average measure of fiscal procyclicality for that country over the given time horizon. A positive (negative) value illustrates procyclical (countercyclical) fiscal policy - discretionary government consumption is positively (negatively) correlated with trend levels of output and/or government consumption grows more (less) in good times than in bad.

The second procyclicality statistic widely used in the literature is based on estimating a fiscal policy response function, similar to Lane (2003) and Woo (2009), as in (2):

$$\Delta log(G_{i,t}) = \alpha_i + \beta_i \Delta log(GDP_{i,t}) + \varepsilon_{i,t} \tag{2}$$

where $G_{i,t}$ and $GDP_{i,t}$ represent real government consumption and real gross domestic product respectively for country i in time t, α is a constant term and the estimate of β ($\widehat{\beta}$) provides the measure of cyclicality. Equation (2) is estimated using ordinary least squares with correction for first order serial correlation. As with the composite measure, this statistic is calculated using data over a number of years for an individual country and provides an average measure of fiscal procyclicality for that country over the given time horizon. A positive (negative) value of $\widehat{\beta}_i$

[3]This composite measure is adapted from Kaminsky et al. (2004) who give both $HPCorr$ and AMP an equal weight of 40 per cent and inflation tax a weight of 20 per cent in the calculation of their composite measure. Our measure excludes inflation tax in order to focus on those elements the government has direct control over. Sensitivity to this omission is tested and the statistic with an inflation tax component included is strongly correlated with one where it is not: a correlation coefficient of 0.97 is obtained.

illustrates procyclical (countercyclical) fiscal policy - there is a positive (negative) correlation between government consumption and output.

Both of these two measures has its merits and drawbacks. The use of the Hodrick-Prescott filter has the major benefit of only considering cyclical components: the discretionary element of fiscal policy. However, as highlighted by Forbes & Rigobon (2002), unadjusted correlation coefficients (which represent half of the composite measure) can generate misleading results when samples have different levels of volatility: a certainty when considering cross country GDP and government consumption figures. It is also the case that the resulting correlations only measure the strength and direction of the relationship but not the responsiveness of fiscal policy to the business cycle. Moreover, the composite measure combines two separate statistics with arbitrary weighting where one of these statistics (AMP) will be sensitive to the normalisation process involved in producing it. The $\hat{\beta}$ statistic obtained by estimating equation (2) does not have the benefit of using detrended data and therefore will implicitly include the trend in the analysis; this may lead to an upwards bias in the estimate assuming an upward trend in both real GDP and government spending. A significant advantage of this approach however is that it measures the elasticity between the two variables unlike the composite measure. However, the correlation (given by the individual statistical significance of the $\hat{\beta}$ estimate) is often ignored with this measure.

We therefore propose a new method which combines the positive features of both those above; its inclusion further tests the results and conclusions obtained in the paper. This new method uses a fiscal policy response function similar to (2) but uses the detrended data for both government consumption and GDP used in (1):

$$\Delta log\left(G_{i,t}^{CYC}\right) = \bar{\alpha}_i + \bar{\beta}_i \Delta log\left(GDP_{i,t}^{CYC}\right) + \bar{\epsilon}_{i,t} \tag{3}$$

where subscript CYC represents the cyclical component of a variable. Equation (3) is estimated using ordinary least squares with correction for first order serial correlation. This estimated pro-cyclicality statistic, which will be notated as $\widehat{\bar{\beta}}$, takes both elements of the above statistics and measures the elasticity of the cyclical (discretionary) element of government consumption to the cyclical element of real GDP.

It has been argued that fiscal procyclicality statistics obtained through methods similar to (2) (and therefore (3)) suffer from an endogeneity issue as output growth is not exogenous to fiscal actions. However, as Lane (2003) notes, there seems no good reason why this feedback between the two variables should not be included in the analysis.[4] Also, the method is the same for each country and therefore the measures can be used relative to each other. Moreover any such feedback is dependent on the size of the fiscal multiplier which is shown to be small in developing countries (see for example Ilzetzki et al. 2010) who are also observed to be more procyclical. Nonetheless, this discussion points to the importance of using more than one method in measuring the conduct of fiscal procyclicality, a point also made by Ilzetzki & Végh (2008) in their choice of multiple methodologies in measuring the cyclical properties of fiscal policy.

The Consequences of Procyclical Fiscal Policy

To assess whether there is a statistically significant link between the compiled fiscal cyclicality measures and macroeconomic outcomes we estimate the following cross country panel specification:

$$M_{i,t} = \alpha + \theta FP_{i,t} + \gamma X_{i,t} + z_{i,t} \tag{4}$$

where $M_{i,t}$ represents a macroeconomic indicator for country i during a time interval t, $FP_{i,t}$ denotes the relevant fiscal cyclicality statistic and $X_{i,t}$ is a set of appropriate control variables. In order to examine the effect of the cyclical properties of fiscal policy on macroeconomic outcomes the data needs to reflect all phases of the business cycle. A country experiencing good times would be expected to grow faster, all other things being equal, than a country in bad times independent of the actions of the fiscal authority. As a result, we estimate the above relationship for 15-year horizons starting from 1960, which yields three periods per country: 1960-1974, 1975-1989 and 1990-2005. This maximises the number of observations for regressions whilst at the same time allowing for appropriate intervals for variables to be measured over.[5] Regressions of specification

[4] Lane (2003) finds a strong correlation between the procyclicality statistics obtained from fiscal policy response functions similar to (2) and statistics which either instrument out GDP growth or attempt to measure the cyclical properties of fiscal policy in other ways.

[5] Alesina et al. (2008) also point to the importance of observing a full business cycle in the sample and thus include at least 16 years of data for each country. The robustness of our results with respect to the interval and the start date will be tested.

(4) are performed applying Generalised Least Squares with random effects where time dummies for each period are included. Each of the fiscal procyclicality variables obtained by applying (1), (2) and (3) enter the regression specifications separately and are tested in isolation of one another. This paper is concerned with both real and nominal economic impacts as well as levels and volatilities of variables. Therefore, the dependent variables ($M_{i,t}$) in regression (4) will be average growth rates, levels of growth volatility and average levels of inflation.

Data

In calculating the fiscal procyclicality statistics we utilize annual data from the IMF *International Financial Statistics* (IFS) for the period 1950 to 2010 where available; in total, information from 114 countries was collected. Information for the dependent and control variables are collated from a wide range of sources; Appendix A provides details of both the methods applied to the raw numbers and the original sources.

Descriptive Statistics

The Prevalence of Fiscal Procyclicality Table 1 presents average fiscal procyclicality measures using all three methods of identification outlined above where the statistic has been based on data from all available years for each individual country; these figures have then been aggregated across income groups as defined by the World Bank. Results presented in Table 1 allow us to make three clear observations. First, fiscal procyclicality is heavily prevalent throughout the globe. This is not only true of developing countries, as is often found, but also in high income economies; for all three fiscal procyclicality statistics across all four income groups, procyclical policy is observed on average.[6] Second, there is a negative correlation between income and fiscal procyclicality; high income countries are less procyclical than middle income countries who themselves are less procyclical than low income countries. This is a common result found in the literature and is true for all fiscal procyclicality statistics utilised in this study. Interestingly, this relationship breaks down

[6]The aggregation process to find a mean value across income groups hides the number of individual country countercyclical observations. These are (4 (11%), 1 (4%), 2 (7%), 0 (0%)) for the $\widehat{\beta}$ statistic, (11 (30%), 2 (8%), 5 (17%), 1 (5%)) for the $\widehat{\widehat{\beta}}$ statistic and (4 (11%), 2 (8%), 3 (10%), 1 (5%)) for the CM statistic where the four figures presented represent the four income categories in descending income order and the parenthesised percentage figures represent the ratio of countercyclical observations to total observations for that income category.

between upper-and-lower-middle income countries who are observed to have similar degrees of fiscal procyclicality but where the lower-middle income countries, on average, have lower statistics than their upper-middle income neighbours. Third, there is a strong degree of consistency across the three fiscal procyclicality statistics. This is confirmed when reviewing the pairwise correlations across the three procyclicality statistics which are all positive and strong.[7]

[Insert Table 1 here]

Fiscal Procyclicality Over Time The above presented results establish that fiscal procyclicality has been the norm rather than an exception in many countries, based on data from 1950-2010. This section deals with the issue of how procyclicality has changed over time.

[Insert Table 2 here]

Table 2 presents average values for CM, $\widehat{\beta}$ and $\widehat{\widehat{\beta}}$ where these statistics are calculated annually over an overlapping time horizon of 20 years throughout the sample period of the data; subsequently the figures are grouped by income category and mean averages taken every decade where the end of the 20 year horizon is taken for the decade categorisation. Results presented in Table 2 allow us to derive the following conclusions. First, procyclical fiscal policy has been prevalent for all income groups throughout the time period for which data is available for; in all 24 examples presented in the table positive (procyclical) statistics are obtained. Second, at all time periods for each of the three fiscal procyclicality statistics the average value of middle income countries are higher than the average value of high income countries; levels of fiscal procyclicality are negatively correlated with income. This compares with other studies in the literature and is consistent with the overall result presented in Table 1. Third, the difference between high and middle income countries' average procyclicality statistics has remained relatively constant over the sample period, suggesting a degree of comovement between the two country groups. Finally, with the exception of three cases in Table 2 the average procyclicality statistic has increased from one decade to the next suggesting countries

[7]The correlation between $\hat{\beta}$ and $\hat{\hat{\beta}}$ is 0.938 which is stronger than those between these two and the composite measure, 0.501 and 0.468 respectively. This suggests that the difference between using equations (1) and (2) is greater than the difference arising from whether the data are detrended or not.

are becoming more procyclical over time, further stressing the importance of understanding the consequences of the cyclical properties of fiscal policy.

The results presented in Table 2 go against the graduation hypothesis proposed in Frankel et al. (2012) who suggest that some developing countries are 'graduating' from procyclical policy through a movement towards countercyclical policies. In contrast, our results imply that procyclicality has been on the increase. Disaggregating the mean averages from Table 2 to country specific observations over two periods, we find that only 16% of countries that were procyclical in the first period subsequently become countercyclical in the final period. This compares to 28% of countries in Frankel et al. (2012); fewer countries are observed to be 'graduating' from procylical fiscal policy in our sample. The reason behind this discrepancy is because Frankel et al. use different time periods to ours comparing procyclicality statistics obtained between 1960-1999 to those for the period 2000-2009; when we take similar time horizons we obtain results more in line with Frankel et al. However, observing the cyclical properties of fiscal policy over only a 10-year period is statistically problematic, as explained above. Also the recent experience of governments adopting austerity measures in bad times is likely to result in this observation of graduation to be short lived.

III Empirical Results

This section presents empirical results on the macroeconomic consequences of procyclical fiscal policy. With the prevalence of fiscal procyclicality presented above this is a significant question. As discussed above, these effects will be tested along three dimensions: average growth per capita, volatility in economic growth, and levels of inflation.

Economic Growth

The first effect to be tested is that between the cyclical properties of fiscal policy and economic growth. A natural hypothesis is that higher levels of fiscal procyclicality would lead to lower levels of economic growth. This could occur through many plausible channels and, if true, would result in a significant cost of following such policies.

Bivariate Analysis To begin this discussion we perform a bivariate comparison between fiscal cyclicality in a country and its level of growth. The most fiscally procyclical countries and the most fiscally countercyclical countries are split into different groups by percentiles. The average growth rates of these two groups are then taken and the difference across them are presented in Table 3.

[Insert Table 3 here]

The results are intuitive and robust; fiscally countercyclical countries grow at faster average annual rates than fiscally procyclical countries. In all twelve separate tests (at four separate percentile levels for the three different measures of fiscal procyclicality) the expected sign is delivered and in seven of these the difference is statistically significant. Moreover, these differences are economically significant, at least with respect to the $\widehat{\beta}$ and $\widehat{\widehat{\beta}}$ statistics; even at the broadest measure the top 40% most procyclical countries in our sample are observed to grow at approximately 1 percentage point less per capita per year than the top 40% most countercyclical countries. Compounded over a number of years this has a significant impact.

Growth Regression In estimating the role of fiscal cyclicality on economic growth, we adopt specification (4) where the control variables, $X_{i,t}$, are in line with Barro (2007) and therefore include the following. To control for convergence the log of GDP per capita at the start of the period is taken ($InitialGDP$) from Heston et al. (2009). The log average number of years of education for the total population aged 15 or over for the start of the period ($Log(Edu)$) is taken from Barro & Lee (2001). Log levels of fertility ($Log(Fert)$), measured as the number of births per women, and life expectancy at birth ($Log(Life)$), are obtained from the World Bank. The size of the public sector (SPS) is calculated using data from the IMF IFS as the ratio of government consumption to GDP and the level of openness in the economy ($Open$) is obtained from Heston et al. (2009), measured as the ratio of total exports plus imports to GDP. For the variables $Log(Fert)$, $Log(Life)$, SPS and $Open$ the annual observations were averaged over the time period of each panel. Finally, as a measure of exchange rate volatility ($ExRateVol$) the standard deviation in the nominal exchange between the country and the US over the period in question is calculated from data obtained from the IMF IFS. The dependent variable is the average annual growth rate in GDP per capita

($GrGDP$) taken from Heston et al. (2009), averaged over the time period.

[Insert Table 4 here]

Table 4 presents estimation results for six specifications; two for each procyclicality statistic, one with a minimum number of control variables where the number of observations is maximised and a second which includes all control variables. In all six specifications the estimated coefficient of the procyclicality statistic is negative and significant to at least the 10 per cent level, and in the case of both $\hat{\beta}$ and $\hat{\tilde{\beta}}$ to the 5% level or stronger. Results presented in Table 4 point to an economically and statistically significant relationship between the level of fiscal procyclicality and average economic growth: higher levels of fiscal procyclicality lead to lower levels of economic growth. This is in line with what is commonly assumed, but not tested, in the fiscal procyclicality literature. This result is also robust to the use of different measures of fiscal procyclicality. Taking, for example, the results from specification (4) in Table 4, the difference between the average level of procyclicality for a low income country compared to that of a high income country (from Table 1) is the equivalent of 0.3 percentage points in average economic growth each year, a significant impact.[8]

These results are in line with those presented in Woo (2009) which tests whether social polarisation is correlated with the level of fiscal procyclicality and subsequently whether the level of fiscal procyclicality is correlated with GDP growth, in a sample of 96 countries between 1960 and 2003. Woo (2009) also finds a negative relationship between growth rates in GDP per capita and the level of fiscal procyclicality which is both economically and statistically significant. However, these results are obtained by applying fewer control variables in the analysis than above and further, by only considering procyclicality statistics obtained using equation (2). Moreover, the procyclicality statistic is not time varying and as such the time horizon for the regression used in Woo (2009) are an average over 43 years. Our evidence illustrates that these results are robust to these omissions. The results are also in line with those of Aghion & Marinescu (2007) who perform a similar analysis on a panel of 19 OECD countries between 1960 and 2007. Our findings illustrate that these results

[8]Using a panel that starts 5 years later (1965) but which still covers time horizons of 15 years at a time, the results are amplified; the point estimates are all increased and these results are significant to at least the 5 per cent confidence level, and with the exception of one result, the 1 per cent confidence level. Further, using a panel starting in 1960 but covering 20 year horizons provides similar results as those presented in Table 4.

also hold when this sample is extended to those countries outside the OECD.

An Instrumental Variable Approach With the specification used for the growth regression in Table 4 there is a potential endogeneity issue arising from the use of GDP series in the calculations of the fiscal procyclicality statistic. One way to control for this would be to instrument out the procyclicality statistic in specification (4). The fiscal procyclicality literature contains many hypotheses as to the causes of its prevalence (typically referring to borrowing and political constraints, as discussed above) and these can form the basis for appropriate instruments. Table 5 presents the estimation results from re-estimating Table 4 where $FP_{i,t}$ is instrumented for where only the estimate of the variable of interest is presented. Benchmark figures from Table 4 also shown for comparison.

[Insert Table 5 here]

The expected direction of results are observed - higher levels of fiscal procyclicality lead to lower levels of growth - and these results are statistically significant. Moreover, the quantitative effect becomes much larger with higher values of estimated coefficients being recorded. One issue with this approach is the restricted availability of information for the instruments used further reduces the number of observations involved in the regressions especially for less developed countries for whom data availability is more of an issue. Nonetheless, estimation results are conclusive. The difference between the average procyclicality statistic for high income countries and low income countries from Table 1 is estimated now to be the equivalent of 0.9 percentage points in growth of GDP per capita each year, similar to the results obtained through the bivariate analysis. The results are both economically and statistically significant and provide further evidence on why we should care about fiscal procyclicality.

Despite the existing small literature on the detrimental impact of fiscal procyclicality on economic growth no research, to our knowledge, exists on other outcomes and channels for which this relationship may run. This is the subject of the following two subsections.

Volatility of Economic Growth

The second relationship we examine is the potential link between fiscal procyclicality and the volatility of economic growth. It is straightforward to postulate that, providing fiscal policy is effective, a country that conducts procyclical policy will exacerbate the business cycle and therefore increase the volatility of growth rates in the economy.

Growth Volatility Regression The specification in equation (4) is estimated by using the standard deviation of growth rates as the dependent variable ($GDPVol$, obtained from Heston et al. 2009). Regressors used in this specification are $InitialGDP$, $Open$, SPS and $ExRateVol$, as defined earlier. We also include $Polity$, an annual statistic measuring the degree of democracy within a country averaged over the period in question (obtained from Henisz 2010) and $OpenVol$ which calculates the standard deviation in the $Open$ statistic. Table 6 presents the results from the analysis.

[Insert Table 6 here]

Again the relationship is tested through subjecting it to six different specifications; two each for the three procyclicality statistics. In all specifications, the expected direction is identified although the level of significance is less conclusive than with the average growth results. For the composite measure of fiscal procyclicality there is a strong relationship identified with high levels of significance, however for both the $\hat{\beta}$ and $\hat{\tilde{\beta}}$ statistics the relationships are only tentatively significant. We expect that the strength of the relationship between fiscal procyclicality and growth volatility is intuitively sensitive to the size of the fiscal multiplier. Taken to the extreme, completely ineffective fiscal policy will have no impact on growth and subsequently on its volatility.[9] However, the expected signs are still observed in the results and although the levels of significance are inconclusive they do provide some support for the relationship that higher levels of fiscal procyclicality lead to

[9] As stated earlier, it is observed that developing countries have higher levels of procyclicality (see for example Table 1) and lower fiscal multipliers (see for example Ilzetzki et al. 2010). If this is true, the link between the cyclical properties of fiscal policy and growth volatility is likely to be blurred by this relationship. There is insufficient estimates on individual countries fiscal multipliers due to data availability issues as well as debate around the best method to identify such multipliers: therefore it is not straightforward to test this hypothesis.

higher levels of growth volatility; more conclusive results are observed in Table 8 below when sensitivity tests are performed.[10]

An Instrumental Variable Approach Similar to the growth specification there is a potential endogeneity problem in these growth volatility expressions. It has been argued that the volatility in growth rates may lead to higher levels of fiscal procyclicality because it leads to variability in the tax revenue base (Talvi & Végh 2005). Performing a similar instrumental variable approach in these regressions where the fiscal procyclicality statistic is instrumented for we find similar results to those presented in Table 6. The expected direction is observed, typically with higher point estimates, but the result are only tentatively significant (not presented).

Inflation

The above evidence suggests that fiscal procyclicality impacts on the real economy. It therefore follows that through stimulating the economy in good times a procyclical government would be expected to raise price levels, as the economy is at its potential, resulting in higher inflation. We now turn to estimating this relationship by following the specification in equation (4) where the dependent variable is the average transformed GDP deflator for the period; the transformation is as in Cukierman et al. (1992) where the GDP deflator, π_t obtained from the World Bank *World Development Indicators*, is transformed using $\pi_t/(1+\pi_t)$. For independent variables $InitialGDP$, $Open$ and $ExRateVol$ are used as above and these are combined with three measures of central bank independence that are established as important determinants of inflation performance in the existing empirical literature. $Turnover$, a measure of central bank governor turnover, and CBI, an overall measure of central bank independence are both taken from Cukierman et al. (1992) for the period 1950 to 1989. An issue with these two measures is that they do not cover the whole time period and do not vary with time. To try and combat this a third measure, CBI', is used which is a further aggregate measure of central bank independence that uses data from both Cukierman et al. (1992) and Polillo & Guillén (2005). This aggregate measure is computed across different

[10]Moreover, using a panel starting 5 years later but which still covers time horizons of 15 years at a time provides more conclusive results than above, especially for the $\widehat{\beta}$ and $\widehat{\bar{\beta}}$ statistics. Taking a panel starting from 1960 but covering 20 year horizons provides similar results as to those presented in Table 6; however, these results will be weakened by the fewer number of observations in the sample.

time periods using the same methodology and we match as best as possible these periods to the ones used in our study. Estimation results are presented in Table 7.

[Insert Table 7 here]

In all six specifications the expected relationship is observed and in five of the six this relationship is significant to at least 5 per cent levels of confidence. The sign and significance of the point estimates for the fiscal procyclicality measures indicate that higher levels of fiscal procyclicality lead to higher levels of inflation, all other things being equal. This is true also after controlling for the size of the country, proxied by initial GDP, where it is observed that more prosperous economies have lower levels of inflation. There is limited availability for central bank independence measures and therefore when these are included in the regressions the number of observations are significantly reduced and the resulting samples are dominated by high income countries. As is seen from columns 2, 4 and 6 in Table 7, despite this lack of variability, the estimated relationship between fiscal cyclicality and inflation is robust to including central bank independence measures. Of the independence measures only the turnover of the central bank governor is found to be significant and this is also true when each measure is included in the specification individually, which is in line with the findings in Cukierman et al. (1992).[11]

IV Further Extensions and Robustness Checks

The Size of the Public Sector

A natural extension of the above analysis is that the greater the size of the public sector in any given economy the greater the impact of procyclical fiscal policy on macroeconomic variables. Yet the procyclicality measures adopted above are relative measures which do not consider the size of the fiscal sector: a common feature of the cyclicality measures used in the literature. If government activity has a bigger role in a country as a proportion of total output then the conduct of fiscal policy is likely to have a more significant impact on aggregate movements. In what follows therefore,

[11] Using a panel starting 5 years later but which still cover time horizons of 15 years at a time provides similar results as those presented in Table 7.

we incorporate a measure of the size of the public sector as an additional robustness test of our results. We test for the size and significance of this relationship through the use of an interaction variable comprised of the following:

$$FP(Int) = \frac{FP_{i,t} \times SPS_{i,t}}{Ave(SPS)} \tag{5}$$

where the level of procyclicality and the size of the public sector are interacted and is normalised by the average size of the public sector. This interaction variable is then included in the specifications of Section III, replacing the nominal procyclicality statistic.

Table 8 presents this analysis for economic growth, volatility and inflation where only the specifications which include all control variables have been included in the analysis and where only the estimate of the variables of interest have been presented; for all figures the benchmark results from Section III have been included.

[Insert Table 8 here]

In all, the analysis includes nine sets of comparative results, and in seven of the nine results not only is the magnitude of the detrimental effect amplified, it is amplified significantly, and further the significance behind the results is tightened. These results further support the concept that fiscal procyclicality is detrimental to growth, volatility and inflation. With respect to economic growth, the point estimates are increased by nearly a third on average and all estimates are significant to at least a 5 per cent level of confidence. With respect to growth volatility, a similar increase in point estimates are observed with higher significance levels. Similar results are also found for the link between fiscal procyclicality and inflation where the point estimates are observed to increase. Estimates presented in Table 8 point to the robustness of the link between the cyclicality of fiscal policy on macroeconomic outcomes to the incorporations of the size of the public sector.

The Level of Development

The results presented above are conclusive and intuitive; fiscal procyclicality has detrimental effects on macroeconomic outcomes. An interesting aspect of this relationship is related to whether this detrimental effect is stronger in some countries than others. This section looks to investigate this

question by examining the results across different levels of development. It does this through including in all the specifications from Section III an additional interaction variable which is the product of the fiscal procyclicality statistic and the log of the initial GDP used to represent the level of development within a country.

Table 9 presents this analysis for the growth results. Only the estimate of the variables of interest in those specifications which include all control variables have been included. One significant drawback in this approach is that the level of collinearity between the fiscal procyclicality and this interaction variable increases standard errors and therefore weakens results.[12] We therefore conduct a test to see whether both the coefficient attached to the procyclicality statistic and the interaction variable are jointly insignificant.

[Insert Table 9 here]

Results presented in Table 9 suggest that a rise in fiscal procyclicality will have greater negative effects on average growth rates the less developed the country is. This inference follows from the negative coefficient on the nominal procyclicality statistic combined with the positive coefficient on the interaction variable showing that the higher the initial GDP in a country the lower this detrimental impact will be. Although the levels of significance are not strong, this is because of the collinearity issue noted above and levels of joint significance for both the $\hat{\beta}$ and $\hat{\beta}$ are good, and the results for the composite measure are tentatively significant. These results are similar in nature to Aghion & Marinescu (2007) who find in their sample of 19 OECD countries that countercyclical fiscal policy has a more beneficial impact on growth the lower the level of financial development in the country.

Performing similar analysis for both growth volatility and inflation shows that the results presented in Tables 6 and 7 above are robust, and that the level of development of a specific country has little predictive power in determining how detrimental fiscal procyclicality will be for these macroeconomic outcomes (not presented). Results presented in Table 9 suggest that the detrimental impact of procyclical fiscal policy on economic growth is stronger for lower income countries.

[12] This collinearity results because as seen in Tables 1 & 2 lower income countries tend to have higher levels of fiscal procyclicality, resulting in a negative correlation between the two variables.

This is of significant interest because it is these countries who are observed to be the most procyclical, as is established above, and therefore it is for these countries that such policy is suboptimal. Fiscal procyclicality in higher income countries is still estimated to lower growth, albeit with a smaller impact.

V Concluding Remarks

The results presented above provide a clear narrative: procyclical fiscal policy is detrimental to both economic growth, output volatility and inflation. These effects are larger in countries with more sizeable public sectors and moreover, the detrimental impact fiscal procyclicality has on growth is bigger in developing countries compared with developed ones. An interesting question these findings pose is what are the channels through which these results are observed? One possible interpretation is that the impact of fiscal policy is asymmetric over the course of the business cycle. Recent research has suggested that fiscal policy is more effective in downturns compared with good times (see for example Auerbach & Gorodnichenko 2012). Under this hypothesis a government conducting countercyclical fiscal policy is using expansionary measures when it has its greatest impact on the aggregate economy: when multipliers are high (in a recession) expansionary effects are amplified. In the case of procyclical fiscal policy the results are reversed, expansionary policy is used when the effectiveness of it is at its lowest. Under this policy the main impact of expansionary policy will be on prices as the economy is close to capacity and therefore cannot increase output, which further supports our empirical finding on inflation.

Another explanation of the results found is that fiscal countercyclicality is a proxy for good general macroeconomic management. As is observed in the empirical results, there are detrimental consequences to procyclical fiscal policy and therefore a government who conducts countercyclical policy is presenting a signal to agents that they are good stewards of the economy. Research has shown that democratic institutions play a significant role in raising economic growth within a country (see for example Barro 2007) and therefore it seems reasonable that the actions of these institutions, and not just their presence, is also of importance. Countercyclical governments are able to both state and credibly demonstrate a commitment to good fiscal and economic management.

A government which conducts procyclical policy in good times looses this credibility and with it the advantages which come from it. A fiscal authority that provides the reputation of strong countercyclical measures would in time find that their reputation did the work for them as rational agents would expect the economy not to fluctuate as much and therefore their private actions will reinforce this. An economy in such a situation would feasibly have higher levels of trend growth, lower levels of fluctuations around this trend and steadier, lower rates of inflation.

Having formally linked inferior macroeconomic outcomes in the form of lower output growth, higher output volatility and higher inflation to fiscal procyclicality, our results point to the importance of moving from procyclical to countercyclical fiscal policy. When combined with the scale of fiscal procyclicality, as established in the first part of this paper, our findings on the consequences of procyclical fiscal policy suggest that establishing fiscal institutions to ensure countercyclical fiscal policy should be a policy priority. Indeed, the recent global crisis experience has clearly indicated that countries with stronger fiscal institutions were also among those better able to avoid the worst effects of the crisis.

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A Data Appendix

Table A1: Data Appendix

Variable	Description and Source

G	Real annual government consumption converted from nominal figures, where possible, using a GDP deflator and otherwise using CPI. The measure of government consumption includes all activities that decrease the net worth of the government. Data are obtained from IMF International Financial Statistics (IFS).
GDP	Real annual GDP converted, where possible, using a GDP deflator and otherwise using CPI. Data are obtained from IMF IFS.
GrGDP	Average of the annual growth rate of real GDP per capita; units in percentage terms. Data are obtained from Heston et al. (2009).
InitialGDP	Natural log of real GDP per capita, in PPP terms. Data are obtained from Heston et al. (2009).
Log(Edu)	Natural log of average years of schooling for individuals above the age of 15. Data are obtained from Barro & Lee (2001).
Log(Fert)	The log of the number of births per women, taken from the World Bank.
Log(Life)	The log of the life expectancy at birth, obtained from the World Bank.
SPS	Size of the public sector measured as the average annual proportion of government consumption (G) in real GDP (GDP). Units are measured in decimals. Authors' calculations are based on the data obtained from IMF IFS.
Open	Average of annual exports plus imports over GDP in constant prices. Unit measured in decimals. Data are obtained from Heston et al. (2009).
GDPVol	Standard deviation of the annual growth rates of real GDP per capita. The data was obtained from Heston et al. (2009).
ExRVol	Exchange rate volatility measured as the standard deviation in the growth rate of monthly nominal exchange rates between the country in question and the USA. Data used to calculate are from IMF IFS.

POLITY	Measure of democracy within a given country on a (-10,10) scale; higher values relating to higher degrees of democracy and lower values indicating greater degrees of autocracy. Data are obtained from Henisz (2010).
OPENVol	Standard deviation of the annual openness of a country measured using OPEN above. Data are obtained from Heston et al. (2009).
π	Value of the GDP deflator in percentage terms. Data are obtained from the World Development Indicators of the World Bank.
CBI'	Measure of central bank independence obtained from Cukierman et al. (1992) as well as Polillo & Guillen (2005) where the latter uses the same methodology as the former to update the statistics.
TURNOVER	Variable that measures turnover of the central bank governor between 1950 and 1989. Data are obtained from Cukierman et al. (1992).
CBI	Measure of central bank independence obtained from Cukierman et al. (1992).
POLCON	Average 'POLCONIII' score using data obtained from Henisz (2010).
XCONST	Average 'XCONST' score using data obtained from Henisz (2010).
GINI	The average of available annual Gini coefficients in the relevant time period using data obtained from Deininger & Squire (1996).
IIRating	Average Institutional Investor Ratings for 1979-2002 obtained from Reinhart et al. (2003).
NumDefault	Number of periods of external default since 1945; data obtained from Reinhart (2010).
YrsDefault	Number of years spent in external default since 1945; data are obtained from Reinhart (2010).
PDefault	Probability of default on sovereign debt computed as the ratio of the number of years in default to the total number of years since independence for each nation; authors' calculations using data from Reinhart (2010).
FiscalVol	Standard deviation in the growth rates of government spending over the relevant period; authors' calculations using data from IMF IFS.

Corruption, Accountability, PoliticalStability, GovernmentEffectiveness, RegulatoryQuality and RuleOfLaw are all variables obtained from Kaufmann et al. (2009) where the variable names are matched in the source documentation.

Table 1: Fiscal Procyclicality Statistics

Mean [min,max]	$\hat{\beta}$	$\hat{\tilde{\beta}}$	CM
High Income	0.390 [-0.451,1.139]	0.253 [-0.657,0.982]	0.184 [-0.095,0.567]
Upper middle income	0.773 [-0.498,1.905]	0.719 [-0.611,1.811]	0.235 [-0.153,0.572]
Lower middle income	0.738 [-0.116,3.122]	0.672 [-0.228,2.758]	0.197 [-0.105,0.497]
Low income	1.158 [0.021,2.308]	1.177 [-0.087,3.699]	0.238 [-0.047,0.462]

Note: Income groups relate to those as classified by the World Bank. Procyclicality statistics $\hat{\beta}$, $\hat{\tilde{\beta}}$ and CM are calculated over all available information for each individual country. Values inside square brackets represent maximum and minimum values respectively, and values outside the square brackets represent mean averages.

Table 2: Fiscal Procyclicality Over Time

	$\hat{\beta}$		$\hat{\tilde{\beta}}$		CM	
	High	Middle	High	Middle	High	Middle
1970s	0.205	0.517	0.148	0.548	0.101	0.161
1980s	0.280	0.676	0.204	0.623	0.143	0.245
1990s	0.267	0.730	0.208	0.700	0.182	0.337
2000s	0.379	0.733	0.291	0.724	0.130	0.277

Note: Income groups relate to those as classified by the World Bank. 'High' represents those classified as high income countries and 'Middle' represents those countries classified as middle income countries. Procyclicality statistics are obtained by taking an overlapping 20 year time horizon annually for every country in the sample. The statistics are then sorted by income group and decade where the end year of the 20 year time horizon is taken for the decade classification.

Table 3: Fiscal Procyclicality and Economic Growth: Bivariate Analysis

	Difference		
Percentile	(1)	(2)	(3)
10	1.112	1.331*	0.217
20	1.253***	1.190***	0.651
30	0.968***	0.883***	0.272
40	0.932***	1.072***	0.269

Note: Difference relates to the average growth rate of the x-percentile countercyclical countries minus the average growth rates of the x-percentile pro-cyclical countries; a positive difference means countercyclical countries have a larger growth rate. Columns (1), (2) and (3) represent results when applying the cyclicality statistics $\hat{\beta}$, $\hat{\tilde{\beta}}$ and CM respectively. We use the standard star convention; *** signifies that the difference is statistically significant to 1% confidence, ** to 5% significance and * to 10%.

Table 4: Fiscal Procyclicality and Economic Growth

	1	2	3	4	5	6
InitialGDP	-0.586***	-1.806***	-0.604***	-1.872***	-0.477**	-1.710***
	(0.004)	(0.000)	(0.003)	(0.000)	(0.022)	(0.000)
Log(Edu)	0.755***	0.208	0.792***	0.201	0.693***	0.064
	(0.001)	(0.412)	(0.000)	(0.424)	(0.005)	(0.805)
$\hat{\beta}$	-0.466***	-0.349**				
	(0.004)	(0.026)				
$\hat{\hat{\beta}}$			-0.424***	-0.349**		
			(0.004)	(0.019)		
CM					-1.351**	-1.080*
					(0.013)	(0.063)
Log(Fert)		-2.790***		-2.745***		-2.842***
		(0.000)		(0.000)		(0.000)
Log(Life)		3.242*		3.923**		4.042**
		(0.053)		(0.017)		(0.017)
SPS		-0.637		-0.690		-0.371
		(0.651)		(0.618)		(0.785)
Open		0.819**		0.773**		0.746**
		(0.016)		(0.020)		(0.022)
ExRateVol		-0.007		-0.007		-0.002
		(0.742)		(0.721)		(0.933)
Observations	181	139	181	139	179	136
R^2	0.262	0.469	0.2270	0.482	0.233	0.458

Note: Regression is a panel of three 15 year periods; 1960-1974, 1975-1989 and 1990-2004. The panel is a random effects panel and includes an overall constant and time period dummies; neither of which are presented in the table. If the volatility of economic growth (measured as the standard deviation in annual growth statistics) is included in the regression specification it is insignificant to any reasonable level of confidence whether the fiscal procyclicality statistic is included or not. The star convention is standard and is as stated in Table 3. Pvalues of t-statistics are in parentheses where heteroskedastic robust standard errors have been used when a Breusch-Pagan test has identified the presence of heteroskedasticity: in specifications 1,3 and 5.

Table 5: Fiscal Procylicality and Economic Growth: An Instrumental Variable Approach

	1	2	3
Benchmark - Table 5			
FP	-0.349**	-0.349**	-1.080*
	(0.026)	(0.019)	(0.063)
Instrumental Variable Approach			
FP	-0.858*	-0.932**	-2.369*
	(0.057)	(0.024)	(0.071)

Note: Regression is a random effects panel of three 15-year periods; 1960-1974, 1975-1989 and 1990-2004. Only the estimates of the variables of interest are presented but the specifications of columns 1, 2 and 3 are otherwise identical to those of columns 2, 4 and 6 in Table 5. Instruments used are political variables POLCON, XCONST and Polity as well as variables capturing Corruption, Accountability, PoliticalStability, GovernmentEffectiveness, RegulatoryQuality and RuleOfLaw. There is also a measure of inequality, GINI, as well as variables reflecting the borrowing constraints, IIRating, NumDefault, YrsDefault and PDefault. Also included is, FiscalVol, which measures the standard deviations in the growth rate of the size of the public sector. The star convention is standard and is as stated in Table 3.

Table 6: Fiscal Procyclicality and Growth Volatility

	1	2	3	4	5	6
InitialGDP	-0.355	-0.036	-0.342	-0.016	-0.378	-0.076
	(0.151)	(0.888)	(0.166)	(0.949)	(0.167)	(0.786)
Open	0.736**	-1.112	0.731**	-1.064	1.051***	-0.774
	(0.045)	(0.171)	(0.048)	(0.189)	(0.010)	(0.297)
Polity	-0.084**	-0.111***	-0.092***	-0.122***	-0.085**	-0.115***
	(0.014)	(0.002)	(0.008)	(0.001)	(0.011)	(0.000)
Beta	0.219	0.315*				
	(0.105)	(0.071)				
BetaBar			0.204	0.322*		
			(0.131)	(0.083)		
CM					2.364***	2.418***
					(0.000)	(0.001)
SPS		0.585		0.967		0.709
		(0.666)		(0.562)		(0.710)
OpenVol		0.164***		0.160***		0.147***
		(0.010)		(0.013)		(0.010)
ExRateVol		-0.015*		-0.014*		-0.031***
		(0.099)		(0.096)		(0.003)
Observations	189	147	189	147	186	143
R^2	0.209	0.304	0.215	0.310	0.250	0.349

Note: Regression is a panel of three 15-year periods; 1960-1974, 1975-1989 and 1990-2004, as above. The panel is a random effects panel and includes an overall constant and time period dummies; neither of which are presented in the table. The star convention is standard and is as stated in Table 3. Pvalues of t-statistics are in parentheses where heteroskedastic robust standard errors have been used when a Breusch-Pagan test has identified the presence of heteroskedasticity: in all volatility specifications.

Table 7: Fiscal Procyclicality and Inflation

	1	2	3	4	5	6
InitialGDP	-0.036***	-0.052***	-0.037***	-0.055***	-0.040***	-0.061***
	(0.010)	(0.003)	(0.008)	(0.001)	(0.003)	(0.000)
Open	0.015	0.050***	0.018	0.052***	0.020	0.041***
	(0.658)	(0.004)	(0.570)	(0.002)	(0.532)	(0.010)
ExRateVol	0.001	-0.000	0.001	-0.001	-0.000	0.000
	(0.624)	(0.993)	(0.615)	(0.721)	(0.888)	(0.930)
$\hat{\beta}$	0.030**	0.035**				
	(0.040)	(0.017)				
$\hat{\hat{\beta}}$			0.028**	0.038***		
			(0.050)	(0.005)		
CM					0.133***	0.042
					(0.008)	(0.392)
CBI'		0.096		0.122		0.105
		(0.654)		(0.565)		(0.642)
Turnover		0.184***		0.179***		0.187**
		(0.007)		(0.010)		(0.011)
CBI		-0.223		-0.220		-0.166
		(0.476)		(0.471)		(0.620)
Observations	122	65	122	66	121	66
R^2	0.131	0.530	0.132	0.534	0.151	0.500

Note: Regression is a panel of three 15 year periods; 1960-1974, 1975-1989 and 1990-2004. The panel is a random effects panel and includes an overall constant and time period dummies; neither of which are presented in the table. The star convention is standard and is as stated in Table 3. Pvalues of t-statistics are in parentheses where heteroskedastic robust standard errors have been used when a Breusch-Pagan test has identified the presence of heteroskedasticity: in specifications 2,4 and 6.

Table 8: The Importance of the Size of the Public Sector

	1	2	3
Average Growth: Benchmark Table 5			
FP	-0.349**	-0.349**	-1.080*
	(0.026)	(0.019)	(0.063)
Average Growth: Interacted Variable			
$FP(Int)$	-0.461**	-0.478***	-1.259**
	(0.017)	(0.007)	(0.041)
Growth Volatility: Benchmark Table 7			
FP	0.315*	0.322*	2.418***
	(0.071)	(0.083)	(0.001)
Growth Volatility: Interacted Variable			
$FP(Int)$	0.542**	0.413*	2.415***
	(0.028)	(0.075)	(0.004)
Inflation: Benchmark Table 8			
FP	0.035**	0.038**	0.041
	(0.017)	(0.005)	(0.392)
Inflation: Interacted Variable			
$FP(Int)$	0.040**	0.045***	0.021
	(0.016)	(0.002)	(0.702)

Note: Regression is a random effects panel of three 15 year periods; 1960-1974, 1975-1989 and 1990-2004. Only the estimates for the variables of interest are presented but the specifications of columns 1, 2 and 3 are otherwise identical to those of columns 2, 4 and 6 in the analysis for each dependent variable in Section 3. The star convention is standard and is as stated in Table 3.

Table 9: Fiscal Procylicality, Economic Growth and the Level of Development

	1	2	3
Benchmark - Table 5			
FP	-0.349**	-0.349**	-1.080*
	(0.026)	(0.019)	(0.063)
Interaction Variable Approach			
FP	-2.445*	-1.793	-6.385
	(0.056)	(0.135)	(0.203)
$FP \times InitialGDP$	0.250*	0.173	0.617
	(0.099)	(0.225)	(0.286)
Joint Significance	0.021	0.030	0.105

Note: Regression is a random effects panel of three 15 year periods; 1960-1974, 1975-1989 and 1990-2004. Only the estimates for the variables of interest are presented but the specifications of columns 1, 2 and 3 are otherwise identical to those of columns 2, 4 and 6 in Table 5. Joint significance relates to the pvalue of a t-test testing the joint significance of both the nominal procyclicality statistic and the interaction statistic. The star convention is standard and is as stated in Table 3.