# RETIREMENT, HEALTH, UNEMPLOYMENT, THE BUSINESS CYCLE AND AUTOMATIC STABILIZATION IN THE OECD:

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**Abstract**:

Official adjustments of the budget balance to the cycle assume that the only category of government spending that responds automatically to the cycle is unemployment compensation. But estimates show otherwise. Payments for pensions, sickness, subsistence, invalidity, childcare and subsidies of all sorts to firms respond automatically and significantly to the cycle as well. In addition, it is fairly common to use official figures for cyclically adjusted budget balances, divide by potential output, and use the resulting ratios to study discretionary fiscal policy. But if potential output is not deterministic but subject to supply shocks, then apart from anything else, those ratios are inefficient estimates of the cyclically-independent ratios of budget balances divided by potential output. (A fortiori, they are inefficient estimates of the cyclically adjusted ratios of budget balances to observed output.) Accordingly, the paper makes use of detailed data from the OECD's Social Expenditure database to produce separate estimates of the impact of the cycle on disaggregated components of the budget balance, both in levels and in the form of their ratios to output. In addition, we discuss the relation between the two sorts of estimates. When the focus is on ratios of expenditure and revenue to output, the cyclical adjustments depend more on inertia in government spending on goods and services than they do on taxes (which are largely proportional to output). But they depend even still more on transfer payments. Besides calling for different series for discretionary fiscal policy if ratios serve, these results also raise questions about the general policy advice to "let the automatic stabilizers work."

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## I. *Introduction*

Studies of discretionary fiscal policy often center on the "cyclically adjusted budget balance," or the budget balance following an adjustment for the part that depends on an automatic response to events. It is also often assumed that all of the adjustments to the cycle come from taxes and unemployment compensation. In addition, following cyclical adjustment, the analysis of discretionary fiscal policy frequently concerns the ratio of the cyclically adjusted government balance to output or potential output rather than the level. We shall put forward two criticisms of this procedure. First, many of the automatic responses to events result from other transfer payments besides unemployment compensation, including payments for pensions, sickness, subsistence, invalidity, childcare and subsidies of all sorts to firms. Second, if the issue is the ratio of the cyclically adjusted budget balance, the cyclical adjustment should be for the ratio rather than the level. Otherwise, the estimates of the cyclical adjustment are inefficient. According to both arguments, the usual estimates of the series for discretionary fiscal policy are often incorrect. The first criticism always applies when there is recourse to official sources for figures for the "cyclically adjusted budget balances" since those figures are constructed on the assumption that taxes and unemployment compensation are the sole elements of the budget that respond to the cycle. The second criticism follows whenever the subsequent analysis focuses on ratios.

If the analysis relates to the ratio of the budget balance to output, then the problem of estimation is not the only issue. Some important conceptual differences also arise. Interestingly, the recent report of the European Commission on Public Finances in EMU for 2004 (European Commission (2004)) recognizes these differences (Part II, chapter 3 and Annex II). As the report observes, if the ratio of the government balance to output is the issue, then only progressive taxes can contribute much to stabilization over the cycle. Proportional taxes will do little, if anything, to stabilize. Any stabilizing response of the budget to the cycle probably will come mostly from the spending side and will arise because of inertia in government expenditures on goods and services. During a recession, the ratio of government spending on goods and services to output will automatically rise if the spending is unaffected while output falls. Not only are these observations in the recent report correct, but it is also difficult to know how well they are

understood since they are rarely acknowledged.

A further conceptual issue must be raised right at the start. The part of the budget balance that responds without delay to the cycle independently of any fresh political decision-making might not be entirely beyond potential discretionary control and therefore might not be "automatic" in the full sense of the word. This applies especially to government spending on goods and services, which we usually consider to be under potential discretionary control. For this reason, we will refer to "non-discretionary fiscal policy" as a more general term than "automatic fiscal policy" or "automatic stabilization." On the other hand, within the same calendar year the cyclical responses of transfer payments for health, retirement, subsidies to firms, or anything else, result predominantly from the application of existing laws apart from any discretionary behavior by government officials. By and large, whatever is automatic about the immediate responses of taxes and unemployment compensation to the cycle is also automatic about the immediate responses of the rest of transfer payments. Thus, we will treat all responses of transfer payments to the cycle as automatic.

While official estimates of automatic stabilization generally distinguish 5 different elements of the government budget balance (household direct taxes, business direct taxes, social security contributions, indirect taxes and unemployment compensation) and study each of them separately, see Giorno *et al.* (1995) it is also official practice to estimate the cyclical response of the 5 respective bases on which these 5 tax and spending items rest, and then to apply the national tax code or else to assume a unitary elasticity of response to the base in order to derive the 5 items, whichever seems more appropriate. Van den Noord (2000) offers an up-to-date, clear and detailed review of the method (in the OECD version, used by the EC as well).[1] we shall deviate from this official procedure in three ways. First, we abandon the preconception that unemployment compensation is the only type of transfer payment that responds automatically to the cycle. From the outset we analyse a far finer disaggregation of transfers, or social

[1] To quote from van den Noord's summary: "First, the elasticities of the relevant tax bases and unemployment with respect to (cyclical) economic activity, *i.e.* the output gap, are estimated through regression analysis. Next, the elasticities of tax proceeds or expenditure [unemployment compensation] with respect to the relevant bases are extracted from the tax code or simply set to unity in cases where proportionality may be assumed. These two sets of elasticities are subsequently combined into reduced-form elasticities that link the cyclical components of taxes and expenditure to the output gap."

cash benefits, than has been presented in the literature to date. To the best of our knowledge, we are the first to combine data from the 2005 releases of the OECD's Economic Outlook and Social Expenditure databases for the analysis of the operation of automatic stabilizers. Second, we examine the non-discretionary responses of the expenditure and revenue components of the budget in both levels and as ratios of output separately. Both of these deviations follow from our opening remarks. As a third deviation, we will also rely entirely on simultaneous-equation methods of estimation. This next departure deserves a separate word.

Simultaneous-equation estimation methods have several advantages. The relevant taxes and transfers depend on distinct tax schedules and benefit entitlement rules of varying complexity, these can change over time and involve different collection periods and delays. From this standpoint alone, there is something to be said in favor of estimating cyclical responses directly rather than inferring them from some preset figures after studying responses of the various tax bases, however well founded those preset figures may be. In addition, the cyclical responses of different tax bases and unemployment (the relevant base concerning unemployment compensation) will tend to be correlated. Hence, the residuals in the separate estimates of these bases will be correlated too. On this ground, seemingly unrelated regression would appear to be fitting. Finally, taxes and government spending could have a reciprocal effect on the cycle, even within a year. Thus, simultaneous-equation estimation that acknowledges the potential endogeneity of the cycle is appropriate.

## II. *The framework*

At issue then is the response of government revenues and expenditures to environmental factors independently of discretionary policy. Therefore, we want to adopt a specification that does not reflect the aims of the authorities. Nothing concerning official expected values and official objectives, as such, should enter. In addition, the focus should be on reactions to changes in a short enough period to preclude discretionary policy. Changes in tax regulations take significant time. So do fresh spending decisions. As regards spending, the European Commission (2004) underlines the delays:

Taking into account relatively long recognition lags, the complexity and slowness of budgetary processes and the political economy of political inaction, a viable working hypothesis over the short term, for instance one year, is to assume full inertia or full adherence to spending plans i.e. to assume that spending is not adjusted for unexpected short- (sic) or windfalls of growth (Annex II.2).

Canzoneri *et al.* (2002) take the same view. There are three variables that are likely to affect government revenues and expenditures even within a year and to do so fairly automatically: output, inflation and the nominal rate of interest. Deviations of output (Y) from potential output (Y*) are of particular interest, since the ultimate aim is to distinguish between discretionary and non-discretionary fiscal policy.

On these general principles, we decided to study the current yearly impact of *first differences* in Y –Y* (as present in the OECD database), or the output gap, on *first differences* in government receipts and expenditures. Especially because of the first-difference form, this focuses on short run responses. We also admitted non-discretionary effects of inflation and the interest rate into the analysis. But while using first differences for inflation, we kept the interest rate in levels, on the ground that any automatic influence of this variable on the government budget would depend largely on initial debt and therefore could be cumulative. If the interest rate does have a cumulative effect on the interest payments on the debt, its level could affect the first difference of the budget balance just as well as the level. While we stuck to these initial choices throughout, it turns out that the use of levels or first differences for inflation and the rate of interest makes almost no difference. In addition, better estimates of current responses may result from the presence of lagged influences. Thus, we also included the lagged level and the lagged first difference of the dependent variable in the estimates. Further, we added a trend and dummies for six-year intervals (1985-90, 1991-96, 1997-2002). Since the data concerns a panel of different countries, we included country fixed effects too.

The sample period used in estimation is limited by the Social Expenditure database. All of the country data entering into the statistical analysis runs to 2001. In most cases the data is available from 1980, but in a small number of countries a shorter span of data was available, so we have worked with an unbalanced panel spanning 21 OECD countries (including 14 of the then 15 members of the European Union) and a total of 367 observations. The missing EU member is Luxembourg, and the 7 OECD countries outside the EU are Australia, Canada, Ice-

land, Japan, New Zealand, Norway and the US.

III. *The estimates in levels and ratios*

In general, the lagged level and first difference of the dependent variable as well as the time trend are almost always insignificant and do not affect the results. Therefore, even though the analysis allows for some delays in responses, the dynamics are totally negligible. No lagged effects occur. On the other hand, the six-year intervals often matter and the country fixed effects generally do.

Table 1 contains aggregate results for 21 OECD countries showing the response of the net public surplus to the cycle and also for revenues and expenditures estimated. The panel on the left shows the results in levels; and the panel on the right in percentages. The notes to Table 1 recapitulate the entire specification from start to finish. For the reasons outlined above, our preferred estimates are those using instrumental variables for the net public surplus and the jointly estimated three stage least squares results for revenues and expenditure. Let us examine the levels results first.

a. *Levels*

In the case of levels, the dependent variable on the left and the output gap on the right are in identical units, namely, home currency at current prices. Thus, the coefficient of the output gap gives a meaningful figure. For example, for the members of EMU, it states by how many cents the budget will respond to a movement of the output gap of one euro. The table only reports the coefficients on the output gap and their associated standard errors and t or z statistics (for OLS, IV and 3SLS estimates respectively), since coefficients on the change in inflation ($\Delta\pi$) and the interest rate ($r_L$) do not have any clear meaning. The measure of the inflation rate is the implicit price of GDP. That of the interest rate $r_L$ is the long term interest rate. We experimented with both the short term and the long term interest rate in the OECD database, and the long term one is much more important.

Table 1: Estimation Results for main aggregates

| | LEVELS | | | | | RATIOS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **n=348** | **Coef** | Std. Err | T | P>\|t\| | Adj R-sq | **Coef** | Std. Err | T | P>\|t\| | Adj R-sq |
| **1. Net Public Surplus (NLG)** | | | | | | | | | | |
| OLS | **0.441** | 0.03 | 13.0 | 0.000 | 0.499 | **0.341** | 0.05 | 7.1 | 0.000 | 0.466 |
| IV | **0.704** | 0.05 | 14.2 | 0.000 | 0.386 | **0.356** | 0.08 | 4.6 | 0.000 | 0.466 |
| **2. General Government Expenditure (YPGT)** | | | | | | | | | | |
| OLS | **0.094** | 0.03 | 2.7 | 0.007 | 0.669 | **-0.296** | 0.04 | -7.7 | 0.000 | 0.620 |
| IV | **-0.404** | 0.07 | -5.9 | 0.000 | 0.440 | **-0.403** | 0.06 | -6.4 | 0.000 | 0.603 |
| 3SLS | **-0.157** | 0.05 | -3.5 | 0.000 | 0.655 | **-0.384** | 0.06 | -6.8 | 0.000 | 0.655 |
| **3. General Government Total Tax and Non-Tax Receipts (YRGT)** | | | | | | | | | | |
| OLS | **0.488** | 0.02 | 20.9 | 0.000 | 0.848 | **0.037** | 0.04 | 0.9 | 0.348 | 0.145 |
| IV | **0.503** | 0.03 | 15.8 | 0.000 | 0.847 | **-0.063** | 0.06 | -1.0 | 0.312 | 0.121 |
| 3SLS | **0.499** | 0.03 | 16.8 | 0.000 | 0.866 | **0.000** | 0.00 | 0.9 | 0.364 | 0.246 |

Notes:
All the dependent variables are in current prices. *t* or *z* statistics in parentheses (*z* in case of 3SLS estimates). In case of 3SLS pseudo $R^2$s are reported.

The general estimation form for all 12 equations is:

$$\Delta A = a_o + a_1 \Delta B + a_2 \Delta\pi + a_3 r_L + a_4 t + \mathbf{a_5 C} + \mathbf{a_6 D} + a_7 (\Delta A)_{-1} + a_8 \Delta_{-1}(\Delta A) + u$$

where:
$\Delta A$ is the first difference of the dependent variable
A is either net public surplus, revenues, expenditures or in the ratio regressions these three divided by Y.
Y: output (GDP) in current prices
Y*: is potential output in current prices
$\Delta B$ is either the first difference of Y–Y* or Y/Y*
$\pi$ is the rate of inflation as measured by the GDP deflator (percentage)
$\Delta\pi$ is the first difference of $\pi$
$r_L$ is the long term rate of interest (percentage)
t is a time trend
**C** is a matrix of country fixed effects
**D** is matrix of dummies for the 6-year intervals: 1985-90, 1991-96, and 1997-2002
$(\Delta A)_{-1}$ is the lagged level of $\Delta A$ (in notation with usual time subscripts, it is $A_{t-1} - A_{t-2}$)
$\Delta_{-1}(\Delta A)$ is the lagged first-difference of $\Delta A$ (in notation with usual time subscripts, it is $(A_{t-1} - A_{t-2}) - (A_{t-2} - A_{t-3})$)
u is a disturbance term with the usual properties
n is the number of observations.

The instruments for $\Delta B$, $\Delta\pi$ and $r_L$, where applicable, are t , the time trend, **C**, the country fixed effects, **D**, the dummies for the six-year time intervals, $B_{-1}$ and $(\Delta B)_{-1}$ and $\Delta_{-1}(\Delta B)$, the lagged level, the lagged first difference and the twice-lagged first difference of B (either Y–Y* or Y/Y*), $g_{-1}$ and $g_{-2}$, the one-period and two-period lagged growth rate of Y, $\pi_{-1}$ and $(\Delta\pi)_{-1}$, the lagged level and the lagged first difference of inflation, $G_{-1}$ and $(\Delta G)_{-1}$, the lagged level and the lagged first difference of public expenditures, $T_{-1}$ and $(\Delta T)_{-1}$, the lagged level and the lagged first difference of taxes, U, $U_{-1}$ and $(\Delta U)_{-1}$, the level, lagged level and lagged first difference of the rate of unemployment and either $(Y-Y^*)_{US}$, $((Y-Y^*)_{US})_{-1}$ and $(\Delta((Y-Y^*)_{US}))_{-1}$ or $(Y/Y^*)_{US}$, $((Y/Y^*)_{US})_{-1}$ and $(\Delta((Y/Y^*)_{US}))_{-1}$, regarding the level, lagged level and lagged first difference of the US GAP (except for the US, where the EU GAP serves instead). When instrumenting $\Delta\pi$ and $r_L$ the twice-lagged first difference of either $\Delta\pi$ or $r_L$ replaces $\Delta_{-}$

$_1(\Delta B)$.

In the first section of the table, the dependent variable is the net public surplus. The coefficients are highly significant. Both estimates are also comforting, since they are in the general vicinity of the typical figures. These typical figures are remarkably close to .5 for either grouping, at least in previous applications of the OECD method (see Giorno et al (1995), Buti and Sapir, eds. (1998, p. 132), and van den Noord (2000)). However, the OLS estimates in rows ignore any reciprocal influence. The next estimates correct for this neglect by introducing instruments for $\Delta(Y-Y^*)$, $\Delta\pi$ and $r_L$. The chosen instruments are listed in the notes to Table 1. They include, among others, the lagged values of aggregate taxes and spending – the two variables whose reciprocal effect on $\Delta(Y-Y^*)$, $\Delta\pi$ and $r_L$ is our main concern. The instruments designed to take account of the output gap require a special word, since this variable is particularly difficult to forecast by construction. With regard to the gap, we made two special choices. First, we assumed that fiscal policy does not affect unemployment within the current year. Accordingly, we included current unemployment among the instruments. Second, in line with Galí and Perotti (2003), we used the current output gap in the US as an instrument for the other 20 countries in the study and the current output gap in the EU (as reported by the OECD) as an instrument in the case of the US. These particular two instruments, which relate to contemporary values (unlike the rest), notably improve the fit. In their presence, the $R^2$s for $\Delta(Y-Y^*)$ approximately double, going up to around 50-60 percent. The $R^2$s for $\Delta\pi$ that result from the instruments are always a bit worse, closer to 40 percent, and those for $r_L$ notably higher, around 90 percent.

As seen from the IV estimates, following introduction of the instruments, the estimates of the influence of the output gap on the net public surplus rise from .44 to .70. This is not a satisfactory result. The failure to consider the reciprocal influence of fiscal policy on current performance when using e OLS should have led to overestimation, not underestimation, of non-discretionary fiscal policy. To explain, suppose that a cyclical rise in output raises net government receipts. In principle, the rise in the government surplus should limit the increase in output. If it does, then the correction for the reciprocal influence means raising the swings in $\Delta(Y-Y^*)$ above observed levels: that is, substituting higher positive values of $\Delta(Y-Y^*)$ in expansions and higher negative values of it in contractions. On the other hand, following the cyclical

corrections, the series for the net government surplus stay the same. Thus, regressing the latter series on the corrected (larger absolute) values for $\Delta(Y-Y^*)$ should yield lower coefficients. The opposite happens. Notwithstanding, we consider the estimates with the instruments preferable on general statistical grounds.

The next results relate to the elementary decomposition of the net government surplus between taxes and spending. Separate IV estimation of the tax and spending equations with the same instruments as before for $\Delta(Y-Y^*)$, $\Delta\pi$ and $r_L$ yields a somewhat higher estimate for the impact of the output gap on the net public surplus for the OECD21 (.503 in section 2, minus –.404 in section 3 gives .907). However, the trouble with these estimates, as indicated earlier, is that the equations for taxes and spending should be estimated simultaneously. Three stage least squares estimates for a 5-equation system containing equations for $\Delta(Y-Y^*)$, $\Delta\pi$ and $r_L$ in addition to taxes and spending improve the precision of the estimated coefficients and the impact of the cycle on taxes drops slightly to 0.499 while that on expenditures drops (in absolute terms, from –.404 to –.157). The basic outcome of using 3SLS is to improve precision and increase the plausibility of the impact of the output gap on the net public surplus in the OECD21. After introducing 3SLS, the impact on the public surplus approximates .65.

It is interesting to compare these results for taxes and expenditures, with received ideas. Automatic stabilization is currently supposed to come essentially through taxes. Unemployment compensation – the only relevant spending item – makes up less than 10 percent of tax receipts in most countries (often much less), and therefore cannot compare in importance with taxes under proportional taxation (or anything resembling it). Thus, the results conform better to standard views on automatic stabilization on the tax than the spending side. The coefficient of the output gap of .499 for taxes in the OECD21 is particularly close to what we would anticipate from earlier work on automatic stabilization. However, the –.157 estimate for expenditures in the OECD21 looks high compared to Giorno *et al.* (1995) and van den Noord (2000)). We shall come back to this issue below. But for the moment let us turn our attention to the revised estimates if we simply substitute ratios of output as the dependent variables and correspondingly substitute $Y/Y^*$ as the output gap.

b. *Ratios*

Ratios often serve in the analysis of fiscal policy. Quite apart, the case for using them is strong. Stabilization policy relates to smoothing economic performance or keeping output close to potential. It does not essentially concern long run production and growth in the level of output. Accordingly, analysis of fiscal policy often focuses on keeping the ratio of output to potential output close to one. As a result, even in cases where study focuses on a single country (and there is therefore no interest in using ratios simply to promote international comparison), the critical fiscal policy variable is often the ratio of the net budget balance to output, and the critical problem is to determine this ratio in the absence of non-discretionary responses to the environment. In line with these remarks, the European Commission centers on the ratio of the budget balance to output in its surveillance of country members' adherence to the Stability and Growth Pact (European Commission (2004), Part II, ch. 3).

Notwithstanding, in analyzing discretionary fiscal policy, studies often correct the budget balance in levels for non-discretionary responses and subsequently merely divide by output in order to obtain the ratios of cyclically adjusted figures to output or potential output. The European Commission is not the only one to do so. Two leading recent academic examples are Taylor (2000) and Galí and Perotti (2003). Both explicitly proceed from cyclically adjusted figures in levels based on official numbers (from the U.S. Congressional Budget Office in one case, the OECD in the other) to subsequent division by potential output in order to analyze discretionary fiscal policy.

If potential output were perfectly deterministic and not subject to any shocks, there would be nothing wrong with this last practice (that is, because of the division by *potential* instead of observed output). The division would then not call for any difference in estimation procedure at all, and the choice of dividing by potential output would be a critical one indeed. However, potential output is subject to supply shocks. Thus, if ratios of output are the matter of interest, direct estimates of the correction of this ratio for the cycle will yield more efficient estimates, regardless whether we divide by observed or potential output. A further benefit will be to clarify the stabilizing forces at work. In the absence of a separate estimate of the ratios, as

such, these forces acting on the ratios remain in the background, even in the dark.[2] As for the choice of observed or potential output, we shall center on ratios of observed output here, since in any shift of focus on ratios, estimates of automatic effects of Y/Y* on the original data deserve priority, in my opinion.

The results in the right portion of Table 1 begin with OLS estimates of the ratio equations. As evident, a cyclical expansion notably raises the ratio of the net public surplus to output. A one percent rise in Y/Y* increases this ratio by over one-third of a percent (.341). So far, so good: the impact of the cycle on the government balance is stabilizing, just as it was before. Once again, if we introduce instrumental variables for $\Delta(Y/Y^*)$, $\Delta\pi$ and $r_L$, the cyclical influence goes up, though less markedly, it rises to .356. There is no need to pause once more on the separate IV estimates of taxes and spending. If we go directly to the preferable simultaneous 3SLS estimates, we find that the impact of the cycle on the net public surplus is around .381, but the most striking result of all is that the response comes entirely from a stabilizing movement in expenditures. The freely estimated coefficient in the revenue equation is close to 0 and is statistically insignificant, hence revenues appear to move proportionately with output. By contrast, government spending moves in the stabilizing direction. This stabilizing movement in the expenditure ratio is largely the outcome of a smaller percentage movement in the numerator than the denominator.[3] These results conform with expectations, as observed near the start in connection with the Commission. Once we reason in terms of ratios, we can no longer expect much non-discretionary stabilization, if any, to come from revenues but must expect it to come largely from spending. However, major questions remain outstanding. How much of the rele-

[2]The most recent report on public finances in EMU of the European Commission (2004) edges toward this position. First, the report recognizes major conceptual differences when study concerns the ratio of cyclically adjusted budget balances to output, as mentioned at the start. Next, the report also recognizes an issue of estimation if ratios to output serve because the predicted ratio to output then depends not only on the predicted value of cyclically adjusted budget balances, but also the predicted ratio of output to potential output Y/Y* (Section 3.3 of Part II and Annex II). In other words, based on the report, forecast errors in Y/Y* affect both the numerator and the denominator in the ratio. But according to my reasoning, the difficulty lies deeper: it is inefficient to estimate the numerator separately.

[3] Arreaza *et al.* (1999) probably deserve credit as the first to bring attention to the issue. Reasoning in ratios, they conclude that taxes are destabilizing and government spending is stabilizing in the OECD and the EU. Mélitz (2000) notes the seeming unorthodoxy of their stand (without siding with them, as might have been right).

vant stabilization results from inertia in government consumption and investment? How much is instead the work of transfer payments and is therefore automatic in the usual sense? To answer this question we must further decompose the data.

## IV. *Further decomposition of government receipts and expenditures*

As long as any further decomposition of government spending between goods and services and transfers is essential, why not exploit all of the information available in the OECD databases? On the revenue side, OECD Economic Outlook also allows tax revenues to be split into direct taxes, both for businesses and households (TY = TYH + TYB) , social security contributions received by government (SSRG) and indirect taxes (TIND). On the spending side, Economic Outlook allows us to breakdown general government total expenditures into final consumption expenditures (CGAA), and its wage (CGW) and non-wage components (CGNW), Social Benefits Paid (SSPG), net capital outlays (CAPOG), Subsidies (TSUB), other net Transfers and net property income (NPY) respectively.

However, this Economic Outlook classification is far from adequate. Social benefits paid embrace too many things: payments for pensions, sickness benefits, invalidity, unemployment, subsistence, income support and childcare. Consider just one example, we would clearly expect pensions, both age related, and those related to early retirement, to respond to the cycle in a stabilizing manner. Cyclical upswings are likely induce people to work longer and to delay their pension receipts. Pensions are also very expensive, and in aggregate represent a sizeable part of social benefits paid. In addition, unemployment compensation probably also responds counter-cyclically, though only with a lag (unless there is a rise in the number of people who qualify for benefits within a year during a contraction among those who are already unemployed, which is possible). However, it is not clear that payments for childcare should move counter-cyclically. In principle, we would argue that these individual components should be analyzed directly. While system estimation is likely to retain advantages, we argue that the appropriate form of estimation should be conducted in a manner that allows their cyclical sensitivities to differ.

Using the OECD's Social Expenditure database we are able to operationalize a more de-

tailed breakdown of transfer payments than has than has previously been employed in this literature. into age related expenditure. Specifically we breakdown Economic Outlook series Social Benefits Paid by Government (SSPG) into AGEI = old age cash benefits, including early retirement pension), incapacity-related benefits (ICR = cash benefits related to disability, occupational injury and disease but excluding sickness benefits), unemployment compensation and severance pay (UC), paid sick leave (SIC = cash payments relating to occupational injury and disease and other sickness daily allowances), a category combining family, housing related and other cash benefits associated with income maintenance (OTH) and a residual required to ensure consistency between the two databases (social benefits in kind less public cash benefits, SSPGX = SSPG – AGEI – ICR – UC – SIC – OTH).

In fact, the Social Expenditure database can also help clarify elements of general government current (or consumption) expenditure, CGAA. This aggregate actually includes goods and services produced for collective consumption (such as security and justice) as well as spending by the government on goods and services that are for individual consumption (health care, housing, education, and so on.). Among these the Social Expenditure database offers data on health benefits in kind. If we are willing to forfeit the possibility of separating government current spending into its wage and non-wage components, we can instead break out health benefits in kind from the total government consumption expenditures (HLTH) while keeping current spending excluding health CXHLTH=CGAA-HLTH). This turns out to be helpful.

Table 2a summarises results for a number of alternative disaggregated variants of three-stage least squares systems. Each system includes an equation for each of the revenue and spending items, plus three equations for the sources of non-discretionary effects. All the equations are estimated in levels and concern the the impact of $\Delta(Y-Y^*)$. Each set of results are reported when the system includes a full set of time dummies and alternatively when only the five yearly dummies are included – all the key results we discuss remain robust to across time dummy treatment. Table 2b shows the ratio results for and reports the impact of $\Delta(Y/Y^*)$. For the sake of brevity we only we only report the estimates of the cyclical effects from each equation, along with the standard errors, Z statistics and the probability value of the Z statistic and the equation's pseudo $R^2$. A common sample period of 348 observations is used throughout.

TABLE 2a

| 3SLS LEVELS | TYH | TYB | SSRG | TIND | CGW | CGNW | CGAA | CXHLTH | SSPG | SXSOC | HEALTH | AGEI | ICR | UC | SIC | OTH | TSUB | CAPOG | Net Transfers | NPY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **A.1** | **21 countries, n=348, full set of time dummies** | | | | | | | | | | | | | | | | | | | |
| **Coef** | **0.175** | **0.213** | **0.084** | **0.055** | -- | -- | **0.029** | -- | **-0.050** | -- | -- | -- | -- | -- | -- | -- | **0.015** | **0.024** | **-0.002** | **0.026** |
| Std. Err | 0.01 | 0.01 | 0.01 | 0.01 | -- | -- | 0.00 | -- | 0.00 | -- | -- | -- | -- | -- | -- | -- | 0.00 | 0.02 | 0.00 | 0.00 |
| Z | 17.3 | 28.8 | 10.3 | 6.3 | -- | -- | 7.0 | -- | -13.1 | -- | -- | -- | -- | -- | -- | -- | 4.7 | 1.0 | -0.5 | 8.1 |
| P>\|z\| | 0.000 | 0.000 | 0.000 | 0.000 | -- | -- | 0.000 | -- | 0.000 | -- | -- | -- | -- | -- | -- | -- | 0.000 | 0.320 | 0.633 | 0.000 |
| "R-sq" | 0.702 | 0.771 | 0.785 | 0.668 | -- | -- | 0.964 | -- | 0.929 | -- | -- | -- | -- | -- | -- | -- | 0.463 | 0.180 | 0.244 | 0.571 |
| **A.2** | **21 countries, n=348, full set of time dummies** | | | | | | | | | | | | | | | | | | | |
| **Coef** | **0.171** | **0.209** | **0.083** | **0.046** | -- | -- | **0.028** | -- | **-0.037** | **-0.008** | -- | **-0.015** | **0.000** | **-0.010** | **0.000** | **-0.005** | **0.015** | **0.012** | **-0.004** | **0.025** |
| Std. Err | 0.01 | 0.01 | 0.01 | 0.01 | -- | -- | 0.00 | -- | -- | 0.00 | -- | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 |
| Z | 17.0 | 28.7 | 10.1 | 5.4 | -- | -- | 6.8 | -- | -- | -2.6 | -- | -6.4 | 1.5 | -6.0 | -0.1 | -7.6 | 0.6 | 4.0 | -1.0 | 8.0 |
| P>\|z\| | 0.000 | 0.000 | 0.000 | 0.000 | -- | -- | 0.000 | -- | -- | 0.010 | -- | 0.000 | 0.147 | 0.000 | 0.908 | 0.000 | 0.539 | 0.000 | 0.338 | 0.000 |
| "R-sq" | 0.700 | 0.773 | 0.782 | 0.662 | -- | -- | 0.963 | -- | -- | 0.484 | -- | 0.960 | 0.817 | 0.088 | 0.577 | 0.460 | 0.189 | 0.481 | 0.245 | 0.570 |
| **A.3** | **21 countries, n=348, five yearly dummies** | | | | | | | | | | | | | | | | | | | |
| **Coef** | **0.170** | **0.210** | **0.080** | **0.045** | -- | -- | **0.027** | -- | **-0.037** | **-0.008** | -- | **-0.015** | **0.000** | **-0.010** | **0.000** | **-0.004** | **0.012** | **0.012** | **-0.004** | **0.024** |
| Std. Err | 0.01 | 0.01 | 0.01 | 0.01 | -- | -- | 0.00 | -- | -- | 0.00 | -- | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 |
| Z | 16.8 | 28.4 | 9.8 | 5.2 | -- | -- | 6.7 | -- | -- | -2.5 | -- | -6.5 | 1.4 | -6.0 | -0.3 | -7.4 | 3.8 | 0.5 | -1.0 | 7.7 |
| P>\|z\| | 0.000 | 0.000 | 0.000 | 0.000 | -- | -- | 0.000 | -- | -- | 0.013 | -- | 0.000 | 0.178 | 0.000 | 0.777 | 0.000 | 0.000 | 0.608 | 0.340 | 0.000 |
| "R-sq" | 0.685 | 0.760 | 0.771 | 0.646 | -- | -- | 0.961 | -- | -- | 0.454 | -- | 0.958 | 0.809 | 0.040 | 0.559 | 0.429 | 0.460 | 0.159 | 0.208 | 0.549 |
| **B.1** | **21 countries, n=348, full set of time dummies** | | | | | | | | | | | | | | | | | | | |
| **Coef** | **0.172** | **0.210** | **0.082** | **0.046** | **0.020** | **0.011** | -- | -- | **-0.038** | **-0.010** | -- | **-0.015** | **0.000** | **-0.009** | **0.000** | **-0.005** | **0.019** | **0.012** | **-0.005** | **0.026** |
| Std. Err | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | -- | -- | -- | 0.00 | -- | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 |
| Z | 17.1 | 29.4 | 10.1 | 5.3 | 14.8 | 2.6 | -- | -- | -- | -3.1 | -- | -6.4 | 1.5 | -5.9 | 0.0 | -7.6 | 0.8 | 3.9 | -1.2 | 8.1 |
| P>\|z\| | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.009 | -- | -- | -- | 0.002 | -- | 0.000 | 0.140 | 0.000 | 0.978 | 0.000 | 0.425 | 0.000 | 0.250 | 0.000 |
| "R-sq" | 0.702 | 0.772 | 0.781 | 0.662 | 0.957 | 0.933 | -- | -- | -- | 0.497 | -- | 0.960 | 0.817 | 0.087 | 0.577 | 0.459 | 0.192 | 0.481 | 0.243 | 0.569 |
| **B.2** | **21 countries, n=348, five yearly dummies** | | | | | | | | | | | | | | | | | | | |
| **Coef** | **0.171** | **0.210** | **0.080** | **0.045** | **0.020** | **0.010** | -- | -- | **-0.038** | **-0.009** | -- | **-0.015** | **0.000** | **-0.009** | **0.000** | **-0.004** | **0.012** | **0.017** | **-0.005** | **0.025** |
| Std. Err | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | -- | -- | -- | 0.00 | -- | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 |
| Z | 16.9 | 29.1 | 9.7 | 5.2 | 14.6 | 2.5 | -- | -- | -- | -3.0 | -- | -6.5 | 1.4 | -5.9 | -0.2 | -7.4 | 3.8 | 0.7 | -1.2 | 7.9 |
| P>\|z\| | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.013 | -- | -- | -- | 0.003 | -- | 0.000 | 0.173 | 0.000 | 0.841 | 0.000 | 0.000 | 0.483 | 0.250 | 0.000 |
| "R-sq" | 0.687 | 0.759 | 0.770 | 0.646 | 0.954 | 0.929 | -- | -- | -- | 0.467 | -- | 0.958 | 0.809 | 0.039 | 0.560 | 0.428 | 0.460 | 0.161 | 0.205 | 0.548 |
| **C.1** | **21 countries, n=348, full set of time dummies** | | | | | | | | | | | | | | | | | | | |
| **Coef** | **0.170** | **0.205** | **0.083** | **0.046** | -- | -- | -- | **0.042** | **-0.047** | **-0.006** | **-0.013** | **-0.015** | **0.000** | **-0.010** | **0.000** | **-0.004** | **0.016** | **0.012** | **-0.004** | **0.026** |
| Std. Err | 0.01 | 0.01 | 0.01 | 0.01 | -- | -- | -- | 0.00 | -- | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 |
| Z | 17.0 | 28.7 | 10.1 | 5.4 | -- | -- | -- | 12.5 | -- | -2.0 | -4.7 | -6.3 | 1.5 | -6.0 | -0.2 | -7.0 | 0.7 | 3.9 | -1.1 | 8.1 |
| P>\|z\| | 0.000 | 0.000 | 0.000 | 0.000 | -- | -- | -- | 0.000 | -- | 0.046 | 0.000 | 0.000 | 0.133 | 0.000 | 0.858 | 0.000 | 0.493 | 0.000 | 0.267 | 0.000 |
| "R-sq" | 0.699 | 0.776 | 0.780 | 0.663 | -- | -- | -- | 0.939 | -- | 0.477 | 0.899 | 0.960 | 0.817 | 0.088 | 0.576 | 0.478 | 0.191 | 0.481 | 0.243 | 0.571 |
| **C.2** | **21 countries, n=348, five yearly dummies** | | | | | | | | | | | | | | | | | | | |
| **Coef** | **0.170** | **0.205** | **0.080** | **0.045** | -- | -- | -- | **0.042** | **-0.047** | **-0.006** | **-0.013** | **-0.015** | **0.000** | **-0.010** | **0.000** | **-0.004** | **0.012** | **0.014** | **-0.004** | **0.025** |
| Std. Err | 0.01 | 0.01 | 0.01 | 0.01 | -- | -- | -- | 0.00 | -- | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 |
| Z | 16.7 | 28.4 | 9.8 | 5.2 | -- | -- | -- | 12.5 | -- | -1.9 | -4.8 | -6.4 | 1.4 | -6.0 | -0.4 | -6.8 | 3.9 | 0.6 | -1.1 | 7.9 |
| P>\|z\| | 0.000 | 0.000 | 0.000 | 0.000 | -- | -- | -- | 0.000 | -- | 0.060 | 0.000 | 0.000 | 0.169 | 0.000 | 0.705 | 0.000 | 0.000 | 0.564 | 0.265 | 0.000 |
| "R-sq" | 0.684 | 0.763 | 0.769 | 0.647 | -- | -- | -- | 0.936 | -- | 0.446 | 0.894 | 0.958 | 0.808 | 0.040 | 0.558 | 0.448 | 0.459 | 0.160 | 0.204 | 0.550 |

With respect to levels results all of the tax items have the expected positive signs. They are also all statistically significant. Direct taxes, both on business and households (TYB and TYH) show a stronger response than do social security contributions (SSRG) and indirect taxes (TIND). This result is consistent across all the variants rows A.1 through to C.2.

On the spending side, total consumption spending by general government (CGAA) shows a significant positive response to the cycle. When disaggregated into its wage and non-wage components the wage element of current expenditure (CGW) shows a more significant and stronger positive response than the non-wage component (CGNW), as shown in rows B.1 and B.2. Turning to the alternative characterisation of health spending and current expenditure excluding health, we find the interesting result that while spending excluding health continues to respond positively to the cycle, spending by the government on individuals' health declines so behaves counter-cyclically. This can be seen in rows C.1 and C.2.

With respect to transfer payments, row A.1 shows a clear and significant counter-cyclical movement in the aggregate social benefits paid data (SSPG). When we look at the dis-aggregate picture, in rows A.2 onward we can see that the cycle enters into the age related expenditure (AGEI) equation very significantly and with a negative sign. Unemployment compensation (UC) and other social expenditures (family benefits, income support and housing benefits, OTH) also bear significant negative effects while incapacity related (ICR) and sickness benefits (SIC) show no significant response to the cycle. Subsidies attract a positive coefficient, as does net property income. As with the effects on the revenue side, the impacts of the cycle on these components of social benefits paid are not affected in a material way by the way in which CGAA is demomposed, nor are they markedly affected by the use of the full set of time dummies as opposed to the five yearly dummies[4].

[4] One result that is less robust relates to the impact of the cycle on net capital outlays (CAPOG). The coefficient is always positive, but its significance relies upon the presence of the full set of time dummies, and suggests that further investigation is warranted before placing a lot of emphasis on this result. However, we postpone this analysis for the moment to concentrate on the new results relating particularly to social benefits paid.

TABLE 2b

| 3SLS RATIOS | TYH | TYB | SSRG | TIND | CGW | CGNW | CGAA | CXHLTH | SSPG | SXSOC | HEALTH | AGEI | ICR | UC | SIC | OTH | TSUB | CAPOG | Net Transfers | NPY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **A.1** | **21 countries, n=348, full set of time dummies** | | | | | | | | | | | | | | | | | | | |
| **Coef** | **-0.015** | **0.055** | **-0.031** | **-0.005** | -- | -- | **0.000** | -- | **0.000** | -- | -- | -- | -- | -- | -- | -- | **-0.020** | **-0.064** | **0.008** | **-0.048** |
| Std. Err | 0.03 | 0.02 | 0.02 | 0.02 | -- | -- | 0.00 | -- | 0.00 | -- | -- | -- | -- | -- | -- | -- | 0.01 | 0.03 | 0.02 | 0.02 |
| Z | -0.6 | 2.6 | -1.5 | -0.2 | -- | -- | -1.1 | -- | -1.0 | -- | -- | -- | -- | -- | -- | -- | -2.0 | -2.2 | 0.5 | -2.1 |
| P>\|z\| | 0.583 | 0.009 | 0.130 | 0.816 | -- | -- | 0.272 | -- | 0.316 | -- | -- | -- | -- | -- | -- | -- | 0.052 | 0.028 | 0.640 | 0.038 |
| "R-sq" | 0.198 | 0.323 | 0.229 | 0.249 | -- | -- | 0.525 | -- | 0.610 | -- | -- | -- | -- | -- | -- | -- | 0.273 | 0.274 | 0.289 | 0.338 |
| **A.2** | **21 countries, n=348, full set of time dummies** | | | | | | | | | | | | | | | | | | | |
| **Coef** | **-0.022** | **0.045** | **-0.029** | **-0.014** | -- | -- | **0.000** | -- | **-0.199** | **0.000** | -- | **-0.099** | **-0.025** | **-0.067** | **-0.009** | **0.002** | **-0.028** | **-0.065** | **0.003** | **-0.046** |
| Std. Err | 0.03 | 0.02 | 0.02 | 0.02 | -- | -- | 0.00 | -- | -- | 0.00 | -- | 0.01 | 0.00 | 0.01 | 0.00 | 0.01 | 0.01 | 0.03 | 0.02 | 0.02 |
| Z | -0.8 | 2.2 | -1.5 | -0.6 | -- | -- | -1.2 | -- | -- | 0.2 | -- | -9.1 | -5.6 | -8.9 | -1.9 | 0.3 | -2.8 | -2.3 | 0.2 | -2.0 |
| P>\|z\| | 0.432 | 0.030 | 0.147 | 0.526 | -- | -- | 0.223 | -- | -- | 0.876 | -- | 0.000 | 0.000 | 0.000 | 0.063 | 0.740 | 0.005 | 0.022 | 0.869 | 0.044 |
| "R-sq" | 0.195 | 0.319 | 0.223 | 0.249 | -- | -- | 0.528 | -- | -- | 0.174 | -- | 0.415 | 0.437 | 0.624 | 0.285 | 0.307 | 0.273 | 0.277 | 0.283 | 0.343 |
| **A.3** | **21 countries, n=348, five yearly dummies** | | | | | | | | | | | | | | | | | | | |
| **Coef** | **-0.024** | **0.066** | **-0.054** | **0.011** | -- | -- | **0.000** | -- | **-0.229** | **0.000** | -- | **-0.102** | **-0.028** | **-0.082** | **-0.009** | **-0.008** | **-0.036** | **-0.071** | **-0.004** | **-0.068** |
| Std. Err | 0.02 | 0.02 | 0.02 | 0.02 | -- | -- | 0.00 | -- | -- | 0.00 | -- | 0.01 | 0.00 | 0.01 | 0.00 | 0.01 | 0.01 | 0.02 | 0.01 | 0.02 |
| Z | -1.1 | 3.8 | -3.2 | 0.6 | -- | -- | -1.1 | -- | -- | 0.0 | -- | -10.9 | -7.2 | -11.7 | -2.2 | -1.3 | -4.3 | -2.9 | -0.3 | -3.5 |
| P>\|z\| | 0.295 | 0.000 | 0.002 | 0.559 | -- | -- | 0.267 | -- | -- | 0.994 | -- | 0.000 | 0.000 | 0.000 | 0.028 | 0.183 | 0.000 | 0.003 | 0.805 | 0.001 |
| "R-sq" | 0.167 | 0.285 | 0.201 | 0.160 | -- | -- | 0.362 | -- | -- | 0.126 | -- | 0.350 | 0.395 | 0.525 | 0.258 | 0.298 | 0.236 | 0.218 | 0.236 | 0.285 |
| **B.1** | **21 countries, n=348, full set of time dummies** | | | | | | | | | | | | | | | | | | | |
| **Coef** | **-0.012** | **0.046** | **-0.027** | **-0.015** | **0.000** | **0.000** | -- | -- | **-0.194** | **0.000** | -- | **-0.097** | **-0.024** | **-0.066** | **-0.009** | **0.002** | **-0.026** | **-0.059** | **0.001** | **-0.038** |
| Std. Err | 0.03 | 0.02 | 0.02 | 0.02 | 0.00 | 0.00 | -- | -- | -- | 0.00 | -- | 0.01 | 0.00 | 0.01 | 0.00 | 0.01 | 0.01 | 0.03 | 0.02 | 0.02 |
| Z | -0.5 | 2.2 | -1.4 | -0.7 | -0.6 | -1.4 | -- | -- | -- | 0.1 | -- | -8.9 | -5.3 | -8.9 | -1.8 | 0.3 | -2.6 | -2.1 | 0.1 | -1.7 |
| P>\|z\| | 0.648 | 0.025 | 0.168 | 0.505 | 0.584 | 0.169 | -- | -- | -- | 0.891 | -- | 0.000 | 0.000 | 0.000 | 0.078 | 0.796 | 0.009 | 0.035 | 0.947 | 0.093 |
| "R-sq" | 0.196 | 0.320 | 0.222 | 0.248 | 0.513 | 0.389 | -- | -- | -- | 0.174 | -- | 0.419 | 0.440 | 0.626 | 0.286 | 0.307 | 0.273 | 0.281 | 0.280 | 0.349 |
| **B.2** | **21 countries, n=348, five yearly dummies** | | | | | | | | | | | | | | | | | | | |
| **Coef** | **-0.016** | **0.066** | **-0.054** | **0.011** | **0.000** | **0.000** | -- | -- | **-0.225** | **0.000** | -- | **-0.099** | **-0.027** | **-0.081** | **-0.009** | **-0.008** | **-0.034** | **-0.068** | **-0.006** | **-0.061** |
| Std. Err | 0.02 | 0.02 | 0.02 | 0.02 | 0.00 | 0.00 | -- | -- | -- | 0.00 | -- | 0.01 | 0.00 | 0.01 | 0.00 | 0.01 | 0.01 | 0.02 | 0.01 | 0.02 |
| Z | -0.7 | 3.7 | -3.2 | 0.6 | -0.5 | -1.4 | -- | -- | -- | 0.0 | -- | -10.7 | -7.0 | -11.7 | -2.1 | -1.4 | -4.2 | -2.8 | -0.4 | -3.2 |
| P>\|z\| | 0.483 | 0.000 | 0.002 | 0.562 | 0.596 | 0.176 | -- | -- | -- | 0.989 | -- | 0.000 | 0.000 | 0.000 | 0.037 | 0.161 | 0.000 | 0.005 | 0.676 | 0.002 |
| "R-sq" | 0.168 | 0.285 | 0.201 | 0.159 | 0.366 | 0.267 | -- | -- | -- | 0.125 | -- | 0.355 | 0.398 | 0.527 | 0.258 | 0.298 | 0.236 | 0.220 | 0.231 | 0.293 |
| **C.1** | **21 countries, n=348, full set of time dummies** | | | | | | | | | | | | | | | | | | | |
| **Coef** | **-0.017** | **0.034** | **-0.027** | **-0.007** | -- | -- | -- | **0.000** | **-0.184** | **0.000** | **0.000** | **-0.089** | **-0.022** | **-0.068** | **-0.007** | **0.002** | **-0.029** | **-0.057** | **0.001** | **-0.044** |
| Std. Err | 0.03 | 0.02 | 0.02 | 0.02 | -- | -- | -- | 0.00 | -- | 0.00 | 0.00 | 0.01 | 0.00 | 0.01 | 0.00 | 0.01 | 0.01 | 0.03 | 0.02 | 0.02 |
| Z | -0.6 | 1.7 | -1.4 | -0.3 | -- | -- | -- | -0.5 | -- | 0.1 | -1.5 | -8.3 | -4.9 | -9.2 | -1.4 | 0.3 | -3.0 | -2.0 | 0.0 | -2.0 |
| P>\|z\| | 0.530 | 0.098 | 0.176 | 0.734 | -- | -- | -- | 0.626 | -- | 0.917 | 0.137 | 0.000 | 0.000 | 0.000 | 0.156 | 0.795 | 0.003 | 0.043 | 0.966 | 0.051 |
| "R-sq" | 0.197 | 0.315 | 0.218 | 0.245 | -- | -- | -- | 0.459 | -- | 0.171 | 0.374 | 0.435 | 0.446 | 0.622 | 0.288 | 0.306 | 0.272 | 0.281 | 0.278 | 0.344 |
| **C.2** | **21 countries, n=348, five yearly dummies** | | | | | | | | | | | | | | | | | | | |
| **Coef** | **-0.021** | **0.057** | **-0.052** | **0.016** | -- | -- | -- | **0.000** | **-0.215** | **0.000** | **0.000** | **-0.093** | **-0.025** | **-0.082** | **-0.007** | **-0.008** | **-0.036** | **-0.064** | **-0.007** | **-0.063** |
| Std. Err | 0.02 | 0.02 | 0.02 | 0.02 | -- | -- | -- | 0.00 | -- | 0.00 | 0.00 | 0.01 | 0.00 | 0.01 | 0.00 | 0.01 | 0.01 | 0.02 | 0.01 | 0.02 |
| Z | -0.9 | 3.3 | -3.1 | 0.9 | -- | -- | -- | -0.5 | -- | 0.0 | -1.4 | -10.1 | -6.6 | -11.9 | -1.8 | -1.3 | -4.4 | -2.7 | -0.5 | -3.2 |
| P>\|z\| | 0.364 | 0.001 | 0.002 | 0.395 | -- | -- | -- | 0.619 | -- | 0.965 | 0.157 | 0.000 | 0.000 | 0.000 | 0.080 | 0.179 | 0.000 | 0.008 | 0.634 | 0.001 |
| "R-sq" | 0.168 | 0.282 | 0.199 | 0.156 | -- | -- | -- | 0.317 | -- | 0.122 | 0.238 | 0.370 | 0.406 | 0.526 | 0.260 | 0.297 | 0.234 | 0.221 | 0.228 | 0.290 |

The results concerning the ratios, reported in Table 2b, are revealing. While household direct taxes were shown to move with the cycle, they evidently do so approximately in step with output, so that when calculated as percentages of output, their importance vanishes. The same is true of indirect taxes. By contrast the direct business tax ratio appears to rise significantly with Y/Y* while this effect is to some degree offset by a fall in social security contributions as a proportion of GDP. The movement of social security contributions though is less well determined, and is sensitive to the inclusion of the five yearly time dummies. This decomposition in revenues yields results that are not inconsistent with the story from Table 1, but the disaggregate estimates are able to add detail to the overall picture.

How do these estimates contribute to the overall picture? First, we cannot reject the null hypothesis that household direct taxes and indirect taxes keep up with the cycle, while we have some evidence (rows A.3, B.2 and C.2) that social social security taxes move in a destabilizing direction. In contrast, business direct taxes do better than just keep up with the cycle, and move significantly in a stabilizing direction. These results may carry conviction. We would expect profits to move more than wages with the cycle, and therefore business direct taxes to be more stabilizing (less destabilizing) than household direct taxes and social security contributions.

Turning to the spending side, the ratio results for the decomposition of social benefits paid are striking. From rows A.1 through to C.2 we cannot reject the null hypothesis that general government consumption and its wage and non-wage components, as well as its health and non-health components, keep up with the cycle.[5] The same is true of aggregate social benefits paid (column A.1). However, this aggregate picture masks more interesting behaviour in the components of social benefits paid.

In rows A.2 through to C.2 it is clear that both unemployment compensation and age related expenditures fall by a significant and sizable percentage of income during cyclical upswings. Incapacity benefits as well as subsidies, net capital expenditure and net property income also both move significantly in the stabilizing direction, and there is some mixed evidence on the significance of the stabilizing moves in sickness benefits. Overall, while various categories

[5] These last results, regarding spending, compare well with Lane (2003), who concentrates on the cyclical sensitivity of government activity on the spending side.

do matter, the response is dominated by and age related expenditures and unemployment compensation.

With these results in hand, we may return to the question of the extent to which the aggregate stabilizing response of the budget in ratios depends on the contribution of government spending on goods and services. The overall stabilizing response of the budget as a ratio of output does indeed owe a great deal to government spending on goods and services. If we sum over all the tax and spending items other than residual spending, the stabilizing response of the budget balance is of the order of .42-.45. But even when we ignore government spending on goods and services, the figure for automatic stabilization is still around .25. Thus, though government consumption and investment is important in explaining the stabilizing movement, transfer payments or social benefits paid are even more so. A one percent rise in the ratio of output to potential output leads to a fall in transfer payments of around 20% of the rise, enough by itself (apart from the inertia in government current expenditures) to overcome the associated fall in the ratio of taxes to output (7% of the rise) by a considerable amount.

How shall we interpret the greater stabilizing role of transfers than government consumption and investment? To answer, let us go back first to Tables 1 and 1a concerning levels. There we see that spending adds about 17% to stabilization in levels. Next, tables 2 and 2a tell us that this stabilization comes predominantly from age related cash benefits, unemployment compensation and incapacity related benefits, rather than from government consumption and net capital outlays.

The tables clearly indicate that government consumption makes no significant impact on the stabilization, while a two classes of social benefits paid, adds a lot. Suppose we interpret all the vast bulk of the stabilization as coming from age related expenditures, unemployment compensation, and incapacity related benefits, as it is easy to do. Then everything falls into place. Government spending on goods and services plays a stabilizing role in terms of ratios strictly because of initial size. But transfers, social benefits paid, do so both on account of initial size and a stabilizing movement in level. While social benefits paid are effectively smaller than government consumption and investment in most countries, they still amount to nearly .8 of this

spending on average. Hence, the stabilizing response of transfer payments stemming from the combination of movement and initial size trumps the stabilizing response of government spending on goods and services coming from initial size alone.[6]

## VI. *Concluding discussion*

We have rejected the mere guess that "among primary expenditures [or apart from interest payments], only unemployment benefits probably have a non-negligible built-in response to output fluctuations" (Galí and Perotti (2003), pp. 542-543).We have also stressed that if, for whatever reason, the interest lies in the cyclically adjusted ratio of government budget balance to observed or potential output, then the right way to proceed is to correct for the automatic impact of the cycle on the ratio itself. Basing the cyclically adjusted figures on estimates of the numerator alone is inefficient. When the proper estimates in the case of ratios take place, along with unemployment compensation, age related cash benefits and incapacity benefits appear to be especially prominent in automatic stabilization. This finding conforms with our expectations and is consistent with the hypothesis that cyclical upswings induce people to work longer and delay pension receipts. In contrast, we found no evidence that family cash benefits, housing benefits and sickness benefits make a significant contribution to stabilization. These results have contributed to our understanding of where the stabilization comes from.

Key remaining questions that demand investigation relate to discretionary fiscal policy. If the series for the cyclically adjusted budget balances should be constructed differently, measures of fiscal policy stances need to be re-estimated. In addition, so do many estimates of the impact of discretionary fiscal policy on the economy. This is true regardless of estimation in levels or ratios. But in the case of ratios, the problems go further since they relate to the estima-

[6] The math helps to see. Let spending be x, output y, normal output y* and suppose x = f(y). Then $d(x/y)/d(y/y^*) = (1/y^*)[(dx/dy) – (1/y)(x/y)]$. The negative value of the second term varies with x/y while dx/dy is just the same regardless of x/y. Thus, if dx/dy is –.17 and x/y =.22 (.22 being about the right figure for government consumption plus investment relative to output in the period on average), the first term may easily dominate the second. This is the decisive consideration (even though the reasoning abstracts from differences between the estimates of $dx/d(y–y^*)$ – or dx/dy, supposedly the same – and $d(x/y)/d(y/y^*)$ stemming from the separate estimation of the two in a stochastic environment).

tion procedure as well as the failure to consider any transfer payments besides unemployment compensation.

A big final question is that of the policy implications. First , as regards the size of automatic stabilization, the answer is easy: the estimates are larger than those in the studies we referred to at the outset. This is only reasonable since the sources of automatic stabilization are wider and cover a number of key elements of transfer payments. In the case of ratios, there is still an issue of which disaggregation of government spending on goods and services is more reliable, and more work is needed here.

But there are other policy implications. Consider the popular advice "let the automatic stabilizers work." In the case of taxes and government spending on goods and services, the injunction has essentially the same interpretation as before. When reasoning in levels, it advises not to interfere with the stabilizing effect of taxes through discretionary government spending. When reasoning in ratios, it gives similar advice though this may not be transparent. We see it most easily by referring to the case of lump-sum taxation. In that case, the ratio of taxes to output would automatically fall in a cyclical expansion, which would then be destabilizing. But since, in fact, taxes rise with income, this does not happen (or less so). Income-related taxes thus avert a destabilizing outcome. It follows that, when reasoning in ratios, the earlier injunction to let the automatic stabilizers work can be interpreted to advise, nearly identically, not to interfere with the reduction in destabilization coming from income-related taxes through discretionary government spending. The real *policy* difference in the injunction to let everything alone regards transfer payments. Now the injunction also says "do not interfere with the automatic stabilizing effects of transfer payments and subsidies", and we have demonstrated that it pays to be more specific about the important breakdown transfer payments.

As observed many times in the past, the automatic stabilization coming from taxes is not the product of any deliberate design. Ratios of taxes to output rose greatly following World War II in the richer section of the world for reasons mostly having nothing to do with desired macroeconomic stabilization. Smoothing of business cycles resulted. However, by and large this for-

tuitous outcome meets approval.[7] In contrast, in the case of unemployment compensation, automatic stabilization was indeed part of the design. The same cannot be said for all the other components of social expenditure and subsidies. Some of these, for example agricultural price supports, are even the subjects of political opposition. Transfer payments typically concern programs that are intended for their redistributive effects and that carry some controversial features – if only in their detailed configuration. There is little doubt that the motto "let the automatic stabilizers work" assumes a different political color if it says, as the data suggests, "let more people go into retirement, or on the poverty rolls, or on incapacity benefits and let public aid to currently subsidized firms increase during recessions." Already the principle of letting the automatic stabilizers work encounters some opposition because of the international differences in the sizes of stabilizers and the lack of any bearing of these different sizes on optimal stabilization (see, for example, Farina and Tamborini (2003)). Any call for unqualified reliance on transfer programs could only stir more controversy. Yet, according to the data, that is precisely what the motto calls for.

[7] Not always. Some people worry that automatic stabilization owes much to big government. True, the size of government can be reduced without cutting down automatic stabilization by lowering taxes and spending concurrently while increasing the progressiveness of taxation. However, progressive taxes can have serious disincentive effects on supply. For an emphasis on this conundrum and related discussion, see Buti *et al*. (2003).

# DATA APPENDIX

| Code | Description | Source |
|---|---|---|
| GDP | Gross Domestic Product (Market prices), Value | Economic Outlook |
| GDPTR | Potential Output, Total Economy, Current Prices | Economic Outlook |
| GAP1 | US Output GAP, EU12 Output Gap for US | Economic Outlook |
| PGDP | GDP Deflator | Economic Outlook |
| INF | PGDP Inflation | Economic Outlook |
| IRL | Interest Rate, Long Term | Economic Outlook |
| UNR | Unemployment Rate | Economic Outlook |
| YPGT | Total Disbursements Government | Economic Outlook |
| YPG | Current Disbursements, Government | Economic Outlook |
| CGAA | Government Consumption, Value | Economic Outlook |
| CGNW | Government Consumption, Excluding Wages | Economic Outlook |
| CGW | Government Consumption, Wages | Economic Outlook |
| SSPG | Social Benefits Paid by Government | Economic Outlook |
| PSE | Public Social Expenditure | SocX |
| PCB | Public cash benefits | SocX |
| PSE-PCB | Benefits in Kind | SocX |
| Residual | SSPG – PCB | |
| CAPOG | Net Capital Outlays<br>CAPOG = IGAA + TKPG – TKTRG - CKFG<br>IGAA=Gross capital formation<br>TKPG= net capital transfers paid +net acquisitions of non-produced non financial assets<br>TKTRG=capital tax and transfer payments received by government<br>CKFG= consumption of fixed capital | Economic Outlook |
| HLTH | Health Benefits in kind | SocX |
| YPEPG | Property Income Paid by Government | Economic Outlook |
| TOCP | Other Current Transfers Paid by Government | Economic Outlook |
| TSUB | Subsidies | Economic Outlook |
| YRG | Total Current Receipts | Economic Outlook |

| | | |
|---|---|---|
| TYB | Direct Taxes, Business | Economic Outlook |
| TYH | Direct Taxes, Households | Economic Outlook |
| TIND | Indirect Taxes | Economic Outlook |
| SSRG | Social Security Contributions Received by Government | Economic Outlook |
| TOCR | Other Current Transfers Received by Government | Economic Outlook |
| YPERG | Property Income Received by Government | Economic Outlook |
| AGE | Age related Social Expenditure:<br>= Old Age Cash Benefits excluding early retirement pension [Code 100 – Code 112] plus Survivors Cash Benefits [Code 200] | SocX |
| ERP | Old Age: Early retirement pension [Code 112] | SocX |
| AGEI | = AGE+ERP | |
| ERL | Early retirement for labour market reasons<br>[Code 712] | SocX |
| ICR | Incapacity-Related Benefits (Disability, Occupational injury and disease, *excluding Sickness*)<br>[Code 300 – Code 313 – Code 314] | SocX |
| SIC | Paid Sick Leave (occupational injury and disease and other sickness daily allowances)<br>[Code 313 +Code 314] | SocX |
| UC | Unemployment compensation / severance pay<br>[Code 711] | SocX |
| OTH | Other Social = Family+Housing+Other Cash Benefits<br>[Code 500+ Code 800 + Code 900] | SocX |

OECD Economic Outlook as provided on the OECD Compendium CD Rom 2005 release 1.

OECD Social Expenditure Database 2005 release.

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