Determinants of Cyclicality of Fiscal Surpluses in The OECD Countries

Mackiewicz, Michał

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Abstract

In this paper we examine factors that make some governments revert to procyclical fiscal policies despite the standard normative prescription being to conduct fiscal policy countercyclically. In order to avoid the pitfalls of the two-step methods previous studies have typically used we used a one-step method with interaction variables. We found robust statistical evidence that procyclical fiscal policies are typically run by countries with weak institutions. There was also some empirical support for a hypothesis that countries that have accumulated a high debt-to-GDP ratio tend to run procyclical fiscal policies, possibly as a result of the financial constraints. We found no evidence that any other variable among the ones suggested in the literature explains the way in which governments react to the business cycle.

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INTRODUCTION

The cyclical behaviour of fiscal policy has been subject to numerous theories and studies. According to the standard normative approach, fiscal policy should respond countercyclically to the business cycle. That is, the deficit should increase during economic downturns, whilst surplus should be generated during the upswings. Such behaviour remains in line with both the standard Keynesian prescriptions and the tax-smoothing theory of Barro (1979) and Lucas and Stokey (1983). A growing body of literature suggests also that it is beneficial to limit the countercyclical policy to automatic stabilisers and to refrain from additional discretionary actions, due to their relatively small multipliers (Perotti 2002), possible non-Keynesian effects (Giavazzi and Pagano 1990; Alesina et al. 2002), and unavoidable implementation lags.

The recent literature shows, however, that such behaviour by fiscal authorities is not common. Gavin et al. (1996) were the first to observe that in most Latin American countries limited access to international capital markets has resulted in sharply procyclical fiscal policies, which, additionally, augmented their macroeconomic volatility. Catao and Sutton (2002) confirmed this result with respect to other low-income countries. Talvi and Vegh (2000) observed that while fiscal policies turn out to be procyclical in most low- and middle-income countries, in the G7 states they remain generally in line with the normative prescriptions. Lane (2003), Calderon, Duncan, and Schmidt-Hebbel (2003; 2004) and Alesina and Tabellini (2005) reached similar conclusions.

Different authors have offered alternative theoretical interpretations for these results. Chronologically the first one is the theory of financial restraints, proposed by Gavin et al. (1996), Calderon et al. (2003) and Calderon and Schmidt (2003). According to this concept,

the main factor that limits governments' abilities to react countercyclically is the credit rationing imposed by investors, which becomes particularly severe during economic downturns. In line with this reasoning, it is argued that less-developed countries are generally more prone to run pro-cyclical policies, due to higher risk and limited access to international capital markets.

Other theories that try to explain the observed procyclicality put stress on the institutional and social characteristics of the countries. Authors of these theories derive procyclical fiscal policies from game-theoretic models, typically in a common-pool setting, that encompass interactions between voters, groups of interest, political actors and investors. The determinants of cyclical behaviour of the fiscal authorities are output volatility and dispersion of political powers (Tornell and Lane 1998, 1999 and Lane 2003), corruption (Alesina and Tabellini 2005), or polarisation of preferences (Woo 2006).

There is a considerable body of empirical research available in support of this group of theories. Virtually all the aforementioned authors presented some econometric evidence in favour of the preferred explanation. However, according to our knowledge, the available theories have not been confronted directly using the same data set, which does not allow to compare their explanatory power. Moreover, two methodological problems are common in the existing studies. The widely used method is a two-step procedure that encompasses estimating an indicator of fiscal cyclicality country-by-country using time series models, and then finding determinants of such indicators, using cross-sectional equations. As Canova and Pappa (2005) pointed out, such a method is likely to be biased and tends to overestimate the true effect. The second issue is the use of ratio of deficit to GDP as a central fiscal indicator, which may lead to overestimating the size of cyclical effects in countries with large public sectors. Since the size of the public sector is likely to be correlated with the institutional

characteristics, such a misspecification is likely to bias the results, while the sign of bias is difficult to assess a priori.

Comparing the explanatory power of different theories that explain the phenomenon of procyclical fiscal policies, whilst avoiding the abovementioned methodological problems, is the objective of this paper. It does so using the panel data for 32 countries, mainly the members of Organisation for Economic Co-operation and Development (OECD), in years 1980-2005. We found evidence that countercyclical fiscal policies are typically run by countries with better institutions, measured by the "Regulation of Credit, Labor, and Business" component of the Gwartney and Lawson's (2005) Economic Freedom of the World index. There was also some empirical support for a hypothesis that countries that accumulated high debt-to-GDP ratio tend to run procyclical fiscal policies, possibly as a result of the financial constraints imposed by the investors. We did not find evidence that any other variable among the ones included in the study explains the way governments react to the business cycle.

The first section presents the key issues in measuring the impact of the business cycle on fiscal variables. The second section reviews the potential determinants of fiscal cyclicality that can be derived from different theories. It also discusses the proposed methodology of testing their explanatory power. The third section presents results of the empirical analysis. The last section concludes.

I. THE CYCLICAL BEHAVIOUR OF FISCAL POLICY

I.1. Choice of the Dependent Variable

In the analysis of cyclical behaviour of fiscal policy, it is crucial to properly define the indicator of fiscal stance. Three variables, fiscal balance, the cyclically adjusted fiscal balance, and public spending, are typically used for this purpose. All three measures typically refer to the consolidated general government sector, while in some studies, mainly due to the availability of comparable data, the central government surplus is used instead.

The first measure, fiscal balance, is the most commonly used indicator of fiscal policy. Its main advantage is that it fully reflects the impact of the public sector on domestic savings and domestic demand. It has, however, also at least two crucial drawbacks. Firstly, it includes interest payments, a type of expenditure that is independent from the government's decisions, at least in the short run. It rather reflect the behaviour of investors on the one side, and the past behaviour of the governments on the other. A simple solution to this problem is using the primary surplus, instead of the total surplus. Secondly, fiscal surplus it is a poor measure of the fiscal authorities' discretionary actions, since it depends strongly on the phase of the business cycle. To control for this dependence, the cyclically-adjusted fiscal surplus is often used instead as a measure of fiscal stance. However, a vast literature concerning the methodology of fiscal adjustment (see, for example, Banca d'Italia 1999) points at fundamental problems with this type of indicator. Neither it can be measured directly and no commonly accepted methodology exists, therefore putting this measure to a large extent under the discretion of the researcher.

An alternative approach is to use public expenditure, usually as a ratio of gross domestic product (GDP), as the central measure of fiscal policy. Since state expenditure only

weakly depend on output (the impact of the business cycle is limited to, usually small, unemployment-related benefits), this indicator can be directly used as the measure of fiscal stance. However, this indicator does not give the full picture of the impact of fiscal policy on domestic demand. It is also a poor measure of fiscal discretion, since it ignores the revenue side of the budget, while for some governments changes of the tax system are an important instrument of shaping the fiscal policy within the business cycle.

We should, hence, choose an indicator that covers possibly all the government's operations. This is crucial, since the fiscal authorities may tend to move some expenditure items to extra budgetary funds, particularly if they are subject to the fiscal rules. The ideal measure should also encompass both expenditure and revenue side of public finances in order to cover any kinds of discretionary actions that change overall fiscal stance. It should also be possibly simple and insensitive to the discretionary choices concerning methodology, automatic stabilizers, and to the exogenous changes of the costs of servicing the public debt. One can easily show that none of the standard fiscal indicators fulfils all the criteria. In order to have both simple and comprehensive measure, we decided to use the primary surplus of general government as the main measure of fiscal stance. We address the issue of cyclical sensitivity indirectly, through including the output gap in the econometric model.

I.2. Measuring Impact of the Business Cycle: Methodological Issues

It is a common practice in the empirical literature to use the ratio of fiscal surplus to GDP as the measure of fiscal stance. In order to control for the impact of the business cycle, this indicator is then regressed on the output gap (a percentage deviation of GDP from its trend). Hence, a typical equation of ratio of fiscal surplus (S_{it}) to GDP (Y_{it}), for country i at time t, takes the form:

(1) $$S_{it} / Y_{it} = \alpha_i + \alpha_1 (S_{it-1} / Y_{it-1}) + \beta_0 (Y_{it} / \overline{Y}_{it} - 1) + \mathbf{x}'_{it}\boldsymbol{\beta}_1 + \eta_{it},$$

where $\overline{Y}_{it}$ denotes the potential output, $\mathbf{x}_{it}$ is a vector of other control variables, and η_{it} is a disturbance term. However, using such a specification results in considerable drawbacks. It implicitly assumes unitary elasticity, which does not have to be true, especially in the short run, in the presence of progressive taxation. A more serious problem is that it overestimates the reaction to the business cycle fluctuations in the countries with larger public sector, while tends to underestimate it in countries where governments are small. To see this, imagine two countries, A and B, that are characterized by public revenues proportional to output, expenditures insensitive to the business cycle and the fiscal authorities that refrain from any discretionary decisions. The only difference is the size of the public sector h (the ratio of revenue to GDP), so that $h_A < h_B$. Then For 1 percentage point change of output gap leads to change of the ratio of surplus to GDP, by h_A and h_B, respectively. This creates a misleading picture that country B runs a stronger countercyclical policy, while, in fact, fiscal authorities in both countries behave in a neutral way with respect to the business cycle.

In order to deal with these problems, Lane (2003) and Woo (2006) used an alternative specification:

(2) $$\Delta \log(G_{it}) = \alpha_i + \beta_1 \Delta \log(Y_{it}) + \eta_{it},$$

where Y_{it} denotes real GDP and G_{it} are fiscal expenditures. While their approach solves the issue of potentially non-unitary elasticities, it is still sensitive to the problem of different-sized public sectors. Moreover, the first-differencing can remove only the linear trend from the variables, while in order to remove any other form of trend typically present in

GDP, some more flexible filtering technique, such as the Hodrick-Prescott filter, is necessary.

I.3. Baseline Specification

In order to solve all the abovementioned problems in a consistent way, we use an alterative approach. The equations that model key fiscal variables, general government real expenditure (excluding interest payments) G and revenue H (for the country i at year t), take the form:

$$(3) \qquad G_{it} = \overline{G}_{it} (\tilde{y}_{it})^{\varepsilon_G} \qquad\qquad H_{it} = \overline{H}_{it} (\tilde{y}_{it})^{\varepsilon_H},$$

where $\overline{G}$ and $\overline{H}$ denote, respectively, the structural levels of expenditure (also excluding interest payments) and revenue, while $\tilde{y}_{it}$ is the output gap, defined as the ratio of actual to potential GDP. The ε_E and ε_H are short-run output elasticities of expenditure and revenue. If g = G/Y, h = H/Y (and, respectively, $\overline{g} = \overline{G} / \overline{Y}$, $\overline{h} = \overline{H} / \overline{Y}$), then these identities can be re-written as:

$$(4) \qquad g_{it} = \overline{g}_{it} (\tilde{y}_{it})^{\varepsilon_G - 1} \qquad h_{it} = \overline{h}_{it} (\tilde{y}_{it})^{\varepsilon_H - 1}.$$

Unlike the conventional approach, we define the general government surplus as the *ratio* of revenue to expenditure[1]. This definition, together with (4), allows us to formulate the following equation of (primary) fiscal surplus:

[1] This is approximately equal 1 plus the ratio of conventional surplus (the difference between revenue and expenditure) and expenditure.

(5) $$\ln(h_{it} / g_{it}) = \ln(\bar{h}_{it} / \bar{g}_{it}) + (\varepsilon_H - \varepsilon_G)\ln(\tilde{y}_{it}).$$

The expression $(\varepsilon_H - \varepsilon_G)$ in this equation is the measure of cyclical budget elasticity, and later in this text will be denoted as ε_S.[2] This formulation allows us to avoid the problem of comparing fiscal cyclicality in countries with different size of the public sector. In the example of two countries, A and B, such a specification will show that in both of them cyclical budget elasticity is the same and equals 1. It also addresses two other problems of the conventionally used specification: it allows for both non-unitary elasticities of revenue and expenditure, as well as for a non-linear trend in GDP time series.

An important issue is modelling the behaviour of structural part ($\log(\bar{h}_{it} / \bar{g}_{it})$) in equation (5). We assume that it can be modelled as an autoregressive process of order N, with a number of additional control variables. It is reasonable to expect that structural surplus is correlated with both present and past values of the output gap. Such a relationship reflects the existence of the authorities' underlying cyclical reaction function. The governments often declare that their objective is to keep full employment, which implicitly means actively managing the structural surplus in order to keep output gap close to 0. On the other hand, the aforementioned empirical results and theories demonstrate that in many cases they fail to do so, aggravating cyclical fluctuations through procyclical fiscal policies. We should, hence, allow for a presence of a cyclical reaction function. At this point, as a baseline case, we

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[2] More strictly, ε_S is the short-run output elasticity of budget balance, measured as the ratio of revenues to expenditures. If it is close to 0, then the budget balance is insensitive to short-run changes in GDP. When it is close to 1, a change of output gap by 1 percent of GDP causes a change of budget balance by ρ percent of GDP, where ρ is approximately equal to the share of public revenues in GDP

assume it to be a constant, dynamic process of order up to M, while further in the paper we allow it also to change both between countries and across time.

In addition to output, structural surplus is likely to depend on a number of other variables. The one typically used in the literature is inflation (Woo 2006). Many of budgetary items are indexed to price growth, hence (both expected and unexpected) changes in rate of price growth may have an impact on fiscal stance. The other determinant is openness of the economy, which reflects the hypothesis that more open economies usually have better access to capital markets and are hence able to have larger deficits. On the other hand, open economies are more dependent on foreign investors and may thus have an incentive to run more responsible fiscal policies. We also allow for the possibility that the level of development (expressed as GDP per capita, either in absolute terms or relative to some average) may also have an effect on the fiscal behaviour. Also, a number of social and institutional characteristics may influence the level of surplus through different channels (see Drazen 2000 or Persson and Tabellini 2000 for thorough reviews). Finally, in order to achieve intertemporal sustainability of fiscal policy, the stock of public debt has to be included among the regressors. The expected positive sign of the respective coefficient expresses a hypothesis of the long-run stabilising behaviour of the growing stock of debt. All the abovementioned characteristics build the column vector of control variables $\mathbf{x}_{it}$. We assume that these variables can exert a dynamic impact on fiscal surplus, with a maximum lag of M.

Hence, the equation of structural surplus can then be specified as:

(6) $$\ln(\bar{h}/\bar{g}) = \alpha_0 + \sum_1^N L^n \alpha_n \ln(\bar{h}/\bar{g}) + \sum_0^M L^m (\kappa_m \ln(\tilde{y}) + \boldsymbol{\gamma}_m' \mathbf{x}) + \eta,$$

where L is the lag operator and η are i. i. d. innovations that represent purely discretionary decisions of fiscal authorities, uncorrelated with any other explanatory variable (we dropped subscripts $_{it}$ to save space). Solving for structural surplus yields:

(7) $$\ln(\bar{h}/\bar{g}) = \frac{\alpha_0 + \sum_0^M L^m (\kappa_m \ln(\tilde{y}) + \boldsymbol{\gamma}_m' \mathbf{x}) + \eta}{1 - \sum_1^N L^n \alpha_n}.$$

After substituting into (5) and re-arranging, we obtain finally:

(8) $$\ln(h/g) = \alpha_0 + \varepsilon_S \ln(\tilde{y}) + \sum_1^N L^n \alpha_n (\ln(h/g) - \varepsilon_S \ln(\tilde{y})) +$$

$$+ \sum_0^M L^m (\kappa_m \ln(\tilde{y}) + \boldsymbol{\gamma}_m' \mathbf{x}) + \eta.$$

The above equation is an ADL(N,max{M;N}) model. Differently from model (5), which contains an unobservable $\log(\bar{h}_{it}/\bar{g}_{it})$, this equation contains only observables and can be thus directly estimated using the econometric procedures.

A parameter of special interest in equation (8) is the overall elasticity of surplus to contemporaneous output gap, equal $\varepsilon_S + \kappa_0$. It has two components: the elasticity of automatic stabilizers ε_S and the elasticity of government's reaction function κ_0. This measure allows us to easily define the procyclical and countercyclical fiscal policy. A natural benchmark for the parameter $\varepsilon_S + \kappa_0$ is 1, which corresponds to the case when revenues change proportionally to output, expenditures are cyclically neutral and the fiscal authorities do not undertake any actions in response to the business cycle fluctuations. Its exact level depends on such factors as the progressiveness of the tax system, relative share of indirect taxes (that typically move proportionally to the tax base), or the share of such cyclically sensitive expenditure components as unemployment benefits. The empirical analysis

presented further in the paper shows that, indeed, 1.2 is a typical value taken by so defined cyclical elasticity of the budget, while standard deviation of the respective estimate only occasionally exceeds 0.2. This allows us to define cyclically neutral fiscal policy as the case when the cyclical budget elasticity ranges from 1.0 to 1.4. Values of ε_S below this range correspond to procyclical policy, when actions undertaken by governments limit the operation of fiscal stabilizers. Budget elasticity higher than 1.4 denotes, in turn, the cases when the governments run countercyclical fiscal policy, thus strengthening the built-in automatic stabilizers.

II. WHAT DETERMINES FISCAL CYCLICALITY?

A method to examine the determinants of fiscal cyclicality is to allow the output elasticity of fiscal surplus, $\varepsilon_S + \kappa_0$, to vary both between countries and over time. While it is unlikely that the governments change the values of ε_S (the strength of the automatic stabilizers) on a year-to-year basis, it is possible that they influence it in the longer run. International comparisons show, indeed, considerable differences in the size of automatic stabilizers between the countries (van den Noord 2002).

The second component, κ_0, reflects the government's discretionary reactions to the state of economy.[3] If a government runs a passive policy, that is, keeps the structural surplus constant, than $\kappa_0 = 0$. However, it is reasonable to assume that typically this is not the case, since most governments, as they proudly announce, take some actions in response to the anticipated recessions. Symmetrically, we can also expect that they do respond to booms as

[3] Since these actions may be described by a reaction function, they may be better described as quasi-discretionary.

well. Contrary to ε_S, that is unlikely to change rapidly, parameter κ_0 may both differ considerably between countries, as well as quickly change on a year-to-year basis.

Since it is both irrelevant and difficult to distinguish econometrically between changes in ε_S and κ_0, we treat them as a single parameter, no matter from where the output elasticity of fiscal surplus comes, whether from automatic stabilisers or a government's reaction function. The following subsection discusses the list of potential determinants of the joint parameter $\varepsilon_S + \kappa_0$.

II.1. Choice of The Determinants of Fiscal Cyclicality

Among the available theories of fiscal procyclicality, chronologically the first one is the hypothesis of financial restraints. According to this hypothesis, the main factor that limits governments' abilities to react countercyclically is credit rationing imposed by investors (Gavin et al. 1996; Calderon et al. 2003; Calderon and Schmidt 2003). The role of financial restraints is supposed to be particularly large in the less-developed countries. Due to low creditworthiness, investors tend to impose high risk premiums there, or resort to direct credit rationing during economic downturns, thus narrowing the room for countercyclical fiscal actions.

This theory, while simple and highly intuitive, has also serious drawbacks, generally associated with its lack of consistent theoretical foundations (see discussion in Alesina and Tabellini 2005). One may doubt, why investors impose borrowing constraints only during recessions, instead of keeping low exposure to a country-specific risks continuously over the business cycle. Another issue is why these countries do not accumulate reserves in good times so that they were able to use them during economically weaker times. However, both doubts seem to have relatively simple answers. The observation that the borrowing

constraints become particularly severe during economic downturns, instead of being smoothed over the cycle, seems to be consistent with the observation that capital markets tend to react too much and too late. The herd behaviour of investors results in massive withdrawals of investments when concerns about the solvency of the public sector become evident. Numerous theories of the widely observed deficit bias from the field of political economy explain why poor countries do not accumulate reserves in good times (see, for example, Drazen 2000 for a review). These two mechanisms together can result in the deficit bias, which can be, however, squeezed out in times of recession because of the borrowing constraints.

Hence, the theory of financial constraints still offers some theoretical explanatory power, while its predictions have widely been tested in the literature. The empirical studies use several economic variables as proxies for the stringency of financial constraints. These variables are the fiscal balance (Perry 2003; Woo 2006), the stock of public debt (OECD 2003), trade openness as a measure of access to foreign capital markets (Lane 2003; Woo 2006), credit ratings and the spread of sovereign debt over the US debt (Alesina and Tabellini 2005), and the current account balance (Woo 2006). Another measure could be country risk premium spreads used by Calderon and Schmidt (2003), while the authors treat high values of this variable rather as a sign of weak institutions and the lack of credibility.

Alesina and Tabellini (2005) suggested that the influence of borrowing constraints on the ability to conduct an anti-cyclical policy should differ during downturns and upturns, and that the borrowing constraints should only exert their impact during recessions. However, this idea has not been tested empirically, probably because of the complexity of the econometric procedure that would have to be used in this case.

Nevertheless, because of some potential shortcomings of the conventional concept of financial constraints, several alternative theories have been developed. Tornell and Lane (1998; 1999) built the common-pool models to explain fiscal procyclicality. In their game-theoretic setup, different power blocs compete for a share in a common pool of fiscal revenues. Power blocs can be interpreted as branches of government (legislative versus executive), parties within a coalition, or ministries within a government's executive branch. Their key result is what is known as the voracity effect. Because the competition for the common resource becomes more intense during economic upturns, spending can grow more than proportionally to the increase in income, resulting in a procyclical outcome. Lane (2003), in line with these theoretical predictions, presented empirical evidence that countries with more volatile output and more dispersed political power are those most likely to run procyclical fiscal policies.

Similarly, Talvi and Vegh (2000) developed a model in which the key forces that drive procyclical policies are the groups of interests that push for state expenditures in their areas. While it is easier for governments to counter actions of these groups during the economically weaker times, this is less the case during expansion, as governments have no excuse for keeping the outlays down then.

Alesina and Tabellini (2005) offered an explanation for procyclical fiscal policies in which the key determinant is the presence of corruption. In their model, it is easier for the authorities to steal during prosperous times, as enough resources are available then to provide a sufficient supply of public goods to the citizens. According to Alesina and Tabellini's (2005) central conclusion, fiscal policies are more likely to be procyclical in countries with higher corruption and weaker institutions, and they present empirical evidence to support this view.

Woo (2006) followed a slightly different line of reasoning. He presented a model of strategically behaving policymakers under a polarisation of preferences, which becomes the key determinant of the degree of procyclicality. He found empirical evidence that income and educational inequality, as measures of polarisation, are indeed correlated with the index of fiscal procyclicality.

These theories form another group, clearly distinguishable from the hypothesis of financial constraints. In line with theories from this group, these are mainly political and empirical characteristics of countries that determine the cyclical behaviour of fiscal policy. Among the variables used in empirical studies are indices of corruption (Alesina and Tabellini[4] 2005), a measure of institutional quality (Woo 2006), measures of political constraints (Lane[5] 2003; Woo 2006), and the Gini coefficient for the distribution of income and an index of educational polarisation, both used as measures of social polarisation by Woo (2006).

There is also a number of other variables used as factors that explain differences in the cyclical behaviour of fiscal policies, that cannot be clearly attributed to any of the abovementioned theories. These are membership in the OECD (Kaminski et al. 2004), initial GDP per capita (Alesina and Tabellini 2005; Woo 2006), GDP per capita (Lane 2003), size of the public sector (Lane 2003; Woo 2006), and the volatility of output, measured as the standard deviation of GDP growth rates (Lane 2003). While some of these variables are used explicitly as regressors for the output elasticity of fiscal variables, the others (such as

[4] The source of the index itself was Kaufmann, Kraay, and Mastruzzi (2004).

[5] The index itself was devised by Henisz (2000).

membership in the OECD) come up as *ex post* explanations for the observed differences, although without clear theoretical reasons.

It is difficult to eliminate a priori any of the variables usually used to explain differences in cyclical behaviour of fiscal policy, since most of them have, however, strong theoretical foundations. Hence, we adopted a different empirical strategy, taking initially a relatively generous set of potential determinants of the parameter $\varepsilon_S + \kappa_0$, and testing their relevance empirically. The initial choice of potential determinants included the variables listed below.

Institutional quality (*isreg*)

To our knowledge, there is no readily-available specific theory that relates cyclical response of fiscal policy to the quality of institutions. However, the impact of the latter variable on fiscal policy in general is a widely accepted presumption. Hence, it is reasonable to expect that is may also exert influence on the way the governments react to business cycle. Among the available indices that are supposed to measure quality of institutions, the Economic Freedom of the World index (Gwartney and Lawson 2005) is probably the most widely used one. Among its five components we have selected the 5th.: "Regulation of Credit, Labor, and Business" as the best measure of the quality of institutions *per se*. The other components are either irrelevant (such as access to sound money) or are addressed in our study in a different way (such as the size of government), hence including them in the index would be likely to blur the results. We expect the quality of institutions to have a positive impact on $\varepsilon_S + \kappa_0$ (i.e. better institutions mean more countercyclical policy).

Political constraints (*iscoh*)

The index of political constraints can be treated as an alternative measure of institutions. We used the POLCON index constructed by Henisz (2000, with the later updates), who defines it as a function of the number of independent effective veto points in the political process. Higher score in POLCON index means lower probability that the undertaken policy will change. Since countries that run strongly procyclical fiscal policy require to change their fiscal stance frequently, we expect them to be characterized by low values of the index of political constraints.

Corruption (*iscor*)

The use of corruption in this study is directly derived from the recent theory of Alesina and Tabellini (2005). As a measure of corruption we used the index of corruption perception from the ICGG database. In line with this theory, we expect corruption to be higher in countries that tend to run procyclical fiscal policy.

Polarisation of preferences (*isgini*)

As suggested by Woo (2006), the polarisation of preferences is likely to be the key underlying factor that explains the differences in fiscal policies. Taking this author's approach, as a proxy for polarisation of preferences we used the Gini coefficient for disposable income. The Gini coefficient itself was obtained from the UNU-WIDER (2005) World Income Inequality Database. The database is a compilation of results from various studies, hence the comparability between countries is limited. Because of low quality of the data and relatively few data points when compared to other indicators, the results obtained using this indicator should be treated with caution. An open issue is also, whether polarisation of income is a valid proxy for a degree of polarisation of preferences.

Age of democracy (*idem*)

Some studies indicate that the age of democracy is an index that measures in a complex manner different aspects of the development. In relation to fiscal policy, Brender and Drazen (2005) use it to explain the presence of political business cycle, while Persson and Tabellini (2005) employ the age of democracy to explain differences in productivity. We use their data to construct an index of the age of democracy, which we defined as a logarithm of the number of years between current year and the first year of democracy. As older democracies are expected to have stronger institutions, we expect them also to run more countercyclical fiscal policy.

Level of development (*yv*)

The existing empirical evidence suggests that procyclical fiscal policies are generally a problem of the less-developed economies. As these countries are often characterized by a mix of weak economic fundamentals, weak institutions and low GDP per capita, it is important to distinguish whether bad policies are due to well-defined problems, such as institutions or high deficit, or it is purely a matter of a country being less-developed. To test the latter, a measure of GDP per capita was included among the regressors of fiscal cyclicality.

Openness of the economy (*xh*)

Openness of the economy, measured as the ratio of sum of exports and imports to GDP, may exert a twofold impact on the cyclical behaviour of fiscal policy. In more open economies governments are likely to adhere to standards of running responsible (i.e. countercyclical, among others) fiscal policy, as they depend strongly on international investors. On the other hand, during a recession the governments in such countries are more exposed to abrupt outflows of foreign capital in case investors suspect problems with

solvency. The governments may in such cases choose to consolidate, thus reverting to procyclical fiscal policy. The two mechanisms work in opposite directions, hence it is difficult to form ex ante expectations concerning the overall impact of openness of the economy on fiscal cyclicality.

Structural surplus (*sl1*) and public debt (*br*)

The main idea of the theories of financial constraints is that governments that are already in bad financial situation may not be able to expand deficit during an economic downturn, due to a credit rationing imposed by investors. It remains an open issue what exactly constitutes a bad financial situation of a government. Potentially, it can be both high structural deficit and a large accumulated stock of debt. We decided to use both indicators in order to determine whether the liquidity constraints play any role in making the fiscal policy procyclical.

II.2. Methodological Issues

An empirical approach typically employed in the literature is to use a two-step procedure (see, for example, Lane 2003, Fatas and Mihov 2004, Alesina and Tabellini 2005). The first step is to estimate country-by-country parameters of the equation:

$$(9) \qquad y_{i\tau} = \alpha_i + \mathbf{x}'_{i\tau}\boldsymbol{\beta}_i + \varepsilon_{i\tau},$$

where y_{it} is a fiscal variable of interest and $\mathbf{x}_{it}$ is a vector of contemporaneous and lagged macroeconomic variables. Then, in the second stage, the parameters of the following set of equations are estimated:

$$(10) \qquad \boldsymbol{\beta}_i = \boldsymbol{\gamma}_0 + \boldsymbol{\Gamma}\mathbf{z}_i + \rho_i \ ,$$

where $\mathbf{z}_i$ is a vector of country-specific political and institutional variables and $\boldsymbol{\Gamma}$ is a matrix of parameters.

However, as Canova and Pappa (2005) pointed out, this two-step procedure may give misleading results, tending to overestimate the impact of variables $\mathbf{z}_i$ on the parameters $\boldsymbol{\beta}$. The main problem to which they pointed is that while the $\boldsymbol{\beta}$'s in the second step have been estimated, the procedure treats them as if they were observable, which leads to the estimates of $\boldsymbol{\Gamma}$ being reported as statistically significant, even though the true effect is weak or absent.[6]

There is also another drawback to the described methodology. It only allows for time-invariant regressors in the second stage, since the equation (10) uses only the cross-sectional variance, while the time variance is entirely used up in the first stage. While it can be a minor problem when $\mathbf{z}_i$ includes only institutional variables that, by nature, change slowly, it becomes more serious when the variables like stock of public debt or the GDP per capita are included in the analysis.

For these reasons, this paper uses an alternative methodology. It assumes that $\boldsymbol{\beta}$'s can vary both between cross-sections and in time, which can be described by equation $\boldsymbol{\beta}_{i\tau} = \boldsymbol{\gamma}_0 + \boldsymbol{\Gamma}\mathbf{z}_{i\tau}$. This formula is then directly plugged into $y_{i\tau} = \alpha_i + \mathbf{x}'_{i\tau}\boldsymbol{\beta}_{i\tau} + \varepsilon_{i\tau}$, which yields finally:

$$(11) \qquad y_{i\tau} = \alpha_i + \mathbf{x}'_{i\tau}\boldsymbol{\gamma}_0 + \mathbf{x}'_{i\tau}\boldsymbol{\Gamma}\mathbf{z}_{i\tau} + \varepsilon_{i\tau}.$$

This equation, that now contains a number of interaction variables $\mathbf{x}'_{i\tau}\boldsymbol{\Gamma}\mathbf{z}_{i\tau}$, can be estimated using standard panel econometric techniques. The vector $\boldsymbol{\beta}$ in the case that is analyzed in this paper consists of only one variable, $(\kappa_0 + \varepsilon_S)_{i\tau}$.

To our knowledge, there are two studies that use interaction terms to allow for varying parameters of fiscal response to the business cycle. The first are Calderon and

[6] See also Canova (2007) for a textbook exposition of this problem.

Schmidt (2003), who showed that fiscal policy tends to become procyclical in those Latin-American countries that are characterized by high country risk premium spreads. They found out that "*countries with low to moderate risk spreads – reflecting better fundamentals and larger credibility – are capable of pursuing counter-cyclical policies*" (p. 898). Their results said, however, little about which factor – fundamentals or credibility is the key determinant of fiscal cyclicality. Another study is of Persson and Tabellini (2005), who used interaction terms of output gap and the dummy variables to show that fiscal reactions to the business cycle tend to be more countercyclical under majoritarian political systems.

However, both analyses use the conventional measures of fiscal surplus (i.e. its ratio to GDP). Hence, since the samples comprised countries with varying size of the public sectors, the validity of both findings is problematic (see point I.2 for a detailed discussion of the issue).

III. EMPIRICAL ANALYSIS

III.1. Data and the Estimation Techniques

The empirical analysis uses economic data from the European Commission's Ameco database. Social and institutional indicators come from the other sources described in Appendix A. The data are organised as an unbalanced panel of 28 countries over the years 1980-2005 (the list of countries is presented in tables in Appendix B).

Since all the estimated equations are dynamic, the standard fixed-effects panel estimator is typically biased and inconsistent (Nickell 1981). To avoid this problem, this study used as its main econometric method the Arellano and Bond (1991) generalised method of moments (GMM) procedure. To make it less computationally intensive, we

limited the number of lags of the dependent variable used as instruments to 15.[7] The second method was the bias-corrected fixed-effects estimator (FE-BC), originally proposed by Kiviet (1995). Judson and Owen (1996; 1999) suggested it to be the best estimator for use in macroeconomic panels where the number of individuals is typically moderate and similar to the number of time periods. However, because of problems with including more than one lag of the dependent variable among the regressors, we decided to use it as complementary to the Arellano-Bond GMM.[8] We used the latter as the primary estimator in the process of specification testing.

III.2. Estimation of The Baseline Model

The preliminary step of the analysis was the testing of the specifications of equation (8). We set the maximum lag for all regressors to two years (i.e. M = N = 2) and let the specification tests determine the dynamic structure of the model. We determined the choice of a two-year lag by the nature of the budgetary process. Governments usually draft their budgets for year t in the second half of year t – 1, when the fiscal and macroeconomic data for year t – 2 are known. Introducing more lags would also have been unlikely to add much more information, as the model already has a memory because of the presence of a lagged dependent variable on the right-hand side. Given a relatively large number of regressors (10 and a constant), including too many lags would also considerably increase the problem of multicollinearity.

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[7] For the calculations we used XTABOND routine in STATA. The programs and dataset are available from author upon request.

[8] We used the STATA implementation of a bias-corrected fixed-effects estimator XTLSDVC, programmed by Bruno (2005).

Equation (8) defines an ADL(2,2) model, with the primary surplus as the dependent variable and a list of exogenous regressors that include output gap, debt, inflation, the openness of the economy, and the relative level of GDP per capita. It seems reasonable to expect that the determinants of fiscal cyclicality described in point II.1 also influence the level of surplus. Hence, all these variables were also included on the right-hand side with lags of up to two years. An exception is the age of democracy, which is a variable that smoothly increases each year by the same percentage (see Appendix A for a description). Since adding lags of this variable introduces no additional information to the model, we included only its contemporaneous value. The stock of public debt was included only in the first and second lags, since the contemporaneous value of debt is directly linked with fiscal surplus through a stock-flow identity.

Table 3 presents the results of the general-to-specific testing of the preliminary ADL model. Specification [1] does not include a Gini coefficient (*isgini*) due to poor data availability for this variable compared to the other indicators. Using it in the initial specification would result in large changes in the number of observations, depending on whether it is excluded further, which would render the specification testing unreliable. Specifications with this variable included are therefore presented separately in column [6].

Column [1] of Table 3 makes it clear that some of the variables do not seem to play any role in determining the level of the fiscal surplus. These are openness (*xh*), the level of development (*yv*), and institutional quality (*isreg*). This, however, may be a result of a lack of significance or only of a multicollinearity between different lags of the same variable. We therefore decided to remove the first and second lags of such variables, thus allowing for dynamic impact only through the presence of the lagged dependent variable on the right-hand side of the model. This led to the specification presented in column [2]. Testing for joint

restrictions showed that restrictions imposed at this stage were valid, with the p-value of the Wald test equal to 27%.

Specification [2] still contained some lags of variables that appeared to be statistically insignificant. At the next stage we decided to specify the lag structure, removing lags that turned out to be statistically insignificant in [2], while not yet removing any variable entirely from the model. We selected the candidates based on the results of the t-tests. We removed the contemporaneous inflation rate (*pi*), the first lags of output gap (*yo*) and the index of political constraints (*iscoh*), and the second lags of public debt (*br*), inflation, and the index of corruption (*iscor*). The newly imposed restrictions resulted in equation [3]. The Wald test showed that the restrictions imposed jointly since the full ADL(2,2) model are valid, with a p-value equal to 56%.

A more radical type of restriction is removing the regressors that do not appear to have any significant impact on the dependent variable. Judging by the t-statistics, the potential candidates for exclusion are the level of development (*yv*) and the age of democracy (*idem*). Low values of t-statistics also suggested another major change in the dynamics of the model, which was removing the second lag of the dependent variable from among the regressors. A number of Wald tests for joint restrictions (not reported here) suggested that while the impact of the two earlier variables is insignificant at any conventional level, with the p-value for the joint restrictions equal to 56%, removing the second lag of the dependent variable causes a considerable decrease of the p-value, to 17%.

Removing the two mentioned variables resulted in specification [4] in Table 3. Still, relatively low values of t-statistics suggested removing the second lag of the dependent variable from among the regressors, as well as the index of political constraints (*iscoh*).

Imposing these two restrictions resulted, however, in a rapid increase of the statistics of the Wald test and a p-value as low as 3.7%.

An examination of the latter specification showed that the orders of magnitude of all coefficients are reasonable and the signs are in line with expectations. The only exception is the coefficient of the corruption indicator, according to which countries with higher corruption have larger surpluses. However, it should be noted that the same variable lagged by one year has almost the same coefficient, but with the opposite sign. This suggests that the two impacts may offset each other so that the total impact would be zero. However, a series of Wald tests (not reported here) showed that removing either of these variables results in a considerable drop of the p-values. Therefore, as the model was to be used for further extensions and testing, we decided to use a more generous specification and retain both variables in the model.

In all the specifications, the Arellano and Bond (1991) m_2 and m_3 statistics indicated no autocorrelation of the error term at conventional levels of significance. Also, the J-statistics of the Sargan's test for overidentifying restrictions suggested that the instruments used are valid in all cases. The same refers to all the estimation results presented further.

Column [5] presents the results of the estimate performed using the bias-corrected fixed-effect estimator. In almost all cases they have the same orders of magnitude and the same sign as their GMM counterparts. Column [6] presents an extension of [4] by including the Gini coefficient that is supposed to measure the polarisation of preferences. The empirical evidence does not support the hypothesis that it is an important determinant of fiscal surplus, although this may be a result of relatively poor-quality data, as well as of considerably smaller number of observations than in the other cases.

The presented analysis allowed us to formulate the baseline specification that captures the crucial determinants of fiscal primary surplus. We use this model later in the paper to analyse the determinants of cyclical behaviour on fiscal surplus through the inclusion of the relevant interaction terms.

III.3. Empirical Results

The method we used to examine the determinants of the cyclical behaviour of fiscal surpluses was to replace the parameter $\varepsilon_S + \kappa_0$ (in equation (8)) with a product of a vector of determinants of fiscal cyclicality and a vector of coefficients, together with a constant. This led to extending equation (8) by adding the transposition of the vector of interaction variables $\mathbf{z}\log(\tilde{y})$, multiplied by the corresponding vector of parameters $\boldsymbol{\gamma}$ on the right-hand side. The elements of vector $\mathbf{z}$ are the potential determinants of fiscal cyclicality, described above.

Prior analysis showed that the lagged rather then contemporaneous values of public debt (*br*) and the index of political constraints (*iscoh*) played a role in determining the level of fiscal surpluses. In these cases we decided to use these lags instead of contemporaneous values to construct the interaction terms.

Table 4 presents the results of the analysis of the specifications for the model with the interaction terms.[9] Staring from the most generous specification (column [1]), we removed the insignificant variables on a one-by-one basis, each time taking the variable with the lowest t-statistics. We checked the validity of the resulting sets of restrictions at each stage using the Wald test against the model with a full set of interaction variables. At the last stage

[9] To economise on space, we removed columns [3] and [4] from the presented table. Full results are available from the author upon request.

two variables with a significant impact on the cyclicality of fiscal policy remained (column [8]). These were the index of regulations (*isreg*) and the size of public debt (lagged by one year, *br*). The p-values of the Wald test for imposing zero restrictions on all other potential determinants is 28%, hence their impact seems not to be significant at conventional levels. Imposing zero restrictions on the impact of *isreg* causes the p-value to fall to 1.1%, while in case of *br* it falls below 1%. In regressions [1] through [8], both coefficients of interest show considerable stability, although the coefficient of *isreg* decreases somewhat after having removed *iscor* from the specification. Since *isreg* is a standardised variable, the results show that countries with this indicator higher by 10% of the sample standard deviation tend to run more countercyclical fiscal policies, characterised by an overall output elasticity of surplus higher by .04 ÷ .06. On the other hand, a ratio of public debt to GDP higher by 10 percentage points results, on average, in the output elasticity of surplus being reduced by .06 ÷ .07. The results obtained from the bias-corrected fixed-effects estimator (column [9] in Table 4) generally confirm the ones obtained from the Arellano-Bond GMM method, although the coefficients are somewhat lower (.03 and .05, respectively).

Similar to our attempts to estimate the parameters of the baseline specification, poor data availability did not allow us to examine the impact of the Gini coefficient (*isgini*) during the main estimation process. We therefore added this variable in the last stage of analysis (column [10] in Table 4). The t-statistics do not exceed .7, so the data do not seem to support the hypothesis about the significance of the impact of income polarisation on the cyclical behaviour of fiscal policies in the analysed countries.

The results we obtained suggest that two main factors behind the procyclical fiscal policies in the sample are low values of the index of regulations *isreg* and a high level of

public debt (high *br*). This gives support to two hypotheses concerning the factors behind fiscal procyclicality.

The first of these hypotheses is that governments resort to procyclical fiscal policies under the pressure of liquidity constraints when they have accumulated large public debt. It is interesting to note that, according to our results, it is a high stock of public debt, not a high deficit, that is the main factor that makes investors impose financial constraints on governments. It should be noted that the last explanatory variable removed from the specification, at the margin of being statistically significant, was trade openness. This seems to give additional support to the hypothesis of financial constraints by suggesting that fiscal policies may be more procyclical in more open economies. Governments in such economies are typically exposed to rapid flows of capital in situations involving emerging doubts concerning fiscal sustainability. They may then be willing to react more aggressively and to consolidate public finances in the face of such runs, even if this means running a procyclical fiscal policy.

The other significant determinant of fiscal cyclicality is the index that measures the quality of regulations, *isreg*. The results suggest that countries with better institutions tend to run more countercyclical fiscal policies. At the same time, our results suggest that they also have larger fiscal surpluses in general (according to [8] in Table 4, a country with values of this index higher by one sample standard deviation runs a primary surplus higher by 4.3% of total expenditures). It is interesting to note that these two channels work independently. That is, better institutions cause more countercyclical fiscal policy directly, not because they result in higher surpluses and hence loosen liquidity constraints.

In addition to the above results, Table 5 presents the results of a number of regressions we ran to check the robustness of the observed relationships. One potential

weakness could be the choice of the dependent variable. The main variable typically used in other studies to describe fiscal stance is the total fiscal surplus, which is equal to the primary surplus minus interest payments on pubic debt. Columns [1] and [2] in Table 5 present the final regressions with the total surplus rather than the primary surplus used as the dependent variable. The coefficient measuring the impact of the quality of regulations (*isreg*) is almost the same as in previous cases, while the coefficient that measures impact of the stock of debt (*br*) is considerably higher, independent on the estimation method. This is likely to reflect the fact that total interest payments react more strongly to the cyclical fluctuations of interest rates in countries with more public debt than in less-indebted ones.

Columns [3] through [5] present the results of estimations for sub-periods 1980-1988, 1989-1997 and 1998-2005, respectively. Because many of the countries joined the sample in the second or even in the third period, the three estimations differ not only by time period, but also by the number of countries included in the sample. All three of these sub-panels are also noticeably more balanced than the full sample. The measured impact of the quality of regulations (*isreg*) on fiscal cyclicality is statistically significant in all three sub-samples (coefficients between .8 and 1.4), and much stronger than in the full sample (coefficient equal to .4). A possible interpretation links this regularity with the sub-panels' shorter time span. If the relationship between the explanatory variable and the cyclical behaviour of surplus were considerably stronger between countries than across time it could produce the observed result. This hypothesis cannot be checked directly through using even shorter panels, however, since the applied method requires a certain time span for the sample (possibly covering a full business cycle) to measure the cyclical sensitivity of public finances.

The results concerning the impact of the second variable, the stock of public debt (*br*), do not seem to be as robust as in the earlier case. The impact is strong only in the middle period (1989-1997), and, similarly to the case of *isreg*, stronger than in the full sample. In the last period the impact is statistically insignificant, while still with the expected sign and an order of magnitude similar to the estimates obtained from the full sample. In the first period the impact is also statistically indistinguishable from zero, but with a different sign than expected. These results show that the impact of liquidity constraints, represented by the stock of public debt, is not as robust as is the case with the institutional variable *isreg*.

Another way of checking the robustness of results is by performing the estimations for sub-groups of countries. Columns [6] through [8] present estimation results for three groups. These are the high-income countries,[10] the EU-15, and the new EU member countries (EU-10).[11] In the two earlier groups the coefficients that measure the impact of *isreg* and *br* on the cyclical sensitivity of public finances are both statistically significant and of the same order of magnitude as in the full sample. In the last sub-sample, theEU-10, the results are considerably different in terms of the order of magnitude, while the signs remain as expected. Also, only the impact of *isreg* remains significantly different from zero. The differences between this and the earlier cases may be a consequence of both a much smaller sample (30 observations, compared with more than 200 in the earlier cases), as well as the effects of transition, since the majority in this sub-sample are the post-communist countries. The fact

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[10] This group consists of the USA, Japan, Australia, Canada, Iceland, Switzerland, Norway, and the EU-15 except for Greece, Portugal, and Spain.

[11] Countries that joined the European Union on the May 1, 2004: Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, and Slovenia.

that coefficients of interest have the same sign suggests that the observed relationships exist not only between developed and less-developed countries, but also within each group. At the same time, the strength of this relationship differs considerably between sub-samples.

IV. CONCLUSIONS

This study presented an analysis of the determinants of cyclical behaviour of fiscal surpluses within the business cycle. It sought to answer the question of why some governments revert to procyclical fiscal policies although the standard normative prescription is to run fiscal policy in a countercyclical manner, relying mainly on automatic stabilisers.

In order to avoid the pitfalls of the two-step methods typically used in previous studies, this study used a one-step method with interaction variables that allowed it to exploit both the time and cross-section variances of the sample. It also overcame the problems with statistical inference linked with the standard two-step procedure.

The study compared the explanatory power of two prominent groups of theories. According to the first of them, the main reason for pro-cyclical fiscal policies is the financial constraints that governments face. According to the other group of theories, the main reasons for fiscal procyclicality are such political and institutional factors as the societies' institutions and preferences. The empirical evidence gives some support to both groups of theories, although this support is not equally strong.

The empirical results show that the quality of regulations, a component of the widely used Gwartney and Lawson (2005) Economic Freedom of the World index, plays a crucial role in determining the cyclical behaviour of fiscal policies. Higher values of this index, interpreted as better institutions, considerably increase the output elasticity of primary fiscal surpluses. The analysis based on the whole 26-year panel shows that values of the index

higher by one sample standard deviation increase the elasticity by .4 to .5 (in a typical cyclically-neutral case this elasticity would be close to unity). In the shorter sub-panels this impact is even stronger, which may suggest that the relationship is stronger across countries than across time. These results are robust when selecting only sub-groups of countries, while for the new EU member states the impact of the quality of regulations is much stronger.

We also found some evidence in support of the role of financial constraints in determining the cyclical behaviour of fiscal policy. According to our results, an increase of public debt by 10% of GDP decreases the overall output elasticity of fiscal surplus by .06. This result is, however, not stable across time, as it has the expected sign in only two out of the three sub-periods, and is statistically significant in only one of them (1989-1997). Also, this impact, while with the correct sign, is not statistically significant in the sub-panel representing the less-developed countries. This last result is surprising, as it contradicts the conventional view that resorting to procyclical fiscal policy in response to financial constraints is mainly a problem of less-developed economies.

Our results do not confirm the role of large deficits as the key causal factor of procyclical fiscal policies. The results also give support to neither of the two recent well-specified theories of fiscal procyclicality provided by Alesina and Tabellini (2005) and Woo (2005). We found no link between corruption, as proposed in the first case, nor social polarisation, as proposed in the second. The latter result may be due to limited availability of data on income polarisation and its relatively poor quality in terms of comparability between countries. There was no statistical evidence for the significant impact of other measures of institutions (besides quality of regulations), such as index of political constraints and the age of democracy. We also found no significant role for the differences in the stage of development, measured as the differences in GDP per capita.

Our results therefore show that it is the quality of institutions that makes governments follow the prescriptions to increase fiscal deficits during recessions and repay the debt during economic booms. To some extent their countercyclical actions may be restrained by the high accumulated level of public debt. It would be worthwhile to analyse whether these regularities also hold for the broader samples of countries, although the limited access to high-quality data covering the general government sectors is an important problem here. Another issue would be to examine precisely what components of fiscal aggregates are responsible for procyclical behaviour. These questions are clearly venues for further research in the area of modelling the cyclical behaviour of fiscal authorities.

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APPENDIX A. DATA DEFINITIONS

Economic variables

The economic data come the Ameco database provided by the European Commission. We used version that was made available in April 2006. Fiscal variables refer to general government and were computed according to ESA'95 accounting standards

Var.	Name	Calculation
sw	Primary surplus	Natural logarithm of ratio of revenue to expenditure (excluding interest payments), both expressed as per cent of GDP
sl	Total surplus	Natural logarithm of ratio of revenue to expenditure, both expressed as per cent of GDP
yo	Output gap	Natural logarithm of ratio of actual to potential GDP, both expressed at 2000 market prices. Potential GDP was calculated from real GDP using Hodrick-Prescott filter.[12]
br	Debt	General government consolidated gross debt, expressed as per cent of GDP
pi	Inflation	Natural logarithm of ratio of present and lagged values of GDP price deflator at market prices
xh	Trade openness	Sum of exports and imports of goods and services at current prices, divided by GDP at current prices. In order to remove any possible cyclical effects the series was smoothed using Hodrick-Prescott filter.
yv	Stage of development	GDP per capita expressed in Euro, as a ratio to sample average. In order to remove any possible cyclical effects the series was smoothed using Hodrick-Prescott filter.

[12] H-P filter was applied using HPRESCOTT routine in STATA.

Quality of regulations (*isreg*)

The index of regulatory quality is the "Regulation" component of Gwartney and Lawson's (2005) Economic Freedom of the World (available at *www.freetheworld.com*). Since until 2000 data are available only with 5-year frequency, the missing data points were interpolated. Index of regulatory quality *isreg*, as well as the other measures related to institutional features (*iscoh*, *idem*, *isgini*) were normalised to have mean 0 and standard deviation equal to 1.

Corruption (*iscor*)

Data on Corruption Perception Index come from the database of Internet Center for Corruption Research (available at *www.icgg.org*). As for two earlier periods data are available only as averages for 1980-1985 and 1988-1992, the data were treated as exact for two mid-years, i. e. 1983 and 1990, respectively. Then, the data for missing years in between were interpolated.

Political constraints (*iscoh*)

The index of political constraints on the executive come from the database of Witold Henisz. It is called the POLCON index (version Polcon V) and is available at *www-management.wharton.upenn.edu/henisz/*.

Gini coefficient (*isgini*)

Data were obtained from UNU-WIDER *World Income Inequality Database*. The database itself is a compilation from numerous sources, which makes extraction of comparable data problematic. To provide balance between coverage and comparability, four sources of data on disposable income (database name: Income, Disposable) were selected: Transmonee 2004, Luxembourg Income Study, European Commission and Brandolini 1998,

1999 and 2004 (for references see UNU-WIDER 2005). As a rule, the data points covering only a single year in row coming from the same study were excluded from the dataset.

Age of democracy (*idem*)

The age of democracy was computed as a difference between the current year and the first year of democracy, as defined by Persson and Tabellini (2005). In the case of three countries that are not covered by their data, Croatia, Czech Republic and Slovakia, as the first year of democracy was used the year of first free elections (1990 in all three cases). In the fourth year, Korea, it was 1948, the last year of the U. S. military government.

APPENDIX B. BASIC SAMPLE STATISTICS

Table 1 Number of available observations in the sample

Country	*sw*	*sl*	*yo*	*br*	*pi*	*xh*	*yv*	*isreg*	*iscor*	*iscoh*	*isgini*	*idem*
Australia	33	33	46	0	45	46	46	34	23	45	0	46
Austria	30	30	46	36	45	46	46	34	23	45	7	46
Belgium	36	36	46	37	45	46	23	34	23	45	7	46
Bulgaria	4	4	15	4	14	15	16	18	8	45	11	16
Canada	21	21	46	0	45	46	46	34	23	45	0	46
Croatia	4	4	11	5	10	12	6	13	7	14	0	16
Cyprus	8	8	16	8	15	46	11	33	3	45	0	46
Czech Republic	14	14	16	10	15	16	11	18	23	12	14	16
Denmark	35	35	46	35	45	46	46	34	23	45	14	46
Estonia	13	13	13	10	12	13	13	18	8	12	8	15
Finland	31	31	46	36	45	46	46	34	23	45	9	46
France	28	28	46	29	45	46	46	34	23	45	8	46
Germany	36	36	46	36	0	46	46	34	23	45	13	46
Greece	18	18	46	36	45	46	46	34	23	44	7	31
Hungary	7	7	15	10	14	28	14	28	23	45	11	16
Iceland	15	15	46	0	45	46	43	33	8	45	0	46
Ireland	21	21	46	36	45	46	46	34	23	45	7	46
Italy	26	26	46	36	45	46	46	34	23	45	23	46
Japan	26	26	46	36	45	46	46	34	23	45	0	46
Korea	8	8	36	0	35	36	36	33	23	45	0	46
Latvia	15	16	16	10	15	16	14	13	8	14	4	15
Lithuania	11	11	16	10	15	16	14	18	7	14	9	15
Luxembourg	16	16	46	36	45	46	46	34	9	45	7	46
Malta	8	8	15	10	14	46	16	28	2	0	0	42
Mexico	9	9	46	0	30	46	11	33	23	45	6	12
Netherlands	37	37	46	31	45	46	46	34	23	45	7	46
New Zealand	12	12	46	0	45	46	45	34	23	45	0	46
Norway	16	16	46	9	45	46	46	34	23	45	10	46
Poland	11	11	16	10	15	26	14	28	23	45	14	17
Portugal	29	29	46	33	45	46	46	34	23	44	7	30
Romania	8	8	16	9	15	26	16	34	9	45	14	16
Slovakia	13	13	14	10	13	16	12	13	8	12	7	16
Slovenia	6	6	16	10	15	16	11	13	7	14	10	16
Spain	11	11	46	36	45	46	46	34	23	43	8	28
Sweden	13	13	46	36	45	46	46	34	23	45	17	46
Switzerland	13	13	46	0	45	46	46	34	23	45	0	46
Turkey	4	4	46	9	20	20	36	33	23	45	0	23
United Kingdom	33	33	46	36	45	46	46	34	23	45	9	46
United States	46	46	46	37	45	46	46	34	23	45	20	46
Total	725	726	1381	732	1257	1452	1282	1155	705	1483	288	1352

Table 2 Means of variables in the sample

Country	*sw*	*sl*	*yo*	*br*	*pi*	*xh*	*yv*	*isreg*	*iscor*	*iscoh*	*isgini*	*idem*
Australia	-0.03	-0.13	0.0	n/a	0.05	0.33	1.2	0.79	0.84	0.81	n/a	4.4
Austria	0.01	-0.05	0.0	0.5	0.04	0.67	1.1	0.08	0.39	0.37	-0.86	3.6
Belgium	0.04	-0.11	0.0	1.0	0.04	1.20	1.3	0.11	0.18	0.88	-0.17	4.9
Bulgaria	0.08	0.03	0.0	0.4	0.39	1.10	0.1	-1.20	-1.40	-1.40	0.74	1.9
Canada	0.09	-0.10	0.0	n/a	0.04	0.55	1.3	1.00	1.00	0.79	n/a	4.8
Croatia	-0.05	-0.10	0.0	0.4	0.04	0.97	0.3	-0.96	-1.50	-0.42	n/a	1.9
Cyprus	-0.01	-0.10	0.0	0.7	0.03	0.99	0.8	-0.21	-0.46	-0.88	n/a	2.9
Czech Republic	-0.10	-0.13	0.0	0.2	0.09	1.10	0.4	-0.90	-0.87	0.41	-1.20	1.9
Denmark	0.09	0.00	0.0	0.5	0.06	0.69	1.5	0.53	1.10	0.49	-0.12	4.2
Estonia	0.04	0.03	0.0	0.1	0.11	1.60	0.2	-0.64	-0.44	0.23	1.10	1.9
Finland	0.09	0.05	0.0	0.3	0.06	0.55	1.2	0.48	1.10	0.50	-0.94	4.2
France	0.00	-0.06	0.0	0.4	0.05	0.40	1.2	0.25	0.27	-0.07	-0.17	3.6
Germany	0.01	-0.05	0.0	0.4	n/a	0.51	1.3	-0.06	0.63	0.74	-0.60	3.5
Greece	0.01	-0.19	0.0	0.7	0.10	0.41	0.5	-0.61	-0.94	-0.94	0.62	2.5
Hungary	-0.02	-0.12	0.0	0.6	0.12	0.94	0.3	-0.67	-1.10	-1.30	-0.83	1.9
Iceland	0.06	-0.03	0.0	n/a	0.16	0.76	1.4	0.20	1.30	0.47	n/a	3.6
Ireland	0.09	-0.04	0.0	0.7	0.07	1.10	0.8	0.65	0.54	0.42	0.20	4.1
Italy	0.01	-0.17	0.0	0.8	0.07	0.39	0.9	-0.37	-1.00	0.41	0.87	3.5
Japan	0.00	-0.10	0.0	0.8	0.03	0.21	1.2	0.63	0.18	0.42	n/a	4.7
Korea	0.17	0.15	0.0	n/a	0.10	0.64	0.4	-0.53	-1.20	-0.62	n/a	3.5
Latvia	0.00	0.00	0.0	0.1	0.32	0.97	0.2	-0.80	-1.50	0.46	0.40	1.9
Lithuania	-0.05	-0.08	0.0	0.2	0.42	1.10	0.2	-1.30	-1.00	0.44	0.62	1.9
Luxembourg	0.06	0.05	0.0	0.1	0.04	1.90	1.6	0.98	0.92	0.47	-0.50	4.6
Malta	-0.08	-0.17	0.0	0.6	0.03	1.50	0.5	-0.24	-0.01	n/a	n/a	2.8
Mexico	0.23	0.04	0.0	n/a	0.24	0.31	0.3	-0.50	-1.90	-1.50	3.40	1.7
Netherlands	0.04	-0.05	0.0	0.6	0.04	1.10	1.2	0.29	0.99	0.42	-0.57	4.2
New Zealand	0.12	-0.03	0.0	n/a	0.06	0.54	0.9	0.83	1.20	0.37	n/a	4.8
Norway	0.17	0.12	0.0	0.4	0.05	0.73	1.6	0.24	0.95	0.46	-1.00	4.4
Poland	0.00	-0.08	0.0	0.4	0.15	0.49	0.2	-1.30	-1.00	-1.30	0.20	2.0
Portugal	-0.02	-0.15	0.0	0.5	0.09	0.56	0.4	-0.33	-0.40	-0.50	1.00	2.5
Romania	0.00	-0.07	0.0	0.2	0.53	0.36	0.1	-1.80	-1.80	-1.40	-0.27	1.9
Slovakia	-0.09	-0.15	0.0	0.4	0.07	1.30	0.3	-0.74	-1.40	0.49	-0.69	1.9
Slovenia	-0.02	-0.06	0.0	0.3	0.21	1.20	0.6	-0.68	-0.43	0.51	-0.77	1.9
Spain	0.05	-0.04	0.0	0.4	0.08	0.36	0.6	0.12	-0.38	-0.59	0.38	2.4
Sweden	0.06	-0.02	0.0	0.5	0.05	0.60	1.5	0.19	1.00	0.45	-1.30	4.2
Switzerland	0.03	-0.03	0.0	n/a	0.03	0.67	1.7	0.46	0.97	0.88	n/a	4.9
Turkey	0.26	-0.23	0.0	0.7	0.40	0.41	0.2	-0.53	-1.40	-0.59	n/a	2.2
United Kingdom	0.01	-0.08	0.0	0.5	0.06	0.50	1.0	0.99	0.78	0.37	0.27	5.0
United States	0.03	-0.08	0.0	0.6	0.04	0.18	1.7	1.20	0.51	0.78	1.20	5.2

APPENDIX C. ESTIMATION RESULTS

Table 3 Estimation results – baseline specification.

	[1]	[2]	[3]	[4]	[5]	[6]
Method	GMM	GMM	GMM	GMM	FE-BC	GMM
Dep. var.	*sw*	*sw*	*sw*	*sw*	*sw*	*sw*
$sw_{(t-1)}$	0.604***	0.652***	0.727***	0.726***	0.839***	0.484***
	[7.34]	[7.76]	[9.62]	[10.1]	[14.5]	[3.47]
$sw_{(t-2)}$	0.136*	0.136	0.0311	0.0466		0.00462
	[1.74]	[1.47]	[0.40]	[0.58]		[0.063]
yo	1.139***	1.094***	1.211***	1.198***	1.239***	1.251***
	[6.79]	[5.77]	[6.85]	[7.44]	[8.07]	[4.67]
$yo_{(t-1)}$	-0.469*	-0.451	-0.747***	-0.692***	-1.105***	-0.397*
	[-1.77]	[-1.60]	[-4.33]	[-4.43]	[-6.22]	[-1.67]
$yo_{(t-2)}$	-0.236	-0.305				
	[-1.01]	[-1.21]				
$br_{(t-1)}$	0.13	0.0904	0.0695	0.0967***	0.00829	0.167***
	[0.99]	[0.67]	[1.51]	[3.20]	[0.24]	[2.79]
$br_{(t-2)}$	-0.0129	-0.00208				
	[-0.11]	[-0.016]				
pi	0.0951	0.0902				
	[0.42]	[0.39]				
$pi_{(t-1)}$	0.275**	0.295**	0.186*	0.136	0.215*	0.0996
	[2.15]	[2.09]	[1.95]	[1.57]	[1.72]	[0.50]
$pi_{(t-2)}$	-0.0727	-0.146				
	[-0.35]	[-0.72]				
xh	1.404	0.0745	0.0655	0.0998*	-0.0565	0.0897
	[1.03]	[1.55]	[1.29]	[1.91]	[-0.84]	[0.93]
$xh_{(t-1)}$	-2.275					
	[-0.77]					
$xh_{(t-2)}$	0.997					
	[0.59]					
yv	0.342	-0.00783	-0.0245			
	[0.60]	[-0.20]	[-0.59]			
$yv_{(t-1)}$	-0.375					
	[-0.34]					
$yv_{(t-2)}$	0.0122					
	[0.021]					
isreg	0.00102	0.0406***	0.0419***	0.0410***	0.0116	0.0460***
	[0.066]	[2.85]	[2.89]	[2.79]	[0.79]	[2.94]
$isreg_{(t-1)}$	0.0194					
	[1.11]					
$isreg_{(t-2)}$	0.0187					
	[1.22]					
iscor	0.0497**	0.0463**	0.0389*	0.0415*	0.0418*	0.0348**
	[2.35]	[2.06]	[1.80]	[1.74]	[1.80]	[2.09]
$iscor_{(t-1)}$	-0.0468***	-0.0472**	-0.0438**	-0.0364**	-0.0405*	-0.00913
	[-2.84]	[-2.53]	[-2.11]	[-2.00]	[-1.86]	[-0.61]
$iscor_{(t-2)}$	0.00023	0.00453				
	[0.020]	[0.49]				

Note: t-statistics in brackets.
*Asterisks indicate significance at levels: *** p<0.01, ** p<0.05, * p<0.1*

Estimation results – baseline specification (continued).

iscoh	0.0139	0.0183	0.0132	0.0078	0.0198	0.0137
	[1.22]	[1.64]	[1.19]	[0.57]	[0.99]	[1.62]
$iscoh_{(t-1)}$	0.00504	0.00555				
	[0.44]	[0.50]				
$iscoh_{(t-2)}$	0.0213	0.0184	0.0209*	0.015	0.027	0.0259***
	[1.63]	[1.47]	[1.82]	[1.28]	[1.38]	[2.66]
idem	0.0578	0.0496	0.0393			
	[1.02]	[0.82]	[1.10]			
isgini						0.0123
						[0.70]
$isgini_{(t-1)}$						0.0201
						[1.43]
Constant	-0.00443**	-0.00459***	-0.00374**	-0.00427**		-0.0032
	[-2.57]	[-3.09]	[-2.47]	[-2.53]		[-1.30]
No of obs.	276	276	295	295	331	104
No of countries	26	26	26	26	29	22
Avg no of years	10.62	10.62	11.35	11.35	11.41	4.727
J-statistics	255.4	244.7	250.4	246.3	x	87.24
Sargan's p-val.	0.700	0.843	0.919	0.944	x	1.000
m_1	-3.63	-3.521	-3.541	-3.559	x	-2.613
m_2	1.161	1.252	1.468	1.408	x	1.535
m_3	-0.212	-0.51	-0.96	-0.836	x	-0.995

Table 4 Estimation results – the main specification with interaction terms

	[1]	[2]	[5]	[6]	[7]	[8]	[9]	[10]
Method	GMM	FE-BC	GMM	GMM	GMM	GMM	FE-BC	GMM
Dep. var.	*sw*	*sw*	*sw*	*sw*	*sw*	*sw*	*sw*	*sw*
$sw_{(t-1)}$	0.700***	0.804***	0.701***	0.707***	0.709***	0.713***	0.823***	0.428***
	[9.43]	[13.9]	[9.31]	[9.85]	[9.81]	[9.91]	[14.8]	[3.09]
$sw_{(t-2)}$	0.0499		0.051	0.046	0.0393	0.0424		0.000187
	[0.64]		[0.65]	[0.59]	[0.51]	[0.55]		[0.0023]
yo	1.422***	0.817	1.296***	1.531***	1.483***	1.354***	1.345***	1.054*
	[3.45]	[0.76]	[5.78]	[7.98]	[8.72]	[8.09]	[3.91]	[1.90]
$yo_{(t-1)}$	-0.762***	-0.987***	-0.748***	-0.756***	-0.744***	-0.748***	-1.014***	-0.539**
	[-4.30]	[-5.64]	[-4.23]	[-4.33]	[-4.26]	[-4.28]	[-5.73]	[-1.99]
$br_{(t-1)}$	0.0657	0.00436	0.0671	0.0667	0.0668	0.0665	-0.00152	0.233**
	[1.47]	[0.13]	[1.48]	[1.49]	[1.50]	[1.48]	[-0.044]	[2.38]
$pi_{(t-1)}$	0.177	0.223	0.176	0.183*	0.152	0.141	0.21	-0.144
	[1.48]	[1.25]	[1.63]	[1.72]	[1.43]	[1.33]	[1.19]	[-0.78]
xh	0.0548	-0.0143	0.0546	0.0548	0.0566	0.0515	-0.0247	0.157
	[1.03]	[-0.20]	[1.01]	[1.03]	[1.05]	[0.97]	[-0.34]	[1.13]
isreg	0.0413***	0.0291*	0.0433***	0.0433***	0.0432***	0.0429***	0.0284*	0.0319**
	[2.67]	[1.80]	[2.73]	[2.76]	[2.75]	[2.77]	[1.85]	[2.11]
iscor	0.0385*	0.0322	0.0390*	0.0391*	0.0396*	0.0409*	0.0371	0.0394**
	[1.87]	[1.39]	[1.82]	[1.83]	[1.84]	[1.92]	[1.61]	[2.51]
$iscor_{(t-1)}$	-0.0446**	-0.0424*	-0.0449**	-0.0457**	-0.0451**	-0.0452**	-0.0450**	-0.00664
	[-2.19]	[-1.84]	[-2.22]	[-2.30]	[-2.27]	[-2.24]	[-2.01]	[-0.41]
iscoh	0.017	0.0224	0.0171	0.0149	0.0156	0.016	0.0222	-0.00044
	[1.55]	[1.10]	[1.40]	[1.31]	[1.33]	[1.39]	[1.07]	[-0.041]
$iscoh_{(t-2)}$	0.00453	0.00703	0.00302	0.00994	0.00906	0.00771	0.0207	0.018
	[0.44]	[0.35]	[0.28]	[0.83]	[0.77]	[0.66]	[0.97]	[1.44]
idem	0.0371	0.0269	0.0361	0.0408	0.0411	0.0384	0.0302	-0.134*
	[0.96]	[0.60]	[0.95]	[1.08]	[1.07]	[1.02]	[0.69]	[-1.73]
yv	-0.0289	-0.0731**	-0.0292	-0.0303	-0.0278	-0.0256	-0.0728**	-0.00667
	[-0.70]	[-2.33]	[-0.72]	[-0.75]	[-0.69]	[-0.63]	[-2.39]	[-0.077]
isreg×yo	0.567***	0.48	0.544***	0.519***	0.397***	0.357***	0.294	1.149***
	[3.34]	[1.58]	[3.17]	[3.09]	[2.92]	[2.80]	[1.21]	[2.70]
br×yo	-0.604**	-0.57	-0.726***	-0.627***	-0.566***	-0.593**	-0.468	-0.983
	[-2.32]	[-0.91]	[-2.73]	[-2.63]	[-2.65]	[-2.50]	[-0.94]	[-1.16]
xh×yo	-0.213	-0.187	-0.238*	-0.232*	-0.21			
	[-1.30]	[-0.51]	[-1.80]	[-1.68]	[-1.56]			
iscor×yo	-0.134	-0.191	-0.175	-0.149				
	[-1.18]	[-0.63]	[-1.37]	[-1.21]				
iscoh×yo	0.526	1.409	0.611					
	[0.95]	[1.35]	[1.33]					
sw1×yo	-1.144	-2.16						
	[-0.52]	[-0.98]						
idem×yo	-0.0484	0.00356						
	[-0.27]	[0.010]						
yv×yo	0.062	0.137						
	[0.18]	[0.24]						
isgini								0.00296
								[0.18]
isgini×yo								0.151
								[0.68]
Constant	-0.00343**		-0.00354**	-0.00354**	-0.00369**	-0.00374**		0.00124
	[-2.38]		[-2.36]	[-2.37]	[-2.40]	[-2.36]		[0.29]
No of obs.	295	331	295	295	295	295	331	114
No of countries	26	29	26	26	26	26	29	22
Avg no of years	11.35	11.41	11.35	11.35	11.35	11.35	11.41	5.182
J-statistics	250.3	x	251	249	248.9	249	x	96.7
Sargan's p-val.	0.920	x	0.915	0.930	0.929	0.928	x	1.000
m_1	-3.534	x	-3.487	-3.513	-3.505	-3.522	x	-2.665
m_2	1.388	x	1.435	1.454	1.48	1.478	x	1.713
m_3	-1.052	x	-1.06	-1.039	-0.991	-0.949	x	-1.371

Table 5 Estimation results – robustness checks

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Method	GMM	FE-BC	GMM	GMM	GMM	GMM	GMM	GMM
Dep. var.	*sl*	*sl*	*sw*	*sw*	*sw*	*sw*	*sw*	*sw*
$sl_{(t-1)}$	0.764***	0.847***						
	[13.6]	[16.3]						
$sl_{(t-2)}$	0.0165							
	[0.21]							
$sw_{(t-1)}$			0.00774	0.485***	0.269*	0.807***	0.651***	-0.177
			[0.045]	[3.30]	[1.93]	[9.89]	[7.21]	[-1.21]
sw			0.0311	0.134	-0.125	-0.00874	-0.00594	-0.255***
			[0.36]	[1.04]	[-1.29]	[-0.080]	[-0.077]	[-6.44]
yo	1.527***	1.469***	0.214	1.558***	0.683	1.154***	1.331***	0.813
	[9.20]	[4.73]	[0.32]	[8.05]	[1.54]	[7.86]	[11.0]	[0.92]
$yo_{(t-1)}$	-0.857***	-1.023***	0.853	-0.361*	-0.413	-0.776***	-0.459***	-0.701
	[-5.49]	[-6.70]	[1.31]	[-1.94]	[-1.20]	[-3.77]	[-2.88]	[-1.53]
$br_{(t-1)}$	0.0416	-0.00904	0.00245	0.147*	0.026	0.0570*	0.137***	-0.585***
	[0.97]	[-0.29]	[0.022]	[1.89]	[0.36]	[1.73]	[3.53]	[-4.22]
$pi_{(t-1)}$	0.13	0.0988	-0.189	0.306	0.262*	0.0746	0.035	0.753**
	[1.24]	[0.63]	[-0.55]	[1.30]	[1.72]	[0.61]	[0.32]	[2.57]
xh	0.0434	-0.00681	1.486***	0.325***	-0.160**	0.048	0.0828	0.456
	[0.79]	[-0.10]	[2.78]	[3.20]	[-2.17]	[0.95]	[1.22]	[1.02]
isreg	0.0392***	0.0272**	-0.0697	0.0628**	0.0302	0.0446***	0.0123	0.165***
	[3.03]	[2.03]	[-1.11]	[2.51]	[1.27]	[3.15]	[0.89]	[3.73]
iscor	0.0444**	0.0420**	0.00308	-0.0009	0.0414*	0.0376*	0.0157	0.125***
	[1.99]	[2.05]	[0.053]	[-0.072]	[1.67]	[1.71]	[1.53]	[3.52]
$iscor_{(t-1)}$	-0.0429**	-0.0451**	0	-0.0505	-0.00392	-0.0438**	-0.0177**	-0.0281
	[-2.39]	[-2.28]	[]	[-1.22]	[-0.29]	[-2.37]	[-1.99]	[-0.68]
iscoh	0.00441	0.00986	0.0988	0.0460***	0.00589	-0.00647	0.0177*	-0.0348
	[0.36]	[0.55]	[1.09]	[3.36]	[0.39]	[-1.34]	[1.96]	[-0.31]
$iscoh_{(t-2)}$	0.00971	0.0161	-0.0267	-0.00933	0.0221	-0.00863	0.0109*	-0.181*
	[0.85]	[0.88]	[-0.26]	[-0.86]	[1.48]	[-0.19]	[1.72]	[-1.83]
idem	0.0627*	0.0457	0.075	0.033	0.136*	0.141	-0.0179	0.497
	[1.65]	[1.16]	[0.38]	[0.39]	[1.76]	[1.36]	[-0.87]	[1.57]
yv	-0.0263	-0.0554**	0.311**	-0.155	0.0218	-0.0154	0.0317	-1.938**
	[-0.81]	[-2.14]	[2.40]	[-1.30]	[0.17]	[-0.47]	[0.85]	[-1.99]
isreg×*yo*	0.384***	0.373*	1.181**	0.786***	1.378***	0.431***	0.284**	5.581***
	[3.39]	[1.76]	[2.40]	[4.07]	[4.95]	[2.77]	[1.99]	[2.96]
br×*yo*	-0.924***	-0.808*	1.27	-1.360***	-0.633	-0.504***	-0.802***	-1.377
	[-3.99]	[-1.80]	[1.08]	[-3.52]	[-1.02]	[-2.92]	[-4.72]	[-0.53]
Constant	-0.00218		-0.00726	-0.00197	-0.00471	-0.00539***	-0.00266	-0.0336
	[-1.42]		[-0.90]	[-0.31]	[-0.84]	[-2.77]	[-1.58]	[-0.89]
No of obs.	295	331	45	117	133	224	222	30
No of countries	26	29	12	14	26	14	15	8
Avg no of years	11.35	11.41	3.75	8.357	5.115	16	14.8	3.75
J-statistics	246.9	x	24.59	110.4	102.7	205.5	206.6	9.811
Sargan's p-val.	0.940	x	1.000	0.924	0.135	1.000	1.000	1.000
m_1	-3.506	x	-2.856	-2.886	-2.987	-2.765	-3.117	-2.044
m_2	0.513	x	0.0393	-0.198	1.879	0.743	1.897	1.221
m_3	-0.193	x	-0.997	1.374	-1.285	-0.91	-0.145	-1.414