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LABOR MARKET ADJUSTMENT, SOCIAL SPENDING AND THE AUTOMATIC STABILIZERS IN THE OECD

BY

JULIA DARBY AND JACQUES MELITZ

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DEPARTMENT OF ECONOMICS
UNIVERSITY OF STRATHCLYDE

GLASGOW

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Julia Darby[1] and Jacques Melitz[2]

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Abstract:

The macroeconomic literature on automatic stabilization tends to focus on taxes and dismiss the relevance of government expenditure, aside from unemployment compensation. Our results go sharply contrary to this view. We engage in an empirical analysis of 20 OECD countries from 1980-2001 and find that age- and health-related social expenditure as well as incapacity benefits all react to the cycle in a stabilizing manner. While possibly new in the macro literature, this conforms to many results in studies of labor and health. Moreover, when the focus is on the ratio of the net surplus to output, automatic stabilization comes essentially from the spending side. Taxes contribute nothing at all.

JEL Classification: E0, E6
Keywords: automatic stabilization, discretionary fiscal policy, cyclically adjusted budget balances.

1. Department of Economics, University of Strathclyde (julia.darby@strath.ac.uk);
2. Department of Economics, Heriot Watt University, CREST, and CEPR (j.melitz@hw.ac.uk).

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I. Introduction

The macroeconomic literature on automatic stabilization tends to focus on taxes and to dismiss the relevance of any government spending besides unemployment compensation. In this study, we combine information from the OECD Economic Outlook database with the OECD social expenditure database to examine the cyclical responsiveness of government expenditure on health, and social expenditure on retirement benefits, incapacity benefits and sick pay as well as unemployment compensation.[1] The results, covering 20 OECD countries from 1980 through 2001, go sharply contrary to the idea that unemployment compensation is the sole social expenditure that responds to the cycle. Expenditures on health, retirement and incapacity also react prominently to the cycle. Furthermore, these spending categories do so in a stabilizing manner. Thus they enhance total automatic stabilization. In addition, the relevant issue in analyzing fiscal policy is often the *ratio* of the net government surplus to output, measured or potential, rather than the level of the surplus. When the ratio is at issue, it is proper to estimate the cyclical impact on the ratio directly rather than to infer it from separate estimates of the level of the surplus and output. In that case, not only does automatic stabilization show up as coming essentially from the spending side rather than the tax one, but most of the stabilization operates through social expenditure. The stabilizing behavior comes from sick pay as well as the other categories of social expenditure.

Upon checking, we found the focus on taxes in discussing automatic stabilization to pervade the textbook literature in macroeconomics. There may be an occasional vague reference to counter-cyclical income support coming from other government spending besides unemployment compensation. But with the outstanding exception of Hall and Taylor (1991, chapter 13, which subsequently became Hall and Pappell (2005), chapter 13), unemployment compensation is the only spending item that receives mention. The textbooks are not misrepresentative. In defending the exclusive consideration of unemployment compensation as a counter-cyclical spending category (except for small items like food stamps), Auerbach and Feenberg (2000), for example, say: "The logic is straightforward: discretionary spending is, after all, discretionary, not automatic, and interest payments and the most important mandatory spending programs, Social Security and Medicare, are based on longer-term factors" (p. 52). Likewise, Gali and Perotti (2003) maintain: "Among primary expenditures [apart from interest payments], only unemployment benefits probably have a non-negligible built-in re-

[1] Melitz (2006) relied exclusively on the OECD national income database in earlier related work.

sponse to output fluctuations." Perotti (2002) is more explicit: "Items like old age, disability and incapacity pensions – the bulk of transfers to households – do not have built-in mechanisms that make them respond automatically to changes in employment or output contemporaneously. Unemployment compensation obviously does."

Since we find that the facts clash with these assertions, a fair question to ask at the start is whether evidence from more specialized fields supports the ruling macroeconomic stand in opposition to us. On the contrary, such evidence goes our way. This line of investigation soon brings to light considerable material – particularly in the field of labor – indicating that retirement, sickness benefits and incapacity-related benefits vary systematically with the cycle. Rebick (1994) offers evidence that new recipients of social security rise during recessions and fall during expansions in Sweden and Japan. Darby, Hart and Vecchi (2001) report a significant impact of the cycle on labor participation rates for both sexes, especially in the age group over 54 in France, Japan, Sweden and the US. Blanchard and Diamond (1990) similarly show that following a negative output shock, the highest response in movement of workers from employment to non-employment comes from teenagers and from people over 65 in the US. Since retirement decisions by workers are long-term, these results would also suggest that demand-side factors are probably as important, if not more so, as supply ones in explaining the responses.[2] In conformity, Hutchens (1999) has recently shown that firms have strong incentives to encourage early retirement and to lay off older workers during recessions in many Western countries on the basis of the structure of payroll taxes, contributions to health insurance, private pension plans and social security systems. Since Hutchens wrote, Coile and Levine (2006) and Hakola and Utusitalo (2005) have confirmed the importance of firm behavior in explaining the counter-cyclical movement of retirements in the US and Finland, for example. All of these results accord with our cross-country findings.[3]

In the case of sick pay and incapacity pay, in fact, the evidence from detailed studies flies off in both directions. On the one hand, there is a literature showing an inverse relationship between rates of absenteeism and rates of unemployment, which has been interpreted to mean that absenteeism is pro-cyclical (see Leigh (1985), Boone and van Ours (2002), and

[2] The point needs to be made since, from a strict supply perspective, utility-maximizing workers might postpone retirement only moderately during expansions because of the long run nature of their decisions (see Mitchell and Fields (1984) and Haveman and Wolfe (1984)).

[3] It should also be noted that mere differences in the average age of retirement during expansions and contractions would suffice to explain the counter-cyclical behavior of pensions in our results without any movement of individuals in and out of retirement.

Khan, Gerdtham and Jansson (2004) and Kaivento (1997) for more references, and see also Barmby, Ercolani and Treble (2002) for general cross-country evidence on sickness absence). The supporting theoretical arguments say that when times are bad, shirking is dangerous. Vulnerable workers – those on temporary contracts or with a history of health problems – will be particularly loath to report sick (see Arai and Skogman Thoursie (2005) and Barmby, Ercolani and Treble (2004)). When times are good, people are able to report sick with less fear of unemployment. In these times, people with permanent health problems also have less difficulty holding down a job. Furthermore, since the pace of work is greater, there may be more work accidents, especially in dangerous industries. On the other hand, the opposing view maintains that sick pay, incapacity pay and unemployment compensation all move together over the cycle. In this case, the argument is that when layoffs rise during recessions, the people with a choice between declaring illness, incapacity or unemployment and who can transit from one status to another, will base their decision on the rate and the duration of replacement of wages through social benefits. Thus, more people with health problems will report ill and incapacitated during bad times. The supporting evidence for this other view also comes mostly from studies comparing performance in depressed regions relative to prospering ones within the same country. McVicar (2006) provides a useful review article. The literature on this side of the fence tends to emphasize the fact that changes in social legislation over the last 30 years or more have facilitated the ability to claim sick leave or disability pay. Accordingly, the percentages of the labor force on sick pay or incapacity pay have risen secularly in the West even though health has not declined. See Bound and Burkhauser (1999) and Beatty, Fothergill and Macmillan (2000) (who speak of the 'hidden sick'). Our results favor this last interpretation or the stabilizing cyclical behavior for incapacity pay but they are ambivalent about sick pay.

There is an important methodological issue at hand. The part of the literature arguing a pro-cyclical movement of sick pay commonly treats the rate of unemployment as the variable reflecting the cycle. Leigh (1985) does so in explaining the behavior of absenteeism; Boone and van Ours (2002) do so too in explaining that of incapacity pay; and Khan, Gerdtham and Jansson (2004) do the same in explaining both sick pay and incapacity pay. But both theory and evidence show that the numbers of the unemployed, recipients of sick pay and recipients of incapacity pay are determined simultaneously. In this connection, Black, Daniel and Sanders (2002) and Autor and Duggan (2003) are important in providing detailed analyses of the impact of the disability program in the US on the long term rate of unemployment in the

country. See also Beatty, Fothergill and Macmillan (2000) and Holmlund (2004) for related theoretical discussion. Thus, there is a considerable objection to treating unemployment as the measure of the cycle in explaining illness and disability pay. The treatment poses a simultaneity problem, and this is all the more true if, as in the relevant literature, the level rather than the first difference of unemployment serves as the measure of the cycle. We shall take our measure of the cycle to be the output gap or the ratio of output to potential output (an alternative measure of the gap) rather than the unemployment rate. We shall also use the first difference rather than the level, and we will also take other steps to respond to the problem of simultaneity in our analysis.

The response of direct government spending on health to the cycle is a separate subject, on which, interestingly enough, there has been little research thus far. This neglect – at least in the labor literature – is probably related to the fact that eligibility for public health insurance is rather loosely tied to the performance of the labor market except over long stretches of time. The eligibility for such government insurance usually depends on little more a personal history of employment. Notwithstanding, if health care is cyclical, government spending on health will probably be so too. The issue is extremely important since government spending on health is big. It amounts to about 6% of GDP and 13% of total government spending on average in our 20-country OECD sample. Intuitively, there are many reasons why recessions may have detrimental health effects for those losing jobs or in fear of losing jobs, largely for socio-psychological reasons (see for example Neumayer (2005)). But while the impact of the cycle on health care or health spending has attracted little attention, there is an active literature on the impact of the cycle on health as such, and not in labor economics but health economics and public health.[4] In fact, this literature goes contrary to the previous intuition: it says that health is counter-cyclical and worsens during booms (Ruhm (2000, 2001, 2003, 2005a,b, 2006), Gerdtham and Ruhm (2006), Ruhm and Black (2002), Tapia Granados (2005a,b)). Of course, the relevant studies concern the impact of the cycle on the total population, whereas the unemployed and the precariously employed only form a minority in all phases of the cycle. This is a key factor. Accordingly, the proposed reasons for worsening health during expansions are longer working hours, job-related stress, less physical activity, less sleep, and the direct effects of some physically dangerous work activities as well as greater consumption of health-damaging goods (tobacco, alcohol and saturated fats). The

typical measure of health in these studies is also mortality – mortality at different ages from different causes (including crime and traffic accidents). But of course, movements in government spending on health could widely differ from movements in health since the spending depends on health care, which though clearly related to health is not the same. Much health care can be postponed. Even if people are healthier on average in recessions, the lower value of leisure at these times could lead to more health care, particularly in case of coverage by health insurance. Indeed, the extra health care when time is cheaper could be an additional reason for better health during recessions.[5] Obviously this reasoning stresses substitution between work time and health care. Our results go in this counter-cyclical direction.[6]

Overall, we find that the extent of automatic stabilization through all elements of social expenditure is about 3.5 times larger than the part coming from unemployment compensation alone. Every dollar of an output gap yields around 4 cents of unemployment compensation in our 20-country OECD panel. But there is also 10 cents of additional social spending on health, retirement, and incapacity benefits. Moreover, either health spending or retirement benefits alone is as important as unemployment compensation. When we conduct the study in ratios, we find that social spending contributes 4 to 5 times more to automatic stabilization than unemployment compensation. A one percent rise in the output gap increases social spending by around 22 percent of the rise while unemployment compensation contributes nearly 5 percentage points to the 22. The rest comes from sickness benefits as well as the previous sources. Incapacity benefits and sickness benefits together add nearly as much to stabilization as unemployment compensation. But health is more important than unemployment compensation, and pensions are the most important of all, accounting for over a third of the entire response of social spending.

With regard to automatic stabilization, all things considered, our results imply larger numbers than before. The usual estimates of aggregate automatic stabilization in the OECD run around .5 in the case of levels. We obtain about .68 as our principal result. In light of our

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4 Admittedly, labor economists sometimes take an interest in health, but essentially to control for it in focusing on other influences.

5 Ruhm (2000) makes many of the same points in a study of the impact of the cycle on health as such. As he notes too, the relative price of health might be lower in recessions. But this could affect health spending either way depending on the elasticity of demand.

6 Jacques Mairesse suggests an interesting analogy to capital to us in private discussion. During booms firms tend to fail to replace capital, to bring older standby equipment into operation, and to make minimal upkeep and repair. Then when business slows down, they undertake major repair and renovation. The logic is the same.

wider definition of automatic stabilization and the greater number of stabilizing influences in our work, this may not be surprising. Stabilization also comes mostly from the tax side in our estimates for levels, in accordance with usual views: .5 of the .68 does. Most of the rest arises from social expenditure. This all relates to the estimates in levels. In the case of ratios of output, we find less automatic stabilization – close to .4. But taxes contribute nothing while social spending explains more than half. The rest of the stabilization comes from inertia or the failure of other spending to move in step with the cycle. Broadly speaking, these results in terms of ratios agree well with Arreaza, Sorensen and Yosha (1999), who were perhaps the first to approach automatic stabilization entirely from the standpoint of ratios to output. They too found taxes to be of little importance and spending to be the basic stabilizing force.

The next section will review the official procedure in dealing with automatic stabilization. There we will also explain our basis for proposing separate estimates in levels and ratios and for our departures from the official procedure. Next, we shall present our econometric framework. Because government tax and spending responses to the cycle may reciprocally affect the cycle itself, we shall instrument the output gap. In addition, the responses of individual tax and spending items may interact. Thus, we shall employ 3SLS in identifying automatic stabilization. In the following section, we shall present the basic results for our entire panel of 20 countries both in the form of levels and ratios. Next, we will offer some robustness tests regarding smaller country samples and sub-periods. We will also offer some tests of symmetry of responses in recessions and expansions. Following, we will provide individual-country results. While our panel estimates are appropriate for studying the mechanisms operating in the OECD and their strength, the precise mechanisms at work and their relative importance will vary from country to country. This is all the more true in the case of our broader perspective on automatic stabilization. A concluding discussion will follow.

II. The Research Setting

The official method of estimating automatic stabilization used by the OECD, the European Commission and the US Congressional Budget Office alike, distinguishes 5 different elements of the government budget balance and then studies each of them separately: household direct taxes, business direct taxes, social security contributions, indirect taxes and unemployment compensation (see Giorno *et al.* (1995)). The official practice is also 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). To quote from his 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."

This method, which has considerable standing in economics, deals with automatic stabilization entirely in levels. But research often focuses on ratios. It is easy to see why. Stabilization policy relates to smoothing economic performance or keeping output close to potential, and consequently, the problem of fiscal policy is often seen as keeping the ratio of output to potential output close to one. Given this view, the critical fiscal policy variable becomes the ratio of the net budget balance to output, and the critical issue is to determine how the ratio responds to the cycle independently of any discretionary behavior by the authorities. But when the issue turns to ratios, it is fairly standard practice to continue using the official estimates of automatic stabilization to correct the budget balance in levels for non-discretionary responses and then simply to divide by output in order to obtain the ratios of cyclically adjusted figures to output or potential output. The European Commission does so in its annual surveys of country members' adherence to the Stability and Growth Pact. But the Commission is not the only one. Two prominent 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 output (Taylor) or potential output (Galí and Perotti) in order to analyze discretionary fiscal policy.

These practices would be fine if the official figures for the cyclically adjusted budget were really hard facts. Even if these figures are not hard facts but only estimates, the practices would still be acceptable if the division of the official numbers was by potential output rather than observed output and potential output was perfectly deterministic and not subject to any shocks. But if the official series are estimates and potential output is subject to supply shocks, then dividing by output is incorrect regardless of division by potential or observed output.

The estimates then yield inefficient estimates of the impact of the cycle on the ratio. For efficiency, the impact on this ratio must be estimated directly.

Furthermore, dividing by output or potential output hides the forces at work. In case of ratios, these forces cease to be the same. Following an adverse shock to output, if taxes stayed constant, the taxes would rise as a percentage of output and be destabilizing. (So would taxes rise as a percentage of potential output if potential output fell too and so would it be destabilizing if output fell proportionately more.) By falling, the taxes are therefore less destabilizing. But in order to be stabilizing, the taxes would need to fall disproportionately. Likewise, in case of a fall in output, government expenditures will have a stabilizing influence on the ratio merely by staying constant. To fail to have any stabilizing influence the expenditures would need to fall as much as output or more in percentage terms. Thus, in any move from analysis of levels to ratios, the stabilizing forces at work tend to shift largely in favor of the spending side. The tendency to center on taxes in analyzing automatic stabilization is thus problematic even apart from the issues we raise about the wide range of government expenditures that respond to the cycle.[7]

In studying the impact on the ratios separately, we shall center on the budget balance relative to observed output rather than potential output, since in any shift of focus on ratios, estimates of automatic effects of the cycle on the original data deserve priority, in our opinion. As indicated previously, we shall also rely entirely on simultaneous equation methods of estimation. Since this constitutes a departure from official practice in itself, it deserves a further word.

Simultaneous-equation estimation methods have several advantages over the official method in estimating the extent of automatic stabilization. The 4 relevant classes of taxes in the official estimates 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 the 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 the various bases

[7] The report on public finances in EMU of the European Commission (2004) recognizes this argument and even acknowledges that the predicted ratio of output to potential output Y/Y* affects the denominator as well as the numerator in the ratio of cyclically adjusted budget balances to output (Section 3.3 of Part II and Annex II). But the report nevertheless hangs on to the use of the official series for cyclically adjusted budget balances in dealing with ratios.

for taxes and 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. Because of this potential endogeneity, simultaneous-equation estimation methods suit best.

III. The Econometric Framework

At issue is the response of government revenues and expenditures to environmental factors independent of discretionary policy. Therefore, we need a specification focusing 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 government spending, the literature on fiscal policy underlines these delays (see, for example, Canzoneri, Cumby and Diba (2002) and the European Commission (2004)). Three variables 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 either $Y - Y^*$ (as present in the OECD database), or the output gap, on *first differences* in government receipts and expenditures, or else first differences in Y/Y^* on first differences in the ratio of government receipts and expenditures to Y. Because of the first-difference form in a short enough period, this focuses on impact effects or 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 stick to these initial choices in our reported results throughout, it turns out that the use of levels or first differences for inflation and the rate of interest makes almost no difference. Given our panel data, we included a common time trend as well as time and country fixed effects. Finally, since current responses

may result partly from lagged responses of the dependent variable, we also included the lagged level and the lagged first difference of the dependent variable in the estimates.[8]

Our equations for individual budgetary items in our estimates therefore take the general form:

$$(1)\ \Delta x_i = \alpha_o + \alpha_1 t + \alpha_t + \alpha_c + \beta_1 \Delta y + \beta_2 \Delta\pi + \beta_3 r_{Lt} + \beta_4 \Delta_{t-1}x + \beta_5 (\Delta_{t-1}x - \Delta_{t-2}x)] + \varepsilon_t$$

$$i = 1, \ldots, 15$$

There are as many of these equations as individual sorts of receipts and expenditures, x_i, in the analysis (that is, 15 of them). t refers to the time trend, α_t is a set of time fixed effects (year dummies), α_c is a set of country fixed effects,[9] y is the output gap, π is the rate of inflation, and 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. In case of the level form, the output gap refers to $Y - Y^*$ and its coefficient, β_1, gives a meaningful figure. It states by how many cents the budget will respond to a movement of the output gap of one euro, for example. (However, β_2 and do β_3 then do not give meaningful figures.) In case of the ratio form or division of the relevant budgetary item by Y, the output gap refers to Y/Y^*, and the coefficient β_1 states the effect of a change in the ratio, Y/Y^*, on the change in the ratio of the relevant tax or expenditure class to Y. (In this case, β_2 and β_3 do yield meaningful numbers.) We also used instruments for Δy, $\Delta\pi$ and r_L. Given the 15 different sub-classifications of receipts and expenditures in our principal estimates (i=1, …, 15), these estimates concern a 18-equation system.

Our series come from the separate OECD databases for National Income and Social Expenditure. The Social Expenditure database shortens the available estimation period since the 2004 release provides data for each country from 1980 to 2001 at best. Sticking to a balanced panel would then have limited the data set still more (to 12 countries). To maximize

[8] Fiscal policy research frequently focuses on the primary government balance rather than the observed one while we use the observed balance and introduce the interest rate as a separate explanatory variable. In fact, we do not have particularly strong views on this topic. But it would be wrong to suppose that because of our choice, the outstanding net government debt drops out of our analysis. This debt is the sum of a starting value minus the cumulated value of net government surpluses over the study period (based on the consolidated government accounts including the central bank). Our country fixed effects incorporate the starting values of the debt in our analysis, while we explicitly admit the lagged values of net government surpluses.

[9] We also incorporate a German reunification dummy in level and first difference form to take account of the fact that the pre-unification data refers strictly to West Germany.

degrees of freedom we have essentially employed an unbalanced panel throughout. As a result, we have 20 countries (including 13 of the 15 members of the European Union in 2001, the closing year of the data) and a total of 344 observations. The missing EU members are Luxembourg and Greece, and the 7 OECD countries outside the EU are Australia, Canada, Iceland, New Zealand, Norway, Switzerland and the US. We do not use Japan in our panel data estimates though we do so in the individual-country tests for a reason that we will explain.

IV. The Data and Econometric Results

(a) The data

We may begin with a general look at orders of magnitude for the variables on the expenditure side in our study. Table 1 shows averages and standard deviations of these variables as percentages of total government expenditures or else as percentages of GDP for the 344 annual observations in our sample period 1980-2001.

Table 1: Summary Statistics on Government Expenditure and its composition.

	% of Total Government Expenditure		% of GDP	
	mean	std. dev.	mean	std. dev.
Total Government Expenditure	100		48.0	8.3
of which,				
(1) Health Expenditure	12.6	2.2	6.0	3.8
(2) Total Social Security Spending	29.4	4.6	14.2	3.8
Key Components of Social Security Spending:				
(2a) Retirement Cash Benefits	16.3	5.6	7.8	2.7
(2b) Incapacity Related Cash Benefits	3.8	1.6	1.8	0.8
(2c) Unemployment Compensation	3.0	1.6	1.5	0.9
(2d) Sickness Pay	1.5	1.1	0.8	0.6
(3) Subsidies	3.9	2.2	1.9	1.0

The table distinguishes 3 separate sorts of government social spending based on the statistics: health expenditures, social security spending and subsidies. There is a further subdivision of social security spending in the table between retirement (old age cash benefits

including early retirement pension and survivors cash benefits), incapacity benefits (related to disability, occupational injury and disease but excluding temporary sick pay), paid sick leave, and unemployment compensation. It is important to keep in mind that the health expenditures refer to a class of government spending on goods and services while the rest of social expenditures are either transfer payments to persons, in the case of social security, or else transfer payments to firms, in the case of subsidies.

As can be seen, retirement cash benefits are by far the largest component of social expenditure, averaging more than 16% of government spending in the aggregate; health is next, averaging almost 13%. Unemployment compensation is much lower, at 3%. Interestingly, incapacity benefits are also higher than unemployment compensation but mildly so. Not only is the size of spending on retirement and on health larger than the other forms of social spending, but both of these forms are more uniform than the rest, including unemployment compensation. Health spending is by far the most uniform of all. Taken as a percentage of total government spending, it is 6 times larger than its standard deviation. By contrast, incapacity, unemployment compensation, and government subsidies to firms (relative to total government spending) are on average only around twice as large as their standard deviations. Of these last three rubrics, spending on incapacity benefits is also the most uniform. Paid sick leave is the least uniform social spending category of all as well as the smallest. These differences in uniformity reflect essentially international differences rather than temporal ones: they persist almost unchanged if we compare the 20 country averages over the study period (either in levels or per capita) and thereby abstract from movement over time. This gives the impression that if there is any cyclical responsiveness in government spending on health, retirement, incapacity, sickness, unemployment, and government subsidies in the cross-sectional evidence, there is a good chance that this responsiveness will be reflected more clearly in the individual-country estimates for health and retirement than for the other social spending groupings. We will return to the accuracy of this initial impression later on.

(b) The results for the aggregates

Let us begin discussing the econometric work with the estimates of equation (1) without any disaggregation at all, or in the case of a single equation for the net government surplus or the ratio of this surplus to output as the dependent variable. Table 2, which contains these estimates, omits all coefficients except those for $\Delta(Y-Y^*)$ or $\Delta(Y/Y^*)$, $\Delta\pi$ and r_L. It also shows both OLS and 3SLS estimates. All of the instruments for $\Delta(Y-Y^*)$ or $\Delta(Y/Y^*)$, $\Delta\pi$ and r_L in the 3SLS estimates are listed in the notes to the table. They include, among others, the lagged values of taxes and spending, or the two variables whose reciprocal effect on $\Delta(Y-Y^*)$ or $\Delta(Y/Y^*)$, $\Delta\pi$ and r_L is of basic concern.

Table 2: Aggregate Estimates – Net Government Surplus

20 countries, 1982-2001, n=344	Levels OLS	3SLS	Ratios OLS	3SLS
Change in output gap $\Delta(Y-Y^*)$ or $\Delta(Y/Y^*)$	0.497*** (.039)	0.452*** (.069)	0.291*** (.049)	0.341*** (0.045)
Change in inflation, $\Delta\pi$	n.r.** (n.r.)	n.r.* (n.r.)	0.0016*** (.0004)	-0.00002 (.0006)
Long term interest rate, r_L	n.r. (n.r.)	n.r.** (n.r.)	0.0002 (.0004)	0. 0005 (.0005)
R^2	0.63	0.62	0.55	0.52

Notes:
Variables are expressed in current prices. n.r. means not reported. Where relevant, estimated coefficients are followed by ***, ** and * to denote statistical significance at 1, 5 and 10% significance levels respectively. Standard errors are reported in parentheses. In case of the 3SLS results pseudo R^2s are reported. Instruments employed include contemporaneous oil price inflation along with lagged values of aggregate OECD GDP, government current expenditure and revenues, the change in the non-working population, exports as a % of GDP, and the instrumented variables themselves along with country and time fixed effects. The R^2 from the instrumenting regressions for the change in the output gap in levels, this change in ratios, the change in inflation and the long term interest rate are 0.46, 0.54. 0.42 and 0.94 respectively.

The OLS estimate for the impact of the output gap on the net government surplus is .5, in agreement with the literature. The corresponding OLS estimate in ratios is lower at .29. In the case of the 3SLS estimates, the one in levels is .45, somewhat below the OLS one, and the one in ratios is a little higher at 0.34. In principle, both sets of 3SLS estimates should be below the corresponding OLS ones, since the failure to consider the reciprocal influence of fis-

cal policy on current performance in the OLS estimates should lead to overestimates not underestimates of automatic fiscal policy. This condition is met in levels not in ratios.[10]

(c) The results for the decomposition

We turn next to the 3SLS estimates of our full system of 18 equations after the decomposition of the net government surplus into 15 different rubrics. The decomposition rests on the following balance sheet identity in the OECD accounts: net government surplus = (1) direct household taxes + (2) other direct taxes, primarily levied on business + (3) social security taxes + (4) indirect taxes – (5) current (wage and non-wage) spending plus capital spending exclusive of social health expenditures (listed as current spending n.h., or net of health, in the tables) – (6) social health expenditures – (7) other government consumption – (8) social spending on pensions – (9) social spending on incapacity related benefits – (10) social spending on sick pay – (11) unemployment compensation – (12) other social expenditures – (13) government subsidies to firms – (14) other government transfer payments – (15) net interest payments. But in reporting the results, we shall ignore four of these accounts: the three residual ones, (7), (12) and (14) and net interest (15). Of these, the three residual ones are difficult to interpret and net interest is often excluded from the start by focusing on the primary surplus. (Net interest always responds significantly to the output gap with the right negative sign.) In addition, we will base our estimates of the aggregate response of the net government surplus on the statistically significant values of the 11 other accounts – or those that we do report – at the .95 confidence level. In this respect, we follow official practice. The official method of calculating total automatic stabilization is to add up the estimates for the 5 rubrics that are deemed significant from the start. We do the same except that we admit the potential significance of 11 rubrics and only retain those rubrics that prove statistically significant.

[10] To explain, suppose that a cyclical rise in output raises the net government surplus. In principle, this rise 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. We get this result for levels not for ratios.

Table 3 contains the results. In the interests of legibility and space, we show only the coefficients of $\Delta(Y-Y^*)$ or $\Delta(Y/Y^*)$ and omit those of $\Delta\pi$ and r_L in this next table. The instruments for $\Delta(Y-Y^*)$ or $\Delta(Y/Y^*)$, $\Delta\pi$ and r_L are identical to those employed in the aggregate estimates.

Table 3: Disaggregate Estimates

3SLS Estimates, 20 countries, 1981-2001, n=344	Levels $\Delta(Y-Y^*)$	Ratios $\Delta(Y/Y^*)$
Revenues:		
Household Direct Taxes	0.300***	-0.0396
	(0.022)	(0.032)
Other Direct Taxes	0.156***	-0.00369
	(0.016)	(0.025)
Social Security Contributions	0.0445***	-0.0350
	(0.014)	(0.023)
Indirect Taxes	0.0141	-0.00724
	(0.015)	(0.026)
Expenditure:		
Current Spending n.h.	-0.0104	-0.139***
	(0.027)	(0.041)
Health Expenditure	-0.0437***	-0.0549***
	(0.0060)	(0.011)
Age Related Benefits	-0.0451***	-0.0797***
	(0.0052)	(0.013)
Incapacity Related Benefits	-0.0150***	-0.0264***
	(0.0019)	(0.0052)
Unemployment Compensation	-0.0407***	-0.0486***
	(0.0047)	(0.0092)
Sick Pay	-0.00186	-0.0151**
	(0.0027)	(0.0060)
Subsidies	-0.0314***	-0.0265**
	(0.0044)	(0.011)

Notes: see Table 2.

As can be seen, the results are as signaled in the introduction. A positive output gap produces 50 cents more tax collection per dollar in levels. Direct household taxes (constituting .28 of total government revenues) are the most important, business taxes (constituting .07 of the total revenues) are much less but still notably so, social security taxes (.23) far less still and indirect taxes (.29) not at all. On the spending side, government purchases of goods and

services does not respond but there is 14 cents less social spending per dollar of output gap, with pensions, health and unemployment compensation each accounting for around 4 cents. Incapacity benefits drop by one to two cents per dollar of output gap while sickness benefits do not respond significantly at all.

In the case of ratios, taxes contribute nothing to stabilization: all of the contribution comes from the spending side. In other words, no category of taxes proves either progressive or regressive. On the other hand, government spending on goods and services exclusive of spending on health shows up as highly stabilizing. Since this spending does not show up as significant in levels, its stabilizing response in ratios can only be interpreted as coming from inertia or, more generally, a failure to keep up with the cycle With regard to social spending, including health, all of the influences that were stabilizing before in levels remain significantly so. But now the contribution of social spending on pensions becomes notably more important than either health or unemployment compensation. This spending contributes 8 percentage points to stabilization as opposed to 5.5 for health and 4.9 for unemployment compensation. In addition, sick benefits become significant and the sum of sick benefits and incapacity benefits contributes nearly as much to stabilization as unemployment compensation. Based on all of the significant social spending influences, the total contribution of social spending is the single most important factor in automatic stabilization, accounting for more than half of the total. Total automatic stabilization from all significant sources is .68 in levels and .39 in ratios. We shall retain these figures in preference to the earlier ones in Table 2.

Before proceeding, it is interesting to pause once more on the fact, noted in the introduction, that our results for incapacity pay and sick pay contradict a section of the literature claiming that both of these sorts of expenditures move pro-cyclically. As we also observed before, this interpretation is closely connected to the use of the rate of unemployment as the measure of the cycle. Simply in order to shed more light on this pending issue, we substituted the change in the rate of unemployment for $\Delta(Y-Y^*)$ or $\Delta(Y/Y^*)$ in our 18-equation framework. Concomitantly, we deflated the spending variables by prices, as makes sense if unemployment is treated as an explanatory variable. In this case sick pay moves negatively with the rate of unemployment both in levels and ratios, though not significantly so, while incapacity

pay moves positively with unemployment in levels and ratios and very significantly so. Thus, the results with respect to sign conform to the conflicting literature regarding sick pay but clearly contradict this literature concerning incapacity pay.[11]

The conformity concerning sick pay is statistically weak, as mentioned. But even had it been strong, we would still contest any inference of a pro-cyclical movement in sick pay on the earlier ground that unemployment and sick pay are both jointly determined. We would especially insist on this joint determination in the context of business cycles. Imagine the existence of a negative relationship between unemployment and sick pay for the sort of reasons stressed in the pro-cyclical literature: higher costs of shirking when unemployment is higher in particular. Imagine too that movements in the recorded unemployment rate occur not only for cyclical reasons but also for secular ones related to demography and changes in benefit eligibility criteria and monitoring. During recessions, employers will not only tend to separate themselves from less reliable workers (thus leaving them without any ability to claim sick pay for temporary illness), just as this conflicting literature suggests, but they may also layoff some workers who are ill, or whom they believe to be eligible to claim sick benefits, that the employers wish to retain. This last tendency implies a positive association between sick pay and unemployment in recessions. In regressions of the change in sick pay on the change in unemployment, the forces leading to a negative relationship between the two (the disciplining effect) might dominate, while in a regression like ours, identifying the cycle with impulses arising from the goods market without any trend (and therefore excluding the long run forces working on unemployment), the positive association between movements in unemployment and sick pay might dominate instead. The fact that sick pay is also significantly stabilizing in ratios but not in levels in our results is not a problem. This outcome could simply stem from the impact of the cycle on the denominator alone.

[11] In fact, the contradiction regarding disability pay strictly relates to Boone and van Ours (2002, 2006), who find that reported work accidents – not exactly the same thing as disability pay though positively related – rise when unemployment goes down. On the other hand, Khan, Gerdtham and Jansson (2004), who use disability pay and sick pay as the dependent variables as we do and who expect negative signs in both cases, find the same positive effect of unemployment on disability pay that we get, contrary to their expectations (while they do get the negative sign they expect for sick pay). Other differences should be mentioned between us and the latter: they estimate in levels rather than first differences, they do not correct the nominal variables for prices, and they add some additional demographic controls that we omit.

V. Robustness Checks and Extensions

In this section we investigate the robustness of our findings in a variety of ways. We check the sensitivity of the results to dropping countries one at a time, we investigate behavior within the EU sub-group in the sample, and we examine panel estimates over the sub-samples 1982-1991 and 1992-2001. Following, we check the sensitivity of our key results to an alternative measure of the cycle and finally we test the null hypothesis of symmetry of effects against the alternative of asymmetric adjustment of fiscal variables to positive and negative output gaps.

(a) Smaller country samples

Do our results depend critically on any single country? In order to check, we sequentially dropped one country at a time. This test is the one that led us to remove Japan from the panel estimates in the first place. The problem was not that Japan affected the signs or the significance of the variables. But its presence did notably alter the size of the coefficients. This remained true when we split the sample in half between the eighties and the nineties (or thereabout). Therefore, whatever it is that makes Japan alter the size of the coefficients significantly holds true for both sub-periods. However, we saw no reason on this ground to exclude Japan in our subsequent individual-country tests. The results of the panel estimates dropping one country at a time following the exclusion of Japan appear in Tables A1a and A1b of the appendix. All alternative 19-country sub-samples are shown. The table repeats the parameter estimates for the full 20-country sample on the first row to facilitate comparison. It can be seen that both the size and significance of the parameter estimates are fairly insensitive to the exclusion of any one member of the sample.

(b) EU panel results

Table 4 pursues the previous test by paring down the sample to the sub-sample consisting of the 15 members of the European Union. Once again we show the results for the full sample in the table (by column in this case) to facilitate comparison. There is no systematic

difference between the EU15 and the full sample on the revenue side except for a significant positive effect of the cycle on "other direct taxes" (primarily business taxes) in ratios in the case of the EU15. The differences are more notable on the spending side though these too are mostly moderate except for health expenditure in levels. In short, the results for the EU15 broadly agree with those for the full sample.

(c) Split Sample Estimates in 1982-1991 and 1992-2001

The contributions of the different categories of spending and revenue could have altered over time. To look into this question, we conducted split sample estimates for 1982-1991 and for 1992-2001. There are generally fewer observations for the earlier period than the later one: 144 rather than 199. Some countries even fall out entirely of the 1982-1991 sample. Unfortunately, therefore, apparent differences over time between the two sub-samples could result simply from changes in the country composition of the sub-samples. In order to control for this possibility, we conducted balanced panel estimates. This limited us to 11 countries[12] and about two-thirds of the observations. The resulting estimates are less reliable; there is a decline in precision that is reflected in larger standard errors. Therefore, we only use the balanced panel estimates (which we do not report) to throw light on whether our results for the full panel depend mostly on changes in the country composition over time.

Table 5 shows the results for the two sub-periods. On the revenue side, the results in ratios reveal no pronounced difference over time except that social security contributions begin to move counter-cyclically – i.e. in a stabilizing direction – in the nineties. This movement is strongly confirmed in the balanced sample and thus evidently reflects a genuine change over time. On the revenue side in levels, direct taxes appear to become much more stabilizing in the nineties, and quite importantly, indirect taxes emerge as stabilizing too in each sub-period though these taxes had not appeared as such in the full sample. The change in

[12] The 11 countries are Australia, Austria, Canada, Denmark, Finland, France, the Netherlands, New Zealand, Sweden, Switzerland and the US.

direct taxes also reflects a genuine movement over time, judging from the balanced sample results covering 12 countries. On the spending side, health expenditures become clearly more stabilizing both in levels and ratios in the more recent period and pensions marginally so, while sick pay, which had seemed stabilizing only in ratios in the sample period as a whole, appear to become somewhat so in levels as well in the more recent period. Once again, the balanced sample results give little reason to doubt that these changes reflect movements over time. Also of note, unemployment compensation may have become less stabilizing during the sample period, especially in ratios, but this result is not marked.

(d) Alternative measures of the cycle

In an additional experiment we replaced the OECD measure of the output gap with HP filtered output data. This only affects the dating of the cycles marginally although it does modify the steepness and the depth of the cycles. Generally, the results are very similar to those with the OECD measure in the case of ratios; but the differences in levels are important. This is one of a number of signs we have had throughout the study that the results in ratios are more robust than those in levels. Early experiments with small differences in specification, relating to the instruments in particular, had no mentionable effect on the estimates in ratios but occasionally some impact on the results in levels. In the case of levels, the most general difference in the event of the HP-filtered measure of the gap is that the stabilizing influence of receipts appears much smaller relative to that of expenditures. This difference in the case of the HP-filtered measure supports our general emphasis on expenditures. But notwithstanding we have a basic preference for the results with the OECD measure of the output gap, partly based on earlier experiments with both measures by the OECD as well as our own.

(e) Testing for asymmetric responses to the output gap

There could be asymmetric effects of contractions and expansions. This would matter since asymmetries would mean possible progressive changes in individual components of government spending over a series of cycles and perhaps even the aggregate and the govern-

ment debt as a whole. We test for such asymmetry with a dummy variable that takes the value 1 when $Y < Y^*$ and 0 otherwise. By interacting this dummy with the output gap term we can test for the significance of differences in responses to the cycle when output is below potential. Table 6 shows the outcomes. A number of significant asymmetries emerge in levels, but only two persist in ratios. These are then the only two that we shall treat as adequately confirmed. Interestingly, neither of them concerns unemployment compensation, in regard to which the cyclical responses appear symmetric (or more exactly, not significantly asymmetric) both in levels and ratios. The first of the two significant asymmetries, which holds at the 95% confidence level, relates to pensions. It says that the stabilizing movement of this category of spending in booms outweighs its similar movement in contractions. In other words, the postponement of retirement in good times has a stronger impact on benefit spending than the shift to early retirement in bad times. This cyclical aspect would moderate the size of age-related expenditures in the budget over time. The second notable asymmetry concerns social security contributions, whose stabilizing response to the cycle in booms exceeds its similar response in recessions at the 10% level of significance. If so, the cycle strengthens this component of government revenues over time.[13]

VI. Individual Country Estimates

Of course, individual countries cannot be expected to rest their discretionary fiscal policy on panel data results covering 19 other countries. National authorities can only reasonably use panel results to inform the estimates of automatic stabilization at home on which they base themselves. Thus, we propose some individual country estimates as well. With a mere 20 time series observations per country as a maximum, 3SLS is not even feasible within

[13] It might be tempting to relate both of these results to those in our earlier split samples showing that the stabilizing influence of pensions and social security receipts both rise over time. But since all of our estimates of effects of the output gap pertain to percentage influences (number of cents per euro or percentage-point changes in one ratio in response to another), the appearance of any connection may be false. Notwithstanding, if cyclical swings of pensions and social security receipts really grow over time, as our split sample results say, then if both the split sample and the asymmetric results are also even partly positively related to the growth of pensions and social security receipts over time, the two sets of results would be reinforcing.

our framework. Though it may be feasible for some countries, IV estimation is not well advised either, since the instrumenting regressions would tend to have little explanatory power, as we have verified. The theoretical gain from the added consistency will not compensate for the loss of precision. Consequently, we will stick to simple OLS estimates in this section. In addition, we will only entertain OLS estimates in case of a minimum of 15 observations. Five countries then fall out (Austria, Iceland, New Zealand, Norway and Switzerland), which leaves us 16, including Japan. In discussing the results of these tests, we will focus exclusively on the issue of the impact of the other components of social spending besides unemployment compensation on automatic stabilization. For this reason, we show only the results for social benefits to persons in Table 7.

Upon first glance at this table, it is difficult not to be struck by the higher frequency of significant results for unemployment compensation than any of the 4 other categories of social spending. Nothing in the earlier estimates or the raw data necessarily prepared us for this result. The coefficients and Student *t*s of the other social categories besides unemployment compensation were often as high and the raw data in Table 1 showed higher averages and higher ratios of averages to international dispersion – more international uniformity – for some of the other categories. Still it is noteworthy that unemployment compensation is of no importance at all in the OLS estimates for the US and Japan. This spending also only matters for Spain and Sweden depending on the choice of levels or first differences.

As an initial indicator of the possible importance of cyclical responses of other categories social spending besides unemployment compensation, we use the ratio of the sum of the individual estimates of all 5 social categories to unemployment compensation alone (i.e., the ratio of column 6 to column 1) in column 8. This ratio then exceeds 3 to 1 for a number of countries. In descending order, the countries are Japan, Sweden, the US, Belgium, France, Italy and the Netherlands in levels, and Japan, the US, the UK, Italy, Ireland and France in ratios. Not surprisingly, given the low (as well as insignificant) estimates for unemployment compensation in Japan and the US, the ratio is exceptionally high for these two countries. True, there are also a number of cases where the ratio is close to one or below it. But upon

examination, except for Denmark these are all instances where health spending is highly pro-cyclical (though insignificant) and this factor alone can account for the low ratio. The lowest pro-cyclical coefficient for health spending in these other examples is the non-negligible figure of nearly 2% for Australia. In the end, Denmark seems to us the only instance where the OLS results are truly puzzling, as they show highly significant destabilizing effects for pensions and incapacity benefits in levels (but not ratios), contrary to the panel data results.[14] [15]

Most pertinent, however, are the results by country for health, pensions, incapacity benefits and sick pay. If we look at those results in levels, we find only a small number of significant coefficients (especially when we consider that 2 of these coefficients are the problematic ones for Denmark). Notwithstanding, two of the significant coefficients that do arise concern the US, where health spending and pensions both enter as significantly stabilizing influences, while unemployment compensation does not do so at all. The situation in ratios differs radically, however. Significant coefficients abound for health, pensions, and incapacity benefits, all of which go in the stabilizing direction, in accordance with the panel estimates. There are fewer significant signs for sick pay and those few are contradictory, going off in both directions. Interestingly, the two cases of significant positive (destabilizing) coefficients for sick pay, Portugal and Sweden, are also consistent with the evidence of the importance of disincentives to report sick in recessions for people holding temporary contracts. Spain should be considered in this connection too since this country has a positive coefficient for sick pay (though moderate and insignificant) while it has a particularly high share of workers holding temporary contracts in the EU.[16] Spain, Portugal and Sweden all feature heavily in the literature on the implications of increased use of temporary versus permanent contracts (see, for

[14] Still, as seen in table A1 of the appendix, the presence of Denmark does not much affect the panel results either in levels or in ratios.

[15] We also checked on the reliability of column 6 with the use of column 7, where the estimate treats social spending as a single aggregate. The results in this next column differ little from column 6 with the outstanding exception of Spain both in levels and ratios (and perhaps also the Netherlands, strictly in ratios). This supports our attention to column 6.

[16] In the third quarter of 2005, Eurostat Labour Force Survey data indicate that the share of employees with temporary contracts reached 14.7% in the EU15, ranging from 34.4% in Spain, 19.9% in Portugal and 17.3% in Sweden to under 10% in Austria, Belgium, Luxembourg and the UK; see Table 9 in Romans and Hardarson (2006).

example Bentolila and Saint-Paul (1992), Bentolila and Dolado (1994), Jimeno and Toharia (1996), Bover *et al* (2000) and Arai and Skogman Thoursie (2005)).

Some of the other country-by-country results in ratios should be mentioned too. Health, pensions and incapacity benefits are all significantly stabilizing at the 1 percent confidence level in Canada as well as unemployment compensation. The same is true for Sweden and the UK, except that in each country one of the 4 coefficients has a below-one-percent confidence level. Both Japan and Finland are interesting: both countries show significantly stabilizing influences for all social spending categories, including sick pay, except unemployment compensation in Japan and health spending in Finland. This makes quite a few country cases where the national results clearly indicate the importance of several elements of social spending besides unemployment compensation.

In sum, the individual-country results support our basic message that it is a mistake to ignore all social spending benefits to persons except for unemployment compensation in analyzing automatic stabilization. This may be a nuisance from a purely analytical standpoint since the mechanisms pertaining to the diversity of social programs will vary greatly by country. This will make individual-country study essential and mean that the relevant time series data will be short and the test results may be fragile. But the situation does not differ notably on this score for household direct taxes, other direct taxes, social security revenues, indirect taxes and unemployment compensation – the categories of government receipts and expenditures that receive prominent attention today in studies of automatic stabilization. The problem is simply one we must face.

VII. Conclusions

In this paper we have exploited detailed data from the OECD Social Expenditure Database along with the national accounts aggregates from the OECD Economic Outlook Database in order to reassess automatic stabilization. We found that health spending, pensions, and incapacity benefits are prominent along with unemployment compensation in automatic

stabilization. This result was only to be expected concerning pensions; and even in the case of health spending and incapacity benefits, need not arouse surprise. Perhaps the stabilizing nature of the cyclical movements of health spending and incapacity benefits could not have been foreseen. But the hypothesis that either of these 2 categories of social spending is a-cyclical goes contrary to a good deal of previous theory and evidence, particularly in the fields of labor and health. In conclusion, we firmly reject the conjectures in earlier macro studies, such as those we quoted from Auerbach and Feenberg (2000), Galí and Perotti (2003), Perotti (2002), that unemployment benefits are the only current expenditures that matter.

As another fundamental part of our study, we have underlined the benefit of direct estimates of ratios of government receipts and expenditures to output wherever the ratios are the relevant issue, as they often are. When the ratios matter, the main sources of automatic stabilization swing from the receipt to the expenditure side of the government budget, and health expenditures, pensions, and incapacity benefits become even more important than they are otherwise. Moreover, according to our results, the estimates of automatic stabilization in ratios are more robust and reliable than those in levels. It seems too that some important movements in automatic stabilization have taken place over recent decades. In particular, unemployment compensation has lost ground relative to incapacity and health expenditures.

Several directions of further research are evident. More investigation of the mechanisms that underlie the responses of the various social spending categories would clearly be warranted. This is perhaps especially true for health spending, whose cyclical behavior has never been studied before, to our knowledge. There has been much attention to the impact of the cycle on health, not health spending, and while intertemporal substitution will clearly explain the stabilizing responses of such spending in our results, corroboration of this explanation or the discovery of a new one would be useful. The welfare consequences of automatic stabilization would also deem examination in the light of our results. If automatic stabilization depends not only on taxes and unemployment compensation but also on cyclical movements in health care, age of retirement and propensity to claim incapacity for work, then the welfare consequences would seem to differ (if only because there will then be more permanent effects

on certain classes of individuals), and the optimal spending responses to those swings may differ too. The welfare consequences of automatic stabilization are a difficult topic, perhaps not sufficiently studied, and the basis for the familiar advice to fiscal policy authorities simply to "let the automatic stabilizers work" is not entirely clear.[17] According to the current view of automatic stabilization, this phenomenon would seem to be mostly accidental, since it depends predominantly on tax collection, which was never constructed with the aim of stabilizing output in mind. But if automatic stabilization hinges on retirement, health care and incapacity pay as well as taxes, the accidental nature of the design is greater and it would be still more of a coincidence if the outcome were close to optimal. Finally, a key implication of our analysis is that the series for cyclically adjusted budget balances should be constructed differently. If so, measures of fiscal stance need to be re-estimated. Many estimates of the impact of discretionary fiscal policy on the economy then need to be so as well.

[17] For some critical discussion of this advice, see Farina and Tamborini (2003) and Buti et al. (2003).

Table 4 – Estimates for the European Union

3SLS Estimates	Levels -coefficients on $\Delta(Y-Y^*)$		Ratios – coefficients on $\Delta(Y/Y^*)$	
	All n=344	EU15 n=239	All n=344	EU15 n=239
Revenues:				
Household Direct Taxes	0.300***	0.269***	-0.0396	-0.0147
	(0.022)	(0.035)	(0.032)	(0.042)
Other Direct Taxes	0.156***	0.128***	-0.00369	0.0760***
	(0.016)	(0.031)	(0.025)	(0.029)
Social Security Contributions	0.0445***	0.0844*	-0.0350	-0.00494
	(0.014)	(0.046)	(0.023)	(0.034)
Indirect Taxes	0.0141	-0.0284	-0.00724	-0.0406
	(0.015)	(0.047)	(0.026)	(0.032)
Expenditure:				
Current Spending n.h.	-0.0104	-0.428***	-0.139***	-0.152***
	(0.027)	(0.068)	(0.041)	(0.054)
Health Expenditure	-0.0437***	0.00420	-0.0549***	-0.0522***
	(0.0060)	(0.013)	(0.011)	(0.014)
Age Related Benefits	-0.0451***	-0.0730***	-0.0797***	-0.0826***
	(0.0052)	(0.013)	(0.013)	(0.016)
Incapacity Related Benefits	-0.0150***	-0.0431***	-0.0264***	-0.0178**
	(0.0019)	(0.0051)	(0.0052)	(0.0072)
Unemployment Compensation	-0.0407***	-0.0404***	-0.0486***	-0.0662***
	(0.0047)	(0.011)	(0.0092)	(0.011)
Sick Pay	-0.00186	0.00967	-0.0151**	-0.0202**
	(0.0027)	(0.011)	(0.0060)	(0.0088)
Subsidies	-0.0314***	-0.0985***	-0.0265**	-0.0618***
	(0.0044)	(0.012)	(0.011)	(0.016)

Notes: see Table 2.

Table 5 – Split Sample Estimates for 1982-1991 and 1992-2001

3SLS Estimates	Levels -coefficients on $\Delta(Y-Y^*)$			Ratios – coefficients on $\Delta(Y/Y^*)$		
	All n=344	1982-91 n=145	1992-01 n=199	All n=344	1982-91 N=145	1992-01 n=199
Revenues:						
Household Direct Taxes	0.300***	0.106***	0.305***	-0.0396	-0.0771	0.012
	(0.022)	(0.024)	(0.025)	(0.032)	(0.049)	(0.035)
Other Direct Taxes	0.156***	0.128***	0.224***	-0.00369	-0.0272	0.0069
	(0.016)	(0.010)	(0.019)	(0.025)	(0.024)	(0.035)
Social Security Contributions	0.0445***	0.0564***	0.0298	-0.0350	0.0107	-0.0626**
	(0.014)	(0.0099)	(0.020)	(0.023)	(0.032)	(0.028)
Indirect Taxes	0.0141	0.0403***	0.0415**	-0.00724	-0.0168	-0.045
	(0.015)	(0.012)	(0.018)	(0.026)	(0.029)	(0.033)
Expenditure:						
Current Spending n.h.	-0.0104	0.0494***	-0.0922**	-0.139***	-0.121**	-0.147***
	(0.027)	(0.019)	(0.039)	(0.041)	(0.054)	(0.048)
Health Expenditure	-0.0437***	-0.0224***	-0.0624***	-0.0549***	-0.0156	-0.0762***
	(0.0060)	(0.0057)	(0.0081)	(0.011)	(0.016)	(0.011)
Age Related Benefits	-0.0451***	-0.0393***	-0.0423***	-0.0797***	-0.0584***	-0.0839***
	(0.0052)	(0.0046)	(0.0063)	(0.013)	(0.017)	(0.016)
Incapacity Related Benefits	-0.0150***	-0.00227	-0.0240***	-0.0264***	-0.0015	-0.0342***
	(0.0019)	(0.0014)	(0.0023)	(0.0052)	(0.0076)	(0.0056)
Unemployment Compensation	-0.0407***	-0.0319***	-0.0280***	-0.0486***	-0.0533***	-0.0368***
	(0.0047)	(0.0053)	(0.0052)	(0.0092)	(0.013)	(0.0100)
Sick Pay	-0.00186	-0.00069	0.00157	-0.0151**	-0.00922	-0.0166***
	(0.0027)	(0.0034)	(0.0028)	(0.0060)	(0.0094)	(0.0048)
Subsidies	-0.0314***	-0.0110***	-0.0406***	-0.0265**	-0.0233	0.00155
	(0.0044)	(0.0040)	(0.0055)	(0.011)	(0.016)	(0.013)

Notes: see Table 2.

Table 6 – Testing Symmetry versus Asymmetry of response

3SLS Estimates n=344	Levels -coefficients on $\Delta(Y-Y^*)$ All	 $Y<Y^*$	Ratios – coefficients on $\Delta(Y/Y^*)$ All	 $Y<Y^*$
Revenues:				
Household Direct Taxes	0.296***	-0.0702	-0.0306	-0.00036
	(0.044)	(0.055)	(0.029)	(0.0008)
Other Direct Taxes	0.327***	-0.236***	0.0505**	0.00005
	(0.028)	(0.036)	(0.022)	(0.0006)
Social Security Contributions	-0.0140	0.0611*	-0.0391*	0.00100*
	(0.028)	(0.036)	(0.021)	(0.0006)
Indirect Taxes	-0.0425	0.0917**	0.00983	0.00011
	(0.030)	(0.039)	(0.023)	(0.0007)
Expenditure:				
Current Spending n.h.	0.0703	-0.0992	-0.107***	0.00107
	(0.054)	(0.068)	(0.037)	(0.0010)
Health Expenditure	-0.0704***	0.0525***	-0.0440***	0.00025
	(0.012)	(0.015)	(0.0097)	(0.0003)
Age Related Benefits	-0.0315***	-0.00883	-0.0672***	0.00067**
	(0.0100)	(0.013)	(0.012)	(0.0003)
Incapacity Related Benefits	-0.0185***	0.00962*	-0.0273***	-0.0000922
	(0.0040)	(0.0051)	(0.0048)	(0.0001)
Unemployment Compensation	-0.0203**	-0.0248**	-0.0403***	0.00009
	(0.0095)	(0.012)	(0.0082)	(0.0002)
Sick Pay	-0.00519	0.0114	-0.00638	0.00002
	(0.0056)	(0.0072)	(0.0054)	(0.0002)
Subsidies	-0.0170*	-0.0190	-0.0778***	-0.00107
	(0.0091)	(0.012)	(0.024)	(0.0007)

Notes: see Table 2.

Table 7a – Individual Country Results

LEVELS	N	(1) unemployment compensation	(2) health	(3) age related benefits	(4) incapacity related benefits	(5) sick pay	(6) sum of separately estd coefs. columns 1-5	(7) estimates using aggregate of columns 1-5	(8) ratio column 6 to column 1
Australia	20	-0.0760***	0.0175	-0.0114	0.0027	-0.0167	-0.084	-0.132	1.105
Belgium	20	-0.0474***	-0.0718	-0.0837	-0.0176	-0.0286	-0.249	-0.264**	5.253
Canada	20	-0.0673***	-0.0060	-0.0184	-0.0046	0.0002	-0.096	-0.076*	1.426
Denmark	20	-0.1040**	-0.0084	0.1390***	0.0350***	-0.0110	0.051	0.029	-0.490
Finland	20	-0.0735**	-0.0038	-0.0289*	-0.0085	-0.0052	-0.120	-0.088*	1.633
France	15	-0.0474***	-0.0368	-0.0917*	-0.0129	-0.0036	-0.192	-0.136*	4.051
Germany	20	-0.0719***	0.0727	0.0004	0.0002	0.0023	0.004	0.013	-0.056
Ireland	15	-0.0397*	0.0351	0.0186	0.0034	0.0092	0.027	-0.002	-0.680
Italy	20	-0.0552***	-0.0344	-0.0577	-0.0157	-0.0502	-0.213	-0.230**	3.859
Japan	20	-0.0024	-0.0108	-0.0122	-0.0009	0.0001	-0.026	-0.024	10.833
Netherlands	20	-0.0790***	-0.0535	-0.0742**	-0.0208	-0.0334	-0.261	-0.240**	3.304
Portugal	19	-0.0387***	0.0285	0.0005	-0.0499**	0.0097	-0.050	-0.036	1.292
Spain	20	-0.0656*	-0.0026	-0.0264	-0.0057	-0.0326**	-0.133	-0.148	2.027
Sweden	20	-0.0210	-0.0646	-0.0152	-0.0454***	0.0265	-0.120	-0.023	5.714
UK	20	-0.0647***	-0.0860**	-0.0198	-0.0077	-0.0107	-0.189	-0.111	2.921
USA	20	-0.0137	-0.0299*	-0.0319***	-0.0023	0.0004	-0.077	-0.067**	5.620
No. negative point estimates		16	12	12	12	9	13	14	

Table 7b – Individual Country Results

RATIOS	N	(1) unemployment compensation	(2) health	(3) age related benefits	(4) incapacity related benefits	(5) sick pay	(6) sum of separately estd coefs. columns 1-5	(7) estimates using aggregate of columns 1-5	(8) ratio column 6 to column 1
Australia	20	-0.0733***	-0.0317	-0.0276	0.0020	-0.0103	-0.141	-0.093	1.924
Belgium	20	-0.0862***	-0.0211	-0.0642	-0.0310*	0.0232	-0.179	-0.215	2.077
Canada	20	-0.1170***	-0.0803***	-0.0425***	-0.0116***	-0.0002	-0.252	-0.251***	2.154
Denmark	20	-0.1600***	-0.0533*	-0.0160	-0.0070	0.0323	-0.204	-0.207*	1.275
Finland	20	-0.1270***	-0.0265	-0.1170***	-0.0496***	-0.0301**	-0.350	-0.322***	2.756
France	15	-0.1020**	-0.0734	-0.1310**	-0.0064	0.0073	-0.306	-0.315**	3.000
Germany	20	-0.0918***	0.0605	-0.0541**	-0.0116	0.0059	-0.091	-0.0799	0.991
Ireland	15	-0.0715**	-0.0657**	-0.0827**	-0.0094*	-0.0261	-0.255	-0.190**	3.566
Italy	20	-0.0812***	-0.0352	-0.1740***	-0.0121	0.0060	-0.297	-0.325**	3.658
Japan	20	-0.0034	-0.0513***	-0.0599***	-0.0035***	-0.0010**	-0.119	-0.127***	35.000
Netherlands	20	-0.1200***	-0.0664	-0.0308	-0.0017	0.0438	-0.175	-0.286*	1.458
Portugal	19	-0.0257**	0.0505	-0.0192	0.0183	0.0085**	0.032	-0.003	-1.245
Spain	20	-0.0725	0.0662	-0.0822**	-0.0061	0.0052	-0.089	-0.240	1.228
Sweden	20	-0.1250***	-0.0497*	-0.1170***	-0.0695***	0.0925*	-0.269	-0.296***	2.152
UK	20	-0.0813***	-0.1130***	-0.1340*	-0.0388**	0.0092	-0.358	-0.320***	4.403
USA	20	-0.0194	-0.0617***	-0.0857***	-0.0070*	-0.0023	-0.176	-0.187***	9.072
No. negative point estimates		16	13	16	16	6	16	16	

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TEST APPENDIX: Table A1a - Sequentially dropping individual countries

3SLS Levels	Household Direct Taxes	Other Direct Taxes	Social Security Contribu-tions	Indirect Taxes	Expenditure n.e.s	Health Expenditure	Age Related Expenditure	Incapacity Related Benefits	Unemploy-ment Com-pensation	Sick Pay	Subsidies
All	0.300***	0.156***	0.0445***	0.0141	-0.0104	-0.0437***	-0.0451***	-0.0150***	-0.0407***	-0.0019	-0.0314***
Australia	0.305***	0.155***	0.0456***	0.0137	-0.0065	-0.0424***	-0.0400***	-0.0148***	-0.0408***	-0.0022	-0.0315***
Austria	0.300***	0.154***	0.0440***	0.0129	-0.0092	-0.0438***	-0.0453***	-0.0149***	-0.0405***	-0.0020	-0.0313***
Belgium	0.300***	0.155***	0.0443***	0.0141	-0.0082	-0.0437***	-0.0456***	-0.0151***	-0.0402***	-0.0021	-0.0314***
Canada	0.287***	0.154***	0.0478***	0.0132	-0.0150	-0.0454***	-0.0472***	-0.0140***	-0.0386***	-0.0003	-0.0310***
Denmark	0.291***	0.151***	0.0367***	0.0193	-0.0190	-0.0446***	-0.0392***	-0.0140***	-0.0445***	-0.0006	-0.0287***
Finland	0.299***	0.153***	0.0452***	0.0130	-0.0062	-0.0448***	-0.0459***	-0.0152***	-0.0398***	-0.0026	-0.0310***
France	0.294***	0.155***	0.0475***	0.0154	0.0004	-0.0442***	-0.0423***	-0.0148***	-0.0398***	-0.0016	-0.0300***
Germany	0.297***	0.155***	0.0492***	0.0155	0.0181	-0.0416***	-0.0470***	-0.0133***	-0.0393***	-0.0022	-0.0339***
Iceland	0.293***	0.159***	0.0457***	0.0184	-0.0070	-0.0436***	-0.0463***	-0.0142***	-0.0410***	-0.0016	-0.0311***
Ireland	0.300***	0.155***	0.0448***	0.0139	-0.0053	-0.0431***	-0.0451***	-0.0149***	-0.0402***	-0.0019	-0.0314***
Italy	0.303***	0.157***	0.0436***	0.0193	-0.0183	-0.0447***	-0.0403***	-0.0148***	-0.0403***	-0.0021	-0.0312***
Netherlands	0.300***	0.156***	0.0445***	0.0141	-0.0104	-0.0437***	-0.0451***	-0.0150***	-0.0407***	-0.0019	-0.0314***
NewZealand	0.299***	0.156***	0.0446***	0.0143	-0.0078	-0.0432***	-0.0445***	-0.0157***	-0.0399***	-0.0021	-0.0321***
Norway	0.299***	0.156***	0.0452***	0.0131	-0.0087	-0.0431***	-0.0448***	-0.0148***	-0.0398***	-0.0020	-0.0312***
Portugal	0.261***	0.176***	0.0347***	0.00881	-0.0090	-0.0434***	-0.0432***	-0.0127***	-0.0374***	-0.0008	-0.0308***
Spain	0.291***	0.163***	0.0459***	0.0209	-0.0184	-0.0432***	-0.0443***	-0.0148***	-0.0411***	-0.0017	-0.0314***
Sweden	0.298***	0.159***	0.0415***	0.0133	-0.0053	-0.0439***	-0.0454***	-0.0150***	-0.0398***	-0.0017	-0.0311***
Switzerland	0.272***	0.157***	0.0345***	0.0225**	-0.0114	-0.0422***	-0.0423***	-0.0103***	-0.0340***	-0.0047**	-0.0151***
UK	0.300***	0.155***	0.0441***	0.0144	-0.0078	-0.0435***	-0.0450***	-0.0150***	-0.0410***	-0.0020	-0.0313***
USA	0.289***	0.170***	0.0386***	0.0139	-0.0071	-0.0470***	-0.0478***	-0.0160***	-0.0390***	-0.0007	-0.0304***

Table A1b - Sequentially dropping individual countries

3SLS Ratios	Household Direct Taxes	Other Direct Taxes	Social Security Contribu-tions	Indirect Taxes	Expenditure n.e.s	Health Expenditure	Age Related Expenditure	Incapacity Related Benefits	Unemploy-ment Com-pensation	Sick Pay	Subsidies
All	-0.0396	-0.0037	-0.0350	-0.0072	-0.139***	-0.0549***	-0.0797***	-0.0264***	-0.0486***	-0.0151**	-0.0265**
Australia	-0.0305	-0.0078	-0.0225	-0.0177	-0.158***	-0.0500***	-0.0892***	-0.0313***	-0.0496***	-0.0166***	-0.0319***
Austria	-0.0441	-0.0020	-0.0363	-0.0082	-0.129***	-0.0527***	-0.0782***	-0.0257***	-0.0473***	-0.0155**	-0.0261**
Belgium	-0.0132	0.0062	-0.0296	-0.0134	-0.122***	-0.0570***	-0.0869***	-0.0260***	-0.0486***	-0.0157***	-0.0299**
Canada	-0.0289	-0.0075	-0.0393	-0.0036	-0.121***	-0.0547***	-0.0824***	-0.0287***	-0.0474***	-0.0165***	-0.0305**
Denmark	-0.0314	0.0032	-0.0416*	-0.0069	-0.136***	-0.0604***	-0.0786***	-0.0289***	-0.0532***	-0.0119**	-0.0150
Finland	-0.0582*	-0.0301	-0.0261	-0.0199	-0.152***	-0.0450***	-0.0766***	-0.0224***	-0.0460***	-0.0153**	-0.0115
France	-0.062**	-0.0043	-0.0219	0.0050	-0.152***	-0.0557***	-0.0756***	-0.0277***	-0.0542***	-0.0165***	-0.0244**
Germany	-0.0473	-0.0018	-0.0326	-0.0092	-0.138***	-0.0515***	-0.0787***	-0.0249***	-0.0446***	-0.0136**	-0.0230**
Iceland	-0.0463	0.0041	-0.0377	-0.0191	-0.139***	-0.0601***	-0.0800***	-0.0264***	-0.0542***	-0.0164***	-0.0294**
Ireland	-0.0398	0.0007	-0.0436*	-0.0066	-0.132***	-0.0539***	-0.0778***	-0.0243***	-0.0485***	-0.0106*	-0.0298***
Italy	-0.0377	-0.0182	-0.0350	-0.0032	-0.147***	-0.0572***	-0.0760***	-0.0259***	-0.0482***	-0.0125**	-0.0262**
Netherlands	-0.0396	-0.0037	-0.0350	-0.0072	-0.139***	-0.0549***	-0.0797***	-0.0264***	-0.0486***	-0.0151**	-0.0265**
NewZealand	-0.0445	-0.0090	-0.0279	-0.0249	-0.140***	-0.0532***	-0.0720***	-0.0240***	-0.0510***	-0.0121**	-0.0275**
Norway	-0.0388	0.0038	-0.0288	-0.0061	-0.109***	-0.0560***	-0.0694***	-0.0214***	-0.0427***	-0.0168***	-0.0229*
Portugal	-0.0493	0.0443*	-0.0375	-0.0205	-0.163***	-0.0501***	-0.0721***	-0.0174***	-0.0499***	-0.0068	-0.0461***
Spain	-0.0367	0.0033	-0.0431	-0.0183	-0.151***	-0.0593***	-0.106***	-0.0376***	-0.0465***	-0.0210***	-0.0203
Sweden	-0.0183	-0.0066	-0.0348	-0.0152	-0.131***	-0.0537***	-0.0741***	-0.0285***	-0.0448***	-0.0136**	-0.0233**
Switzerland	-0.0472	0.0047	-0.0436**	0.0054	-0.136***	-0.0520***	-0.0773***	-0.0264***	-0.0480***	-0.0117**	-0.0266**
UK	-0.0387	-0.0017	-0.0344	-0.0087	-0.135***	-0.0557***	-0.0764***	-0.0264***	-0.0467***	-0.0158***	-0.0264**
USA	-0.0389	0.0032	-0.0253	-0.0158	-0.138***	-0.0529***	-0.0768***	-0.0302***	-0.0497***	-0.0178***	-0.0330***

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 CAPOG = IGAA + TKPG – TKTRG - CKFG IGAA=Gross capital formation TKPG= net capital transfers paid + net acquisitions of non-produced non financial assets TKTRG=capital tax and transfer payments received by government CKFG= consumption of fixed capital	Economic Outlook
HLTH	Health Benefits in kind	SocX
YPEPG	Property Income Paid by Government	Economic Outlook

Code	Description	Source
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: = 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 [Code 712]	SocX
ICR	Incapacity Benefits (Disability, Occupational injury and disease, *excluding Sickness*) [Code 300 – Code 313 – Code 314]	SocX
SIC	Paid Sick Leave (occupational injury and disease and other sickness daily allowances) [Code 313 +Code 314]	SocX
UC	Unemployment compensation / severance pay [Code 711]	SocX
OTH	Other Social = Family+Housing+Other Cash Benefits [Code 500+ Code 800 + Code 900]	SocX

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

SocX = OECD Social Expenditure Database 2004 release.

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