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**NON-DISCRETIONARY AND
AUTOMATIC FISCAL POLICY
IN THE EU AND THE OECD**

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ABSTRACT

Non-Discretionary and Automatic Fiscal Policy in the EU and the OECD*

Official adjustments of the budget balance to the cycle merely assume that the only category of government spending that responds automatically to the cycle is unemployment compensation. But estimates show otherwise. Payments for pensions, health, 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 borrow official figures for cyclically adjusted budget balances, divide by potential output, and then 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 provides separate estimates of the impact of the cycle on the levels of budget balances and the ratios of budget balances to output. In addition, it discusses the relation between the two sorts of estimates. When the focus is on ratios of budget balances 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*

Analysis of discretionary fiscal policy often begins by isolating the part of the budget balance that reflects an "automatic" response to events. Only the rest – the "cyclically adjusted balance," as it is known – can serve as the basis for studying discretionary fiscal policy. This paper questions the usual manner of calculating the part of the budget balance that does not reflect any discretionary control. I shall put forward two criticisms of the typical procedure. It is generally assumed that all the automatic responses of the budget to events come from taxes and unemployment compensation. I will show instead that many of these responses come from other transfer payments besides unemployment compensation, including payments for pensions, health, subsistence, invalidity, child care and subsidies of all sorts to firms. Next, it is common to adjust taxes and unemployment compensation for the cycle and to reason subsequently about the ratio of the cyclically adjusted net government balance to output or to potential output. By contrast, I shall argue that whenever the reasoning concerns the ratio of the government deficit to output, direct estimates of the impact of the cycle on this ratio are appropriate. Otherwise the estimates of the cyclical adjustment are inefficient. Both of these arguments say that the usual estimates of the series for discretionary fiscal policy are incorrect. According to the first argument, this is always so; according to the second, it is often the case. Since new series are thus required on one or both counts, many estimates of the whole record of discretionary fiscal policy need revision. The econometric results of many studies of the impact of discretionary fiscal policy need to be reconsidered too.

If we use ratios instead of levels to measure automatic stabilization, there is not only the previous issue of estimation. In addition, some important conceptual differences arise. Interestingly, the recent report of the European Commission on Public Finances in EMU for 2004 (European Commission (2004)) recognizes these other matters (Part II, chapter 3 and Annex II). As the report observes, whenever the ratio of the government balance to output is in question, taxes will not contribute much, if anything, to stabilization over the cycle in case of proportional taxation. Only progressive taxes are likely do so. Thus, when the issue is the impact of fiscal policy on the ratio of the government balance to output, stabilization will probably come

mostly from the spending side and will arise simply from 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. All these observations in the recent report are correct, and it is also difficult to know how well they are understood since they are rarely acknowledged. But as regards ratios, my main emphasis will be on the previous issue of estimation.

There is also another conceptual issue that comes up 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, I 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, I will treat all responses of transfer payments to the cycle as automatic.

The tests in this study rest on the annual data in the OECD CD-rom for 2004 containing the *Economic Outlook* databank. As already implicit, I will deviate from official estimates of automatic stabilization in several ways. The official estimates generally distinguish 5 different elements of the government budget balance and then study each of them separately: household direct taxes, business direct taxes, social security contributions, indirect taxes and unemployment compensation (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, as used by the EC as

well).[1] As my first deviation, I will evidently abandon the preconception that unemployment compensation is the only type of transfer payment that responds automatically to the cycle. As my second deviation, I will also examine the non-discretionary responses of government balances in levels and as ratios of output separately. Both of these deviations are obvious from my opening remarks. However, as a third deviation, I will also rely entirely on simultaneous-equation methods of estimation. This last departure deserves a separate word.

Simultaneous-equation estimation methods have several advantages. The 4 relevant classes of taxes depend on distinct tax schedules of varying complexity that change over time and have different collection periods and delays. From this standpoint alone, there is something to be said in favor of estimating tax responses directly rather than inferring them from some preset figures after studying the responses of the 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 may be proper. Notwithstanding, it must be admitted that adopting the official methods was never even an alternative here. The relevant data for applying the official methods is not available in the OECD database for most transfer payments (of a very wide variety). In addition, the official methods have certain merits, particularly in using detailed national data and providing separate national estimates. Thus, to some degree, I may be making a virtue out of necessity.

II. *The framework*

At issue is the response of government revenues and expenditures to environmental factors independently of discretionary policy. Therefore, we want a specification that does not re-

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[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."

flect the aims of the authorities. Nothing concerning official expected values and official objectives, as such, should enter. In addition, it is best to focus on reactions to changes in a short period in the effort 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).

Compare Canzoneri *et al.* (2002). 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 also of special interest, since the ultimate aim is to distinguish between discretionary and non-discretionary fiscal policy.

On these general principles, I 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. Because of the first-difference form in particular, this focuses on short run responses. I also admitted non-discretionary effects of inflation and the interest rate into the analysis. But while using first differences for inflation, I 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 I 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. Even automatic responses may take longer than a year to take place (for example, because of a lagging response of unemployment and therefore unemployment compensation), and the rules on which they rest frequently change. Thus, I also included the lagged level and the lagged first difference of the dependent variable in the estimates. Further, I added a trend and dummies for six-year intervals (1973-78, 1979-84, 1985-90, 1991-96, 1997-2002). Since the data concerns a panel of different countries, I included country

fixed effects too. 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. Thus, even though the analysis allows for some delays in responses (despite the focus on non-discretionary fiscal policy), 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.

All of the country data entering into the statistical analysis goes up through 2002. Most of it begins in the early seventies. But though some of the series in the database begin in 1960, only a scattering of observations dating prior to 1970 enters in the econometric tests (because of lack of other required series that start as early). The results concern 20 OECD countries, and include 14 of the 15 members of the European Union. The missing EU member is Luxembourg, and the 6 OECD countries outside the EU are Australia, Canada, Japan, New Zealand, Norway and the US.

<div align="center">III. <u>The estimates in levels and ratios</u></div>

a. *Levels*

Tables 1 and 1a contain the most aggregative results. Table 1 does so for the 20 OECD countries, Table 1a for the 14 members of the European Union alone. The top half shows the results in levels; the bottom half in percentages. The notes to Table 1 recapitulate the entire specification from start to finish. Let us examine the levels first. In this case, 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. But the coefficients of the change in inflation ($\Delta\pi$) and the interest rate (r_L) do not have any clear meaning and are not reported. 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. I 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. The table omits the coefficients of all the explanatory variables besides the output gap, inflation and the rate of interest. The parenthetical figures concern statistical significance: *t* statistics in case of single-equation estimates, *z* ones in the 3SLS analysis.

In rows 1, the dependent variable is the net public surplus. The results are simple least squares. As seen, according to the estimate, a one-euro rise in output above potential output increases the net surplus by 55 cents in the OECD20 and by 35 cents in the EU14 alone. Both coefficients are highly significant. Both estimates are also comforting, since they are in the general vicinity of the typical figures. These last 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 estimates in rows 1 ignore any reciprocal influence. The next ones, in rows 2, 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. But as the output gap is particularly difficult to forecast by construction, the instruments designed to take account of this variable require a special word. With regard to the gap, I made two special choices. First, I assumed that fiscal policy does not affect unemployment within the current year. Accordingly, I included current unemployment among the instruments. Second, in line with Galí and Perotti (2003), I used the current output gap in the US as an instrument for the other 19 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^2s for $\Delta(Y-Y^*)$ approximately double, going up to around 50 percent. The R^2s for $\Delta\pi$ and r_L that result from the instruments (even without those two) are always notably higher, often above 90 percent.

As seen from rows 2, after introducing the instruments, the estimates of the influence of the output gap on the net public surplus rise from .55 to .64 for the OECD20 and from .35 to .44 for the EU14. This is not a satisfactory result. The failure to consider the reciprocal influence of fiscal policy on current performance in rows 1 should have led to overestimates, not underestimates, 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, I consider the estimates with the instruments preferable on general statistical grounds.

The next four equations relate to the elementary decomposition of the net government surplus between taxes and spending. In rows 3 and 4, taxes and spending are estimated separately with the same instruments as before for $\Delta(Y-Y^*)$, $\Delta\pi$ and r_L. The decomposition yields precisely the same estimate as before for the impact of the output gap on the net public surplus for the OECD20 (.47 in row 3 minus −.17 in row 4 gives .64) and a somewhat higher estimate of this impact for the EU14 (.54 instead of .44). However, as mentioned before, these last two equations should be estimated simultaneously.

Rows 5 and 6 provide the right sort of estimates. These estimates rest on three-stage-least-squares for a 5-equation system containing separate equations for $\Delta(Y-Y^*)$, $\Delta\pi$ and r_L, where these last 3 equations depend on the earlier instruments. Following the use of 3SLS, we can see that the separate effects of $\Delta(Y-Y^*)$ on taxes and expenditures in the OECD20 (Table 1) appear exactly as they were before in rows 3 and 4, but the precision of the estimates shoots up. In the case of the EU14, or Table 1a, the precision of the estimates also goes up, though perhaps not as spectacularly. But things are more complicated in this next table. The impact of the cycle on taxes stays the same but that on expenditures rises (in absolute terms, from −.22 to −.3). Taking stock of the two tables as a whole, the basic outcome of using 3SLS is to improve precision and to narrow the differences between the estimates of the impact of the output gap on the net public surplus in the EU14 and the OECD20. After introducing 3SLS, the impact on the public surplus approximates .6 in both cases. Still, in the strictly European part of the sample, taxes respond notably less and expenditures notably more than in the full sample.

It is interesting to compare these last results in rows 5 and 6, 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 im-

portance 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 .47 for taxes in the OECD20 (line 5) is particularly close to what we would anticipate from earlier work on automatic stabilization (though the .3 estimate for the EU14 is on the low side). However, the $-.17$ estimate for expenditures in the OECD20 looks high, to say nothing of the $-.3$ estimate in the EU14 (lines 6) (compare 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 when 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. Apart from the European Commission, two recent leading academic examples of this practice 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, in the case of division by *potential* output, as Taylor and Galí and Perotti do). The division would then not call for any difference in estimation procedure at all, and the choice of dividing by potential rather than observed 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 of division by observed or potential output. A further benefit will be to clarify the stabilizing forces acting on the ratios. In the absence of a separate estimate of the ratios, as such, these forces remain in the background, even in the dark.[2] As for the choice of observed or potential output, I shall center on ratios of observed output. The essential reason is that in any shift of focus on ratios, estimates of automatic effects of Y/Y^* on the original data deserve priority, in my opinion.

Rows 7 of Tables 1 and 1a repeat the OLS estimates of rows 1. 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 (.36). So far, so good: the impact of the cycle on the government balance is stabilizing just as it was before. Moreover, the impact of the cycle is now identical for the EU14 and the full sample. All the better. Once again, if we introduce instrumental variables for $\Delta(Y/Y^*)$, $\Delta\pi$ and r_L (rows 8), the cyclical influence goes up. It rises to .46 (or .45), that is, by a greater percentage (10/36 or 9/36) than it did previously. There is no need to pause once more on the separate IV estimates of taxes and spending (rows 9 and 10). If we go directly to the preferable simultaneous-equation estimates of the two in rows 11 and 12, we find that the impact of the cycle on the net public surplus is around .41-.42 for the OECD20 and the EU14 ($-.07 - (-.49)$ or $-.11 - (-.53)$) or close to the corresponding separate estimates

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[2]The most recent report on public finances in EMU of the European Commission (2004) notably edges toward this position. The report recognizes major conceptual differences when study concerns the ratio of cyclically adjusted budget balances to output, as mentioned at the start. In addition, the report also recognizes an issue of estimation when 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, forecast errors in Y/Y^* affect both the numerator and the denominator in the ratio. According to my reasoning, the difficulty lies deeper: it is inefficient to estimate the numerator separately. Still, the two concerns are related.

(of .45-.46) in rows 8. However, as was also true before in levels, the response of taxes is somewhat lower in the EU14 than it is for the OECD20 while the opposite is true for spending (though the difference is now more muted than before).

But the most striking result of all relates to the size of the respective responses of taxes and expenditures. Taxes move moderately less than output in response to the cycle. Thus, they move in a destabilizing direction. They do so to the tune of .07 to .11. By contrast, government spending moves in the stabilizing direction. This too is largely the outcome of a smaller percentage movement in the numerator than the denominator, but in this case, the difference in movement is stabilizing. The stabilizing change of the ratio of government spending to output is also marked: on the order of .49 to .53.[3] This is basically in conformity with expectations, as observed near the start. Once we reason in terms of ratios, we can no longer expect much non-discretionary stabilization, if any, to come from taxation but must expect it to come largely from spending instead. However, major questions remain outstanding. How much of the relevant 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, we must distinguish between the contribution of government spending on goods and services and the rest.

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 CD-rom? On the tax side, the OECD provides separate figures for household direct taxes, business direct taxes, social security tax receipts, transfers received, and indirect taxes. On the spending side, it offers figures for public wages, non-wage consumption, investment, social benefits paid, subsidies, other transfer payments, and net interest payments. There is also a residual category of spending, which includes capital transfers and payments, and government consumption of fixed capital. This makes 13 rubrics in all.

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[3] Arreaza *et al.* (1999) obtain the same general result and also interpret it to say that taxes are destabilizing and government spending is stabilizing in the OECD and the EU. They may have been the first to do so. Mélitz (2000) notes the seeming unorthodoxy of their stand (without siding with them).

The division of transfer payments between social benefits paid, subsidies and other transfer payments requires a further word. "Social benefits paid" includes payments to individuals for health, retirement benefits, subsistence, child care and invalidity. It also contains unemployment compensation. The "subsidies" are payments to firms. The "other transfer payments" are then a residual element of transfers collecting all the ones that have not been filed into the other two and better-defined rubrics.[4]

Once again, Tables 2 and 2a show separate results in levels and ratios. The ones in levels correspond exactly to those in rows 5 and 6 of the preceding tables and those in ratios correspond exactly to those in rows 11 and 12 of those tables. More precisely, the estimates in Tables 2 and 2a are joint estimates with further equations for $\Delta(Y - Y^*)$ or $\Delta(Y/Y^*)$, $\Delta\pi$ and r_L based on the same instruments as before. The new estimates rest on 3SLS. Thus, these estimates concern a 16-equation system, including a separate equation for the 13 different tax and spending items, and three more for the sources of non-discretionary effects. For the sake of legibility, I omit the results for r_L from Tables 2 and 2a. (These are almost always insignificant except for the effects on net interest payments). The results on the left sides of both tables concern levels (and the impact of $\Delta(Y-Y^*)$), while those on the right sides concern ratios (and the impact of $\Delta(Y/Y^*)$).

With respect to levels, all of the tax items have the expected positive signs. They are also all significant for the OECD 20 but only household and business direct taxes are so for the EU14. On the spending side, wages are highly significant with a positive sign and non-wage consumption is highly significant with a negative sign for the OECD20. But both influences are small and cancel each other out. As regards the EU14, the corresponding two effects are smaller and statistically insignificant. With respect to transfer payments, social benefits paid enter very

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[4] "Other current transfers" include payments by the central government for damages resulting from natural causes, such as fires and floods (which may be associated with insurance (net of insurance payments) or with emergency relief). Another element is "annual or other regular contributions paid by member governments to international organizations (excluding taxes payable to supra-national organizations)". Still another factor are fines and penalties. Somewhat mysteriously (since the figures concern general government), the numbers include some "transfers between different levels of government, such as frequently occur between central and state or local government units." The quotations come from a text from the Statistics Division of the UN, which is applicable, according to the services of the OECD.

significantly with a negative sign both for the OECD20 and EU14. The other two categories of transfer payments also bear significant signs (marginally so in the case of "other transfer payments" for the OECD20 at conventional confidence levels). But the signs are opposed between the OECD20 and EU14, only those for the OECD20 (positive) going in the destabilizing direction. These latter signs are also much smaller than the corresponding ones for the EU14, which go the "right" way.

As an important consideration, the residual category ("residual spending") is significant both for the OECD20 and the EU14. Significantly, this category covers government injections of capital into enterprises and can hide many things. To make matters worse, the variable enters with opposite signs in Tables 2 and 2a, and with large coefficients to boot. In the case of the EU14, the coefficient is enormous: .19. These opposite signs could well explain the conflicting signs for subsidies and other transfer payments in the two samples (those signs being much lower – or more negative – in the case where the coefficient for residual spending is positive, that of the EU14). Some doubt consequently surrounds the estimates of the individual spending items. It should be noted, though, that the stabilizing movement of "social benefits paid" on the left-hand sides is difficult to contest, since the signs of influence of $\Delta(Y - Y^*)$ on this variable are negative in both tables despite the opposite signs of the residual spending in the two. In addition, both coefficients are large, and both have exceedingly high statistical significance – especially the one closer to zero (−.066) concerning the OECD20 (and which, judging from the associated estimate of residual spending, is probably an underestimate and should be even more negative). Whatever the doubts about exact magnitudes, a stabilizing movement of "social benefits paid" of at least .066 in levels can be accepted. The estimates for wage and non-wage consumption in the OECD20 and the EU14 are also consistent with one another and merit confidence. On the other hand, the estimates for investment are wide apart and they do not.

The results on the right-hand sides, concerning the ratios, are far more satisfactory. There the residual spending items are totally insignificant. Thus, though those items move with the cycle, they evidently do so approximately in step with output, so that when calculated as percentages of output, their importance vanishes. Very significantly too, there is a remarkable conformity all down the line between the estimates of the impact of $\Delta(Y/Y^*)$ in Tables 2 and

2a. If we add up the coefficients for taxes on the right-hand sides in Table 2 and we do the same in Table 2a, we get the identical figure, −.07, in both cases. The discrepancy with Tables 1 and 1a is negligible too. Looking back at lines 11 of those tables, the estimates of the impact of Y/Y* on total taxes there were respectively −.07 and −.11. If we repeat the same operation for the 7 itemized elements of spending besides the residual element, the respective totals of the coefficients in Tables 2 and 2a are −.51 or −.53, as compared with estimates of −.49 and −.53 in lines 12 of Tables 1 and 1a. In sum, the decomposition on the right-hand sides in Tables 2 and 2a merits confidence.

What story do those estimates tell us? First, household direct taxes move in a destabilizing way. They do not keep up with the cycle. Social security taxes do so even less. However, indirect taxes keep up, while business direct taxes do better than just keep up. 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. Turning to the spending side, the results for transfer payments are the most striking. Social benefit payments fall markedly as a percentage of income during cyclical upswings. Further, subsidies and other transfer payments also both move significantly in the stabilizing direction. But though thus important, the contribution of these last two rubrics to stabilization is less than half as large as the contribution of social benefits paid alone. The results regarding wages and non-wage consumption also merit notice. Neither class of government expenditures keeps up with the cycle but wages do so less than non-wage consumption – by far.[5]

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 5 tax and the 7 spending items other than residual spending, the stabilizing response of the budget balance is of the order of .42-.45. But even if we ignore this inertia, the figure for automatic stabilization is still around .25. Thus, though government consumption and invest-

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[5] These results regarding spending compare well with Lane (2002), who concentrates on the cyclical sensitivity of government activity on the spending side.

ment is important in explaining the stabilizing movement, transfer payments are even more so. A one percent rise in the ratio of output to potential output leads to a fall in transfer payments of 30 to 33% of the rise, enough by itself (apart from inertia in government current expenditures) to overcome the associated fall in the ratio of taxes to output (7% of the rise) by around 25%.

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 essentially from transfers rather than government consumption and investment (despite the ambiguities stemming from the unreliability of the results associated with residual spending). The left-hand sides of both tables clearly indicate that government consumption adds little to the 17% while a single class of transfers alone, "social benefits paid," adds a lot. Suppose we interpret all of the 17% as coming from transfers, 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 government transfers do so both on account of initial size and a stabilizing movement in level. While transfer payments may be smaller than government consumption and investment in most countries, they still amount to nearly .8 of the latter on average. Hence, as regards ratios (or the levels relative to output), 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]

V. *Some individual-country analysis*

The study would also suggest the importance of national distinctions. Such distinctions obviously matter greatly in case of the usual conception of automatic stabilization (which excludes most transfer payments), since tax structures and systems of unemployment compensa-

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[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 is 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 (while 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*) that stem from separate estimation of the two in a stochastic environment).

tion differ by country. But national distinctions are still more important if a central element in non-discretionary fiscal policy is aggregate transfer payments. Some programs of government financing of retirement, health, unemployment, poverty, child care, regional assistance and subsidies to firms that are big in some countries do not even exist in others.

Unfortunately, however, it is impossible to replicate the analysis for individual countries. The national data series are too short. The previous 3SLS analysis proves impracticable. The most comparable tests by country I was able to perform depend on seemingly unrelated regressions (SUR) with instruments for the environmental factors $\Delta(Y-Y^*)$ or $\Delta(Y/Y^*)$, $\Delta\pi$ and r_L. Even then, 5 of the countries in the previous work needed to be dropped because of insufficiently long time series (Denmark, Greece, Ireland, New Zealand, and Spain). Table 3 displays a few of the results for the other 15 countries in turn. These results pertain to 4 separate estimates per country: two in levels, two in ratios. One of the estimates in levels and one of them in ratios relate to the net government surplus. These two correspond exactly to lines 2 and 7 of table 1. The other pair relates to the 14 dependent variables in Table 2, and rest on SUR with IV instead of 3SLS. With respect to those SUR estimates, I only display the results for 5 of the 14 variables, and I only report them for the impact of $\Delta(Y-Y)$ or $\Delta(Y/Y^*)$. This selectiveness in reporting avoids reams of pages that would be difficult to digest and to comment seriously. The five chosen variables for display focus on the spending rubrics that may be of special interest: wages, non-wage consumption, social benefits, subsidies and other transfer payments. Even limited in this way, the table still contains a large number of figures. Therefore, I highlight the significant z values at the 10% confidence level with the use of bold letters and the significant z values above the 5% confidence level with bold letters for the coefficients as well as the z values.

All these estimates obviously deserve much less confidence than those in Tables 2 and 2a. There are too few degrees of freedom. Each equation contains estimates of 10 or 11 separate coefficients (for $\Delta(Y-Y^*)$ or $\Delta(Y/Y^*)$, $\Delta\pi$, r_L, the lagged level and first difference of the dependent variable, the trend, and 4 or 5 six-year dummies). But there are only around 28 observations altogether. (The table reports the exact number of observations per country (N)). As a result, the typical number of degrees of freedom is around 16. Notwithstanding, a few points

can be made. The stabilizing response of the net public surplus to the cycle emerges – in levels or ratios, one or the other – for 12 of the 15 countries (all but Australia, Norway and Sweden). In 8 of the countries, it emerges in both forms. Wages and non-wage consumption often appear as moving in the stabilizing direction. In addition, the stabilizing influence of at least one of the three classes of transfer payments always emerges – that is, if we go down to the 10% level of significance. In 10 of the countries, the significance of one or more classes of transfer payments is clear above the 95% confidence level.

I propose to take a closer look at the estimates for the U.S. As in many other instances of closed-economy macroeconomics, the U.S. has been the outstanding individual-country laboratory for studies of automatic stabilization. Some especially careful estimates are available for this country, even at the microeconomic level (see, especially, Auerbach and Feenberg (2000)). It is reassuring, therefore, that the stabilizing response of the net public surplus to the output gap comes out plainly both in levels and in ratios for the U.S. The country is thus a good laboratory in this regard. However, the U.S. happens to be highly untypical in another respect. It is one of the few countries in the sample where the impact of transfer payments emerges faintly if at all. Measured in levels, transfer payments are totally insignificant for the U.S., and in ratios, the significance of these payments appears for only one of the three relevant rubrics, "social benefits paid," and then only near the 10% confidence level.[7] Thus, the tendency to focus on the U.S. could have something to do with the usual failure to give proper attention to transfer payments. On the other hand, principal focus on this country will obviously not explain the typical disregard of the issue of levels or ratios. Quite apart from the matter of principle, the difference in the sources of stabilization in levels and ratios emerges clearly in the U.S. When judged in terms of ratios, the government spending on goods and services in the country contributes greatly to the stabilizing movement of the budget balance. Indeed, nowhere does the significance of public wages and non-wage consumption in stabilization come out more plainly.

VI. *Concluding discussion*

I have rejected the guess that "among primary expenditures [or apart from interest payments], only unemployment benefits probably have a non-negligible built-in response to output

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[7] Why there is no data for the U.S. for "other transfers paid" is not clear.

fluctuations" (Galí and Perotti (2003), pp. 542-543). I 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 action is to correct for the automatic impact of the cycle on the ratio itself. In these cases, cyclically adjusted figures resting on estimates of the numerator alone are inefficient. According to the proper estimates, transfer payments are especially prominent in automatic stabilization concerning ratios. But the main point, as regards ratios as such, is the issue of estimation.

Two sorts of questions remain open. One relates to the specific transfer programs that contribute to stabilization. Some programs may not contribute at all, some may do so more than others, and some may even work in a pro-cyclical direction. The OECD classification of social benefits paid, subsidies, and other transfer payments is far from adequate. Social benefits paid embrace too many things: payments for pensions, health, invalidity, unemployment, subsistence and child care. We would clearly expect pensions, for example, to respond to the cycle in a stabilizing manner. Cyclical upswings likely induce people to work longer and to delay pension receipts. Pensions are also very expensive. 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, health service is a non-inferior good and does not necessarily move counter-cyclically if the patient bears a non-negligible fraction of the cost. Nor is it clear that payments for child care should move counter-cyclically. The stabilizing influence of subsidies to firms poses similar interrogations. Subsidies can cover many diverse programs going from agricultural price supports to help for labor training. What are the subsidy programs at work? Finally, it would be nice to know too where the stabilizing impact of "other transfer payments" comes from.

The second sort of 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 concern the estima-

tion procedure in addition to the failure to consider any transfer payments besides unemployment compensation.

A big final question is that of the policy implications. As regards the size of automatic stabilization, the answer is easy: the estimates are larger. They go up in levels from the usual figures of .5 to around .6. This is only reasonable since the sources of automatic stabilization are wider and cover all transfer payments. In the case of ratios, there is still the issue whether to use the .42 figure inclusive of government spending on goods and services or the .25 one exclusive of it. I believe the larger estimate to be better. It is the only one consistent with the .6 figure in levels. This last figure clearly depends on the response of all government spending as well as taxes to the cycle. We might be tempted to exclude the contribution of government consumption and investment in order to resolve the problem. But this would not be wise. The point of no contribution of government spending on goods and services in levels is precisely the one where inertia in government spending exerts a maximum effect in the corresponding calculation in ratios. Thus, the only way to maintain coherence in the analysis in levels and ratios is to admit inertia in government spending on goods and services when reasoning in ratios. Unless we do so and thus admit all non-discretionary responses to the cycle in the case of ratios, we generate a discrepancy mainly based on terminology alone.

The .42 figure in ratios and the .6 one in levels are also easy to fit together. Taxes and government spending, individually, are mostly of the order of .3 to .5 of output in the OECD. Let us take .4 as our basis for reasoning and, only to facilitate the calculation, let us translate the entire response of the budget balance to the cycle into a change in taxes (thereby putting aside the opposite signs of taxes and expenditures in the budget balance). Consider then the case of a cyclical doubling of output. The earlier .42 estimate for the influence on the ratio of the budget balance to output means that the government's income share would go up from .4 by .42 or to about .57, close to .60. This then fits well with the estimate of the change in the budget balance of around .60 of the rise in output.

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, the similarity of meaning comes through by considering lump-sum taxes. In the case of such taxes, a cyclical expansion would automatically cause the ratio of taxes to output to fall. It is then clear that income-related taxation reduces the scale of the destabilizing movement of the tax ratio that would otherwise occur during an expansion. Thus, when reasoning in ratios, the earlier injunction to let the automatic stabilizers work advises, nearly identically, not to interfere with the reduction in the destabilizing effect of 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".

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 fortuitous outcome has met approval.[8] In contradistinction, in the case of unemployment compensation, automatic stabilization was indeed part of the design. The same cannot be said for transfer payments as a group. Some of them, like agricultural price supports, are even the subjects of political opposition. Transfer payments typically concern programs which 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 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 such a

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[8] Not always. Some people worry about the relation of automatic stabilization to big government. 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. See Buti *et al*. (2003).

call is implicit in the data.

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TABLE 1

TAXES, SPENDING AND GOVERNMENT DEFICITS: THE AGGREGATES OECD20

Dependent Variable: 1st Differences		Test Method	$\Delta(Y-Y^*)$	$\Delta\pi$	r_L	R^2	N
(1)	Net public surplus	OLS	.55 (4.3)	+n.r. (1.83)	-n.r. (-.66)	.58	553
(2)	Net public surplus	IV 2SLS	.64 (3.8)	+n.r. (1.08)	+n.r. (.44)	.58	513
(3)	Taxes	IV 2SLS	.47 (4.2)	+n.r. (.85)	-n.r. (-.61)	.82	513
(4)	Expenditures	IV 2SLS	-.17 (1.89)	-n.r. (-.26)	-n.r. (-1.43)	.89	514
(5)	Taxes	3SLS	.47 (17)	+n.r. (1.06)	-n.r. (-.69)	.82	513
(6)	Expenditures	3SLS	-.17 (7.5)	+n.r. (.89)	-n.r. (-.47)	.89	513

Dependent Variable: 1st Differences		Test Method	$\Delta(Y/Y^*)$	$\Delta\pi$	r_L	R^2	N
(7)	Net public surplus ÷ Y	OLS	.36 (9.5)	.16 (4.6)	~0 (.08)	.35	553
(8)	Net public surplus ÷ Y	IV 2SLS	.45 (8)	.09 (1.95)	.03 (.61)	.35	513
(9)	Taxes ÷ Y	IV 2SLS	-.07 (-1.87)	.08 (2.6)	.06 (1.73)	.19	513
(10)	Expenditures ÷ Y	IV 2SLS	-.5 (-10.9)	.02 (.58)	.04 (1.19)	.52	514
(11)	Taxes ÷ Y	3SLS	-.07 (-2.15)	.07 (2.63)	.04 (1.74)	.19	513
(12)	Expenditures ÷ Y	3SLS	-.49 (-13.9)	-.1 (-.23)	.04 (1.24)	.54	513

Notes:

Y = output (GDP) in current prices   Y* = potential output in current prices

π = rate of inflation of price of GDP (percentage) r_L = long term rate of interest (percentage)

N = number of observations   n.r. = not reported

All the dependent variables are in current prices. *t* or *z* statistics in parentheses (*z* in case of 3SLS estimates). In case of 3SLS, the R^2s are also adapted.

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 ΔA is the first difference of the dependent variable A: either net public surplus, taxes, expenditures as such or these three divided by Y
  − ΔB is either the first difference of Y−Y or Y/Y*
  − $\Delta \pi$ is the first difference of π
  − t is a time trend
  − **C** is a matrix of country fixed effects
  − **D** is matrix of dummies for the 6-year intervals: 1973-78, 1979-84, 1985-90, 1991-96, and 1997-2002
  − $(\Delta A)_{-1}$ is the lagged level of ΔA (in notation with usual time subscripts, it is $A_{t-1} - A_{t-2}$)
  − $\Delta_{-1}(\Delta A)$ is the lagged first-difference of ΔA (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

In the case of equations (2), (3), (4), (8), (9) and (10), ΔB, $\Delta \pi$ and r_L are replaced by estimates based on instruments. The instruments for ΔB 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
  − π_{-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
  − $(Y/Y^*)_{US}$, $((Y/Y^*)_{US})_{-1}$ and $(\Delta((Y/Y^*)_{US}))_{-1}$, the level, lagged level and lagged first difference of the US GAP (except for the US, where the EU GAP serves instead)

The instruments for $\Delta \pi$ and r_L are identical except that the lagged level, the lagged first difference and the twice-lagged first difference of either $\Delta \pi$ or r_L replace B_{-1}, $(\Delta B)_{-1}$ and $\Delta_{-1}(\Delta B)$.

In the case of equations (5) and (6) and equations (11) and (12), both equations belong to a 5-equation system with extra equations for ΔB, $\Delta \pi$ and r_L. In these cases, the equations for ΔB, $\Delta \pi$ and r_L include all of the same instruments as before as the explanatory variables. The only difference is that the lagged levels, lagged first differences and twice-lagged first differences of all 3 dependent variables enter in all three equations.

Source: OECD *Economic Outlook* CD-ROM.

TABLE 1a

TAXES, SPENDING AND GOVERNMENT DEFICITS: THE AGGREGATES EU14

Dependent Variable: 1st Differences		Test Method	$\Delta(Y - Y*)$	$\Delta\pi$	r_L	R^2	N
(1)	Net public surplus	OLS	.35 (2.9)	+n.r. (1.02)	-n.r. (-.43)	.49	364
(2)	Net public surplus	IV 2SLS	.44 (3.2)	+n.r. (.84)	-n.r. (-.66)	.49	341
(3)	Taxes	IV 2SLS	.32 (2.2)	+n.r. (2.44)	+n.r. (2.7)	.66	341
(4)	Expenditures	IV 2SLS	-.22 (-1.94)	+n.r. (2.3)	+n.r. (2.27)	.74	341
(5)	Taxes	3SLS	.3 (3.9)	+n.r. (2.2)	+n.r. (2.4)	.65	341
(6)	Expenditures	3SLS	-.3 (-3.9)	+n.r. (2.1)	+n.r. (1.9)	.72	341

Dependent Variable: 1st Differences		Test Method	$\Delta(Y / Y*)$	$\Delta\pi$	r_L	R^2	N
(7)	Net public surplus ÷ Y	OLS	.36 (7.3)	.14 (4)	~0 (.05)	.35	364
(8)	Net public surplus ÷ Y	IV 2SLS	.46 (6)	.16 (2.2)	.06 (1.13)	.37	341
(9)	Taxes ÷ Y	IV 2SLS	-.12 (-2.45)	.13 (2.96)	.04 (1.93)	.17	341
(10)	Expenditures ÷ Y	IV 2SLS	-.53 (-8.2)	.04 (.81)	.05 (1.16)	.54	341
(11)	Taxes ÷ Y	3SLS	-.11 (-2.73)	.12 (3.2)	.07 (2.19)	.18	341
(12)	Expenditures ÷ Y	3SLS	-.53 (-11.5)	-.01 (-.31)	.03 (.97)	.57	341

See Notes to Table 1

TABLE 2

TAXES, SPENDING: THE DECOMPOSITION
OECD20 : 3SLS ESTIMATES

Dependent Variable:	Dependent Variables in Levels: First Differences			Dependent Variables as a Percentage of Y: First Differences		
	$\Delta(Y-Y^*)$	$\Delta\pi$	R^2	$\Delta(Y/Y^*)$	$\Delta\pi$	R^2
Household Direct Taxes	.21 (21)	+n.r (2.4)	.73	-.04 (-1.8)	.015 (2.75)	.14
Business Direct Taxes	.17 (17)	+n.r. (5.2)	.52	.04 (2.3)	-.01 (-.59)	.13
Social Security Tax Receipts	.07 (7.9)	-n.r. (-1.08)	.75	-.08 (-5.1)	~0 (.39)	.24
Transfers Received By Government	.001 (3.6)	+n.r. (.86)	.27	-.02 (-1.64)	-.01 (-1.3)	.09
Indirect Taxes	.07 (7.2)	+n.r. (.34)	.61	.03 (1.7)	-.02 (-1.86)	.12
Wages	.014 (5.3)	+n.r. (3.3)	.93	-.12 (-9.4)	0.01 (.81)	.39
Non-Wage Consumption	-.013 (-3.5)	+n.r. (1.66)	.94	-.06 (-6.2)	~0 (.45)	.21
Investment	-.09 (-7)	-n.r. (-2.03)	.29	-.02 (-1.94)	~0 (.35)	.14
Social Benefits Paid	-.066 (-17.5)	-n.r. (-1.92)	.94	-.21 (-13.9)	-.03 (-2.84)	.55
Subsidies	.012 (5.1)	+n.r. (.92)	.34	-.05 (-5.5)	~0 (.65)	.21
Other Transfer Payments	.006 (1.89)	+n.r. (~0)	.24	-.04 (-3.8)	-.01 (-.98)	.20
Net Interest Payments	.03 (1.66)	-n.r. (-.42)	.13	-.01 (-.81)	-.01 (.01)	.26
Statistical Discrepancy	-.09 (-5.6)	-n.r. (-1.2)	.21	.04 (1.26)	-.01 (.25)	.33

Both sets of 3SLS estimates include additional equations for $\Delta(Y-Y^*)$ or $\Delta(Y/Y^*)$ and $\Delta\pi$ and r_L. There are other regressors for the 13 dependent variables shown, and for $\Delta(Y-Y^*)$ or $\Delta(Y/Y^*)$, $\Delta\pi$ and r_L. These are the same as in Table 1. z statistics in parentheses. The R^2s are adapted. Number of observations: 415

TAXES, SPENDING: THE DECOMPOSITION
EU14: 3SLS ESTIMATES

Dependent Variable:	Dependent Variables in Levels: First Differences			Dependent Variables as a Percentage of Y: First Differences		
	$_D(Y - Y*)$	$\Delta\pi$	R^2	$\Delta(Y/Y*)$	$\Delta\pi$	R^2
Household Direct Taxes	.19 (5.9)	+n.r (2)	.50	-.04 (-1.87)	.04 (1.97)	.15
Business Direct Taxes	.08 (3.2)	+n.r. (.75)	.12	.05 (3.38)	.01 (1.28)	.10
Social Security Tax Receipts	.05 (1.3)	+n.r. (1.9)	.43	-.09 (-4.7)	.01 (.49)	.27
Transfers Received By Government	-.007 (-1.2)	+n.r. (.79)	.16	-.01 (-1.2)	~0 (.5)	.15
Indirect Taxes	.05 (1.3)	+n.r. (.47)	.33	.02 (.95)	-.03 (-1.78)	.10
Wages	-.009 (-.44)	+n.r. (3.8)	.68	-.13 (-9.33)	.2 (1.74)	.43
Non-Wage Consumption	-.005 (-.25)	+n.r. (1.92)	.54	-.05 (-4.9)	~0 (.32)	.23
Investment	.003 (0.35)	+n.r. (2.85)	.29	-.01 (-1.27)	.01 (1.37)	.16
Social Benefits Paid	-.2 (-7.2)	+n.r. (1.44)	.64	-.23 (-13.5)	-.05 (-3.9)	.56
Subsidies	-.054 (-5.4)	-n.r. (-.96)	.24	-.05 (-4.8)	-.01 (-.66)	.23
Other Transfer Payments	-.05 (-3.12)	-n.r. (-3.06)	.07	-.05 (-3.8)	-.03 (-2.7)	.23
Net Interest Payments	.03 (0.79)	+n.r. (1.42)	.31	-.01 (-.63)	~0 (-.29)	.29
Statistical Discrepancy	.19 (5.35)	-n.r. (-.17)	.35	.05 (1.26)	-.03 (-1.06)	.34

Both sets of 3SLS estimates include additional equations for $\Delta(Y - Y*)$ or $\Delta(Y/Y*)$ and $\Delta\pi$ and r_L. There are other regressors for the 13 dependent variables shown, and for $\Delta(Y - Y*)$ or $\Delta(Y/Y*)$, $\Delta\pi$ and r_L. These are the same as in Table 1. z statistics in parentheses. The R^2s are adapted. Number of observations: 335

TABLE 3: SELECTED INDIVIDUAL-COUNTRY RESPONSES TO Y-Y* OR Y/Y*
Levels in columns 1; percentages of Y in columns 2

Dependent Variable: First Differences	AUS (1)	AUS (2)	AUT (1)	AUT (2)	BEL (1)	BEL (2)	CAN (1)	CAN (2)	FIN (1)	FIN (2)	FRA (1)	FRA (2)	GER (1)	GER (2)	ITA (1)	ITA (2)
Net Public Surplus	.036 (.23)	.01 (.18)	.105 (.58)	**.30 (1.69)**	**.29 (2.52)**	**.45 (2.15)**	**.40 (2.94)**	**.45 (1.97)**	**.94 (2.59)**	**.43 (1.97)**	**.39 (2.84)**	.26 (1.53)	**.26 (2.53)**	**.46 (1.98)**	**.49 (2.1)**	**.50 (3.85)**
Wages	.024 (1.4)	**-.046 (-4)**	.027 (.60)	**-.053 (-1.85)**	-.015 (-.84)	**-.042 (-2.64)**	.029 (1.42)	**-.09 (-4.41)**	**-.045 (-2.43)**	**-.054 (-2.18)**	-.016 (-1.03)	**-.058 (-3.77)**	.007 (.57)	**-.032 (-2.7)**	-.077 (-1.44)	-.021 (-.77)
Non-Wage Consumption	**-.13 (-3.1)**	-.014 (-.03)	-.03 (-1.07)	.006 (.32)	**-.056 (2.68)**	**-.058 (-2.8)**	**-.034 (-2.11)**	-.034 (-1.58)	**-.036 (-3.2)**	-.20 (-1.38)	-.042 (-1.17)	-.005 (-.17)	-.018 (-.84)	-.024 (-1.17)	**-.78 (-2.14)**	-.021 (-.90)
Social Benefits Paid	**-.08 (-3)**	**-0.64 (-2.54)**	**-.11 (-3.48)**	**-.14 (-4.19)**	**-.04 (-2.51)**	**-.145 (-6.78)**	-	-	-0.48 (-1.69)	-.048 (-1.23)	**-.065 (-3.36)**	**-.101 (-3.25)**	-.053 (-1.85)	**-.091 (-2.01)**	-.065 (-1.55)	**.064 (1.79)**
Subsidies	.005 (.63)	**-.02 (-2.9)**	**-.05 (-2.42)**	**-.05 (-3.28)**	-.01 (-1.22)	.006 (.81)	**-.051 (-3.06)**	-.016 (-.99)	-.004 (-.46)	.017 (1.49)	**-.024 (-1.97)**	-.224 (-1.71)	**.036 (3.8)**	**.025 (2.66)**	**-.045 (-2.59)**	-.066 (-.28)
Other Transfer Payments	**-.026 (-2.17)**	-.01 (-1.12)	-.04 (-1.66)	**-.03 (-2.15)**	.001 (1.20)	.001 (.18)	-.028 (-1.54)	**-.128 (-3.63)**	.025 (1.44)	.001 (.03)	-.001 (-.16)	**.01 (1.63)**	.007 (.22)	.002 (.93)	**-.049 (-3.48)**	-.005 (-.49)

Dependent Variable	JAP (1)	JAP (2)	NETH (1)	NETH (2)	NOR (1)	NOR (2)	POR (1)	POR (2)	SWE (1)	SWE (2)	UK (1)	UK (2)	US (1)	US (2)	N
Net Public Surplus	**.47 (4.5)**	**.175 (1.73)**	**.51 (2.65)**	**.41 (1.94)**	-.075 (-.12)	.56 (1.4)	**.17 (1.59)**	.09 (.55)	.11 (.35)	.22 (.74)	**.50 (2.54)**	.28 (.99)	**.42 (2.80)**	**.48 (3.07)**	AUS 24
															AUT 27
Wages	-.003 (-.44)	**-.029 (-4.35)**	**-.058 (-2.2)**	**-.085 (-2.93)**	-.042 (-1.04)	-.051 (-.95)	**.091 (2.16)**	**-.048 (-3.33)**	-.052 (-1.42)	**-.149 (-3.47)**	**-.112 (-3.04)**	-.069 (-1.89)	**-.015 (-2.26)**	**-.093 (-10)**	BEL 28
															CAN 28
															FIN 24
Non-Wage Consumption	-.008 (-.70)	**-.035 (-2.77)**	**-.107 (-2.63)**	-.054 (-1.52)	.019 (.57)	.005 (.17)	**.156 (3.87)**	.013 (.58)	.042 (1.1)	-.002 (-.07)	-.019 (-.36)	**-.047 (-1.83)**	-.021 (-1.54)	**-.061 (-5.48)**	FRA 28
															GER 33
															ITA 36
Social Benefits Paid	**-.031 (-2.71)**	**-.047 (-2.78)**	**-.127 (-2.36)**	**-.10 (-2.02)**	-.048 (-1.74)	-.013 (-.18)	.007 (.21)	-.01 (-.60)	.018 (.42)	.05 (.71)	**-.083 (-2.08)**	-.044 (-1.1)	.019 (.49)	**-.041 (-1.71)**	JAP 29
															NETH 27
Subsidies	.002 (.28)	**-.018 (-2.22)**	**-.044 (-1.94)**	-.004 (-.18)	.022 (1.14)	-.01 (-.39)	~0 (~0)	.02 (.80)	**.033 (1.60)**	-.007 (-.41)	.008 (.65)	**-.05 (-3.25)**	-.01 (-1.04)	.002 (.38)	NOR 26
															POR 28
															SWE 31
Other Transfer Payments	.001 (.09)	.001 (.14)	-.009 (-.52)	-.001 (-.07)	-.058 (-1.72)	**-.058 (-1.98)**	**-.254 (-6.71)**	-.056 (-1.67)	.041 (1.24)	**.06 (1.58)**	**.048 (3.48)**	.01 (.87)	-	-	UK 29
															US 30

For notes, see next page

<u>Notes</u>:

The coefficients in columns 1 are responses to $\Delta(Y-Y^*)$; those in columns 2 are responses to $\Delta(Y/Y^*)$. All dependent variables are in first-difference form. *z* statistics in parentheses. Denmark, Greece, Ireland, New Zealand and Spain figure in the previous estimates but not here because the time series for them are too short. In the case of net public surplus, the specifications correspond exactly to those in rows 2 and 8 of Table 1. They are 2SLS with the same instruments as before for $\Delta(Y-Y^*)$, $\Delta(Y/Y^*)$, $\Delta\pi$ and r_L. The estimates of the other 5 dependent variables are obtained simultaneously, together with estimates of the other 8 dependent variables in Table 2. But these estimates are based on SUR (seemingly unrelated regressions) with instruments for $\Delta(Y-Y^*)$ or $\Delta(Y/Y^*)$, $\Delta\pi$ and r_L. The regressors and the instruments are the same as those in Table 2 (to which the details are given in the notes to Table 1) except for the omission of all the twice-lagged variables as instruments in order to preserve degrees of freedom.