Automatic Stabilizers and Economic Crisis: US vs. Europe

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Abstract

This paper analyzes the effectiveness of the tax and transfer systems in the European Union and the US to act as an automatic stabilizer in the current economic crisis. We find that automatic stabilizers absorb 38 per cent of a proportional income shock in the EU, compared to 32 per cent in the US. In the case of an unemployment shock 48 per cent of the shock are absorbed in the EU, compared to 34 per cent in the US. This cushioning of disposable income leads to a demand stabilization of 26 to 35 per cent in the EU and 19 per cent in the US. There is large heterogeneity within the EU. Automatic stabilizers in Eastern and Southern Europe are much lower than in Central and Northern European countries. We also investigate whether countries with weak automatic stabilizers have enacted larger fiscal stimulus programs. We find no evidence supporting this view. However, we find that active fiscal policy is lower in more open economies.

JEL Code: E32, E63, H20, H31.

Keywords: automatic stabilization, crisis, liquidity constraints, fiscal stimulus.

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This paper uses EUROMOD version D21 and TAXSIM v9. EUROMOD and TAXSIM are continually being improved and updated and the results presented here represent the best available at the time of writing. Our version of TAXSIM is based on the Survey of Consumer Finances (SCF) by the Federal Reserve Board. EUROMOD relies on micro-data from 17 different sources for 19 countries. These are the ECHP and EU-SILC by Eurostat, the Austrian version of the ECHP by Statistik Austria; the PSBH by the University of Liège and the University of Antwerp; the Estonian HBS by Statistics Estonia; the Income Distribution Survey by Statistics Finland; the EBF by INSEE; the GSOEP by DIW Berlin; the Greek HBS by the National Statistical Service of Greece; the Living in Ireland Survey by the Economic and Social Research Institute; the SHIW by the Bank of Italy; the PSELL-2 by CEPS/INSTEAD; the SEP by Statistics Netherlands; the Polish HBS by Warsaw University; the Slovenian HBS and Personal Income Tax database by the Statistical Office of Slovenia; the Income Distribution Survey by Statistics Sweden; and the FES by the UK Office for National Statistics (ONS) through the Data Archive. Material from the FES is Crown Copyright and is used by permission. Neither the ONS nor the Data Archive bears any responsibility for the analysis or interpretation of the data reported here. An equivalent disclaimer applies for all other data sources and their respective providers.

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1 Introduction

In the current economic crisis, fiscal policy is widely seen to play a key role in stabilizing demand and output. A large part of the debate on the fiscal policy response to the crisis has focused on discretionary policy action in the form of fiscal stimulus packages. But there is a second source of fiscal expansion in an economic crisis: the workings of automatic stabilizers. Automatic stabilizers are usually defined as those elements of fiscal policy which mitigate output fluctuations without discretionary government action (see, e.g., Eaton and Rosen (1980) or Auerbach and Feenberg (2000)). Some observers have argued that automatic stabilizers may provide a contribution to demand stabilization which is as important as active fiscal policy measures. For example, Jürgen Stark, member of the European Central Bank directorate, recently claimed that "*automatic stabilization accounts for 50% of the fiscal stimulus in Germany over the next 2 years.*"[1]

The extent to which automatic stabilizers mitigate the impact of income shocks on household demand essentially depends on two factors. Firstly, the tax and transfer system determines the way in which a given shock to gross income translates into a change in disposable income. For instance, in the presence of a proportional income tax with a tax rate of 40%, a shock on gross income of one hundred Euros leads to a decline in disposable income of 60 Euros. In this case, the tax absorbs 40% of the shock to gross income. A progressive tax, in turn, would have a stronger stabilizing effect. Secondly, the link between current disposable income and current demand for goods and services is crucial. If the income shock is perceived as transitory and current demand depends on some concept of permanent income, and if households can borrow, their demand will not change. In this case, the impact of automatic stabilizers on current demand would be equal to zero. Things are different, though, if households are liquidity constrained. In this case, their current expenditures do depend on disposable income so that automatic stabilizers play a role.

It is the purpose of this paper to assess the contribution of automatic stabilizers to overall fiscal expansion and demand stabilization, and to compare their magnitude in Europe and the US. We analyze the impact of automatic stabilizers using microsimulation models for 19 European countries (EUROMOD) and the US

[1] Interview with Frankfurter Allgemeine Zeitung on May 20th 2009.

(TAXSIM).[2] In our baseline simulation, we only take into account personal income taxes (at all government levels), social insurance contributions as well as payroll taxes paid by employees, and transfers to private households like, e.g., unemployment benefits.[3] Computations are done according to the tax benefit rules which were in force before 2008 in order to avoid an endogeneity problem resulting from any policy responses after the start of the crisis. As a measure of automatic stabilization, we use the normalized tax change as in Auerbach and Feenberg (2000). This indicator relates the shock absorption by the tax and transfer system to the overall size of the income shock. In the example given above, the normalized tax change would be equal to 0.4, which means that the automatic stabilizers of the tax and transfer system would absorb 40% of the shock to gross income.

We run two controlled experiments of macro shocks to income and employment. The first is a proportional decline in household gross income by 5% (income shock). This is the usual way of modeling shocks in simulation studies analyzing automatic stabilizers. However, economic downturns typically affect households asymmetrically, with some households losing their jobs and suffering a sharp decline in income and other households being much less affected, as wages are usually rigid in the short term. We therefore consider a second macro shock where some households become unemployed, so that the unemployment rate increases by five percentage points (unemployment shock). After identifying the effects of these shocks on disposable income, we use methods developed by Zeldes (1989) to estimate the prevalence of credit constraints among households. On this basis, we calculate how the stabilization of disposable income translates into demand stabilization.

Our analysis leads to the following main results. In the case of an income shock, approximately 38% of the shock would be absorbed by automatic stabilizers in the EU. For the US, we find a value of 32%. This is surprising because automatic stabilizers in Europe are usually perceived to be drastically higher than in the US. Our results qualify this view to some extent, at least as far as proportional shocks on

[2] The simulation approach allows us to investigate the causal effects of different types of shocks on household disposable income, holding everything else constant and therefore avoiding endogeneity problems (see Bourguignon and Spadaro (2006)). We can hence single out the role of automatic stabilization which is not possible in an ex-post evaluation as it is not possible to disentangle the effects of automatic stabilizers, active fiscal and monetary policy and behavioral responses like changes in labor supply or disability benefit take-up.

[3] We abstract from other taxes, in particular corporate income taxes. For an analysis of automatic stabilizers in the corporate tax system see Devereux and Fuest (forthcoming) and Buettner and Fuest (2009).

household income are concerned. When looking at the personal income tax only, the values for the US are even higher than the EU average. Within the EU, there is considerable heterogeneity, and results range from a value of 25% for Estonia to 56% for Denmark. In general automatic stabilizers in Eastern and Southern European countries are considerably lower than in Continental and Northern European countries. In the case of the unemployment shock, the difference between the EU and the US is larger. EU automatic stabilizers absorb 48% of the shock whereas the stabilization effect in the US is only 34%. Again, there is considerable heterogeneity within the EU.

How does this cushioning of shocks translate into demand stabilization? Since demand stabilization can only be achieved for liquidity constrained households, the picture changes significantly. For the income shock, the cushioning effect of automatic stabilizers is now equal to 26% in the EU. For the US, we find a value of 19%, which is again rather similar. For the unemployment shock, however, we find a large difference. In the EU, the stabilization effect is equal to 35% whereas the value for the US (19%) is similar to the value for the income shock. These results suggest that social transfers, in particular the rather generous systems of unemployment insurance in Europe, play a key role for demand stabilization and explain an important part of the difference in automatic stabilizers between Europe and the US.

In the empirical literature on automatic stabilizers, two types of studies prevail: macro (time series) studies and micro data estimates.[4] Sachs and Sala-i Martin (1992) and Bayoumi and Masson (1995) use time series data and find values of 30%-40% for disposable income stabilization in the US. Other studies focus on the relationship between output volatility, public sector size and openness of the economy (Cameron (1978), Galí (1994), Rodrik (1998), van den Noord (2000), Auerbach and Hassett (2002)). On the micro data side, Auerbach and Feenberg (2000) use the NBER's microsimulation model TAXSIM to estimate the automatic stabilization for the US from 1962-95 and find values for the stabilization of disposable income ranging between 25%-35%. Auerbach (2009) has updated this analysis and finds a value around 25% for more recent years. Mabbett and Schelkle (2007) conduct a similar analysis for 15 European countries in 1998 and find higher stabilization effects than

[4]Early estimates on the responsiveness of the tax system to income fluctuations are discussed in the Appendix of Goode (1976). More recent contributions include Fatàs and Mihov (2001), Blanchard and Perotti (2002), Mélitz and Zumer (2002).

in the US, with results ranging from 32%-58%.[5] How does this smoothing of disposable income affect household demand? To the best of our knowledge, Auerbach and Feenberg (2000) is the only simulation study which tries to estimate the demand effect taking into account liquidity constraints. They also use the method suggested by Zeldes (1989) and find that approximately two thirds of all households are likely to be liquidity constrained. Given this, the contribution of automatic stabilizers to demand smoothing is reduced to approximately 15% of the initial income shock.

What does the present paper contribute to this literature? Firstly, previous studies have focused on proportional income shocks whereas our analysis shows that automatic stabilizers work very differently in the case of unemployment shocks, which affect households asymmetrically.[6] Secondly, to the best of our knowledge, our study is the first to estimate the prevalence of liquidity constraints for EU household data.[7] This is of key importance for assessing the role of automatic stabilizers for demand smoothing. Thirdly, our analysis includes a decomposition of the overall stabilization effects into the contributions of taxes, social insurance contributions and benefits. We show that this decomposition is important for the comparison between the U.S. and Europe. Finally, a difference between our study and Auerbach and Feenberg (2000) as well as Auerbach (2009) is that we take into account unemployment benefits and state level income taxes. This explains why our estimates of automatic stabilization effects in the US are higher.

A final issue we discuss in the paper is how fiscal stimulus programs of individual countries are related to automatic stabilizers. In particular, we ask whether countries with low automatic stabilizers have tried to compensate this by larger fiscal stimuli, but we find no correlation between the size of fiscal stimulus programs and automatic stabilizers. However, we find that active fiscal policy is lower in more open economies.

The paper is structured as follows. Section 2 describes the microsimulation mod-

[5] Mabbett and Schelkle (2007) rely for their analysis (which is a more recent version of Mabbett (2004)) on the results from an inflation scenario taken from Immvervoll et al. (2006) who use the microsimulation model EUROMOD to increase earnings by 10% in order to simulate the sensitivity of poverty indicators with respect to macro level changes.

[6] Auerbach and Feenberg (2000) do consider a shock where households at different income levels are affected differently, but the results are very similar to the case of a symmetric shock. Our analysis confirms this for the US, but not for Europe.

[7] There are several studies on liquidity constraints and the responsiveness of households to tax changes in for the US (see, e.g., Zeldes (1989), Parker (1999), Souleles (1999), Johnson et al. (2006), Shapiro and Slemrod (1995, 2003, 2009))

els EUROMOD and TAXSIM. In addition, we discuss how stabilization effects can be measured and describe the different macro shock scenarios we consider. Section 3 presents the results on automatic stabilization which are discussed in Section 4 together with potential limitations of our approach. Section 5 concludes.

2 Data and methodology

2.1 Microsimulation using TAXSIM and EUROMOD

We use microsimulation techniques to simulate taxes, benefits and disposable income under different scenarios for a representative micro-data sample of households. Simulation analysis allows conducting a controlled experiment by changing the parameters of interest while holding everything else constant (cf. Bourguignon and Spadaro (2006)). We therefore do not have to deal with endogeneity problems when identifying the effects of the policy reform under consideration.

Simulations are carried out using TAXSIM - the NBER's microsimulation model for calculating liabilities under US Federal and State income tax laws from individual data- and EUROMOD, a static tax-benefit model for 19 EU countries, which was designed for comparative analysis.[8] The models can simulate most direct taxes and benefits except those based on previous contributions as this information is usually not available from the cross-sectional survey data used as input datasets. Information on these instruments is taken directly from the original data sources. Both models assume full benefit take-up and tax compliance, focusing on the intended effects of tax-benefit systems. The main stages of the simulations are the following. First, a micro-data sample and tax-benefit rules are read into the model. Then for each tax and benefit instrument, the model constructs corresponding assessment units, ascertains which are eligible for that instrument and determines the amount of benefit or tax liability for each member of the unit. Finally, after all taxes and benefits in question are simulated, disposable income is calculated.

[8] For more information on TAXSIM see Feenberg and Coutts (1993) or visit http://www.nber.org/taxsim/. For further information on EUROMOD see Sutherland (2001, 2007). There are also country reports available with detailed information on the input data, the modeling and validation of each tax benefit system, see http://www.iser.essex.ac.uk/research/euromod. The tax-benefit systems included in the model have been validated against aggregated administrative statistics as well as national tax-benefit models (where available), and the robustness checked through numerous applications (see, e.g., Bargain (2006)).

2.2 Income definitions

Market income Y_M is defined as the sum of all incomes from market activities:

$$Y_M = E + Q + I + P + O \tag{1}$$

where E is earnings, Q business income, I capital income, P property income, and O other income. Disposable income Y_D is defined as market income minus net government intervention $G = T + S - B$:

$$Y_D = Y_M - G = Y_M - (T + S - B) \tag{2}$$

where T are direct taxes, S social insurance contributions, and B are social cash benefits (i.e. negative taxes).

2.3 Measurement of automatic stabilization

A common measure for estimating automatic stabilization is the "normalized tax change" used by Auerbach and Feenberg (2000) which can be interpreted as "the tax system's built-in flexibility" (Pechman (1973, 1987)). It shows how changes in market income translate into changes in disposable income. In the following we simply refer to this measure as the *income stabilization coefficient* τ. We derive τ from a general functional relationship between disposable income and market income:

$$\tau = \tau(Y_M, T, S, B). \tag{3}$$

We compute τ using arithmetic changes (Δ) in disposable income (ΔY_D) and market income (ΔY_M) :

$$\begin{aligned} \Delta Y_D &= (1 - \tau)\Delta Y_M \\ \tau &= 1 - \frac{\Delta Y_D}{\Delta Y_M} = \frac{\Delta Y_M - \Delta Y_D}{\Delta Y_M} = \frac{\Delta G}{\Delta Y_M} = \frac{\Delta T + \Delta S - \Delta B}{\Delta Y_M} \end{aligned} \tag{4}$$

It measures the sensitivity of disposable income, Y_D, with respect to market income, Y_M. The higher τ, the stronger the stabilization effect, e.g. $\tau = 0.4$ implies that 40% of the income shock is absorbed by the tax benefit system. Note that the income stabilization coefficient is not only determined by the size of government (e.g. measured as expenditure or revenue in percent of GDP) but also depends on

the structure of the tax benefit system and the design of the different components.

Furthermore, it is important to explore the extent to which different individual components of the tax transfer system contribute to stabilization. Comparing tax benefit systems in Europe and the US, we are interested in the weight of each component in the respective country. We therefore decompose the coefficient into its components which include taxes, social insurance contributions and benefits:

$$\tau = \sum_f \tau_f = \tau_T + \tau_S + \tau_B = \frac{\Delta T}{\Delta Y_M} + \frac{\Delta S}{\Delta Y_M} - \frac{\Delta B}{\Delta Y_M} \tag{5}$$

However, in order to stabilize final demand and output, the cushioning effect on disposable income has to be transmitted to expenditures for goods and services. If current demand depends on some concept of permanent income, demand will not change in response to a transitory income shock. Things are different, though, if households are liquidity constrained and cannot borrow. In this case, their current expenditures do depend on disposable income so that automatic stabilizers play a role. Following Auerbach and Feenberg (2000), we assume that households who face liquidity constraints fully adjust consumption expenditure after changes in disposable income while no such behavior occurs among households without liquidity constraints.[9] The adjustment of liquidity constrained households takes place such that changes in disposable income are equal to changes in consumption. Hence, the coefficient which measures stabilization of aggregate demand becomes:

$$\tau^C = \frac{\Delta C_{LQ}}{\Delta Y_M} \tag{6}$$

where ΔC_{LQ} denotes the consumption response of liquidity constrained households. In the following, we refer to τ^C as the *demand stabilization coefficient*. In order to explore the sensitivity of our estimates of the demand stabilization coefficient with respect to the way in which liquidity constrained households are identified, we choose two different approaches. In the first one, we use the same approach as Auerbach and Feenberg (2000) and follow Zeldes (1989) to split the samples according to a specific wealth to income ratio. A household is liquidity constrained if its

[9]Note that the term "liquidity constraint" does not have to be interpreted in an absolute inability to borrow but can also come in a milder form of a substantial difference between borrowing and lending rates which can result in distortions of the timing of purchases. Note further that our demand stabilization coefficient does not predict the overall change of final demand, but the extent to which demand is stabilized by the tax benefit system.

capitalized wealth W is less than the disposable income of at least two months, i.e:

$$LQ = \mathbf{1}\left[W \leq \frac{2}{12} Y_D\right] \tag{7}$$

The second approach simply considers the bottom 75% of the gross income distribution to be liquidity constrained.

2.4 Scenarios

The existing literature on stabilization so far has concentrated on increases in earnings or gross incomes to examine the stabilizing impact of tax benefit systems. In the light of the current economic crisis, there is much more interest in a downturn scenario. Reinhart and Rogoff (2009) stress that recessions which follow a financial crisis have particularly severe effects on asset prices, output and unemployment. Therefore, we are interested not only in a scenario of an uniform decrease in incomes but also in an increase of the unemployment rate. We compare a scenario where gross incomes are decreased by 5% (income shock) to a scenario where the unemployment rate increases by five percentage points (unemployment shock).[10]

The increase of the unemployment rate is modeled through reweighting of our samples.[11] The weights of the unemployed are increased while those of the employed with similar characteristics are decreased, i.e., in effect, a fraction of employed households is made unemployed. With this reweighting approach we control for several individual and household characteristics that determine the risk of becoming unemployed (see Appendix A.2). The implicit assumption behind this approach is that

[10] Our scenarios can be seen as a conservative estimate of the expected impact of the current crisis (see Reinhart and Rogoff (2009) for effects of previous crises). The (qualitative) results are robust with respect to different sizes of the shocks. It would be further possible to derive more complicated scenarios with different shocks on different income sources or a combination of income and unemployment shock. However, this would only have an impact on the distribution of changes which are not relevant in the analysis of this paper. Therefore, we focus on these two simple scenarios in order to make our analysis as simple as possible. One should note, though, that our analysis is not a forecasting exercise. We do not aim at quantifying the exact effects of the current economic crisis but of stylized scenarios in order to explore the build-in automatic stabilizers of existing pre-crisis tax-benefit systems. Conducting an ex-post analysis would include discretionary government reactions and behavioral responses (see, e.g., Aaberge et al. (2000) for an empirical ex-post analysis of a previous crisis in the Nordic countries) and we would not be able to identify the role of automatic stabilization.

[11] For the reweigthing procedure, we follow the approach of Immvervoll et al. (2006), who have also simulated an increase in unemployment through reweighting of the sample. Their analysis focuses on changes in absolute and relative poverty rates after changes in the income distribution and the employment rate.

the socio-demographic characteristics of the unemployed remain constant.[12]

3 Results

3.1 US vs. Europe

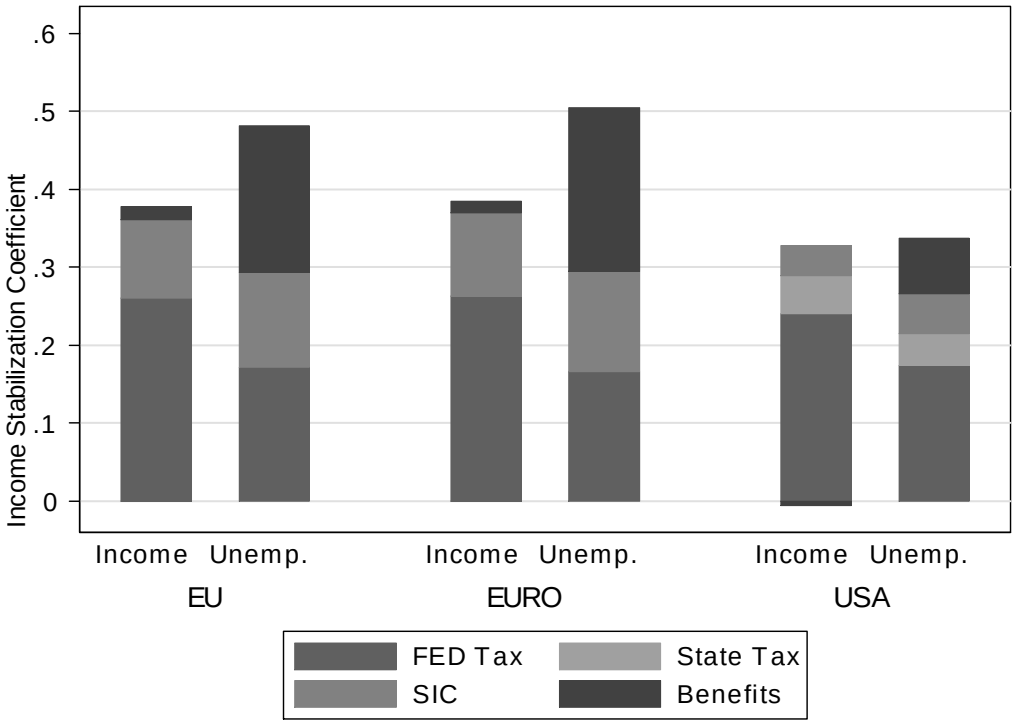
We start our analysis by comparing the US to Europe. Our simulation model includes 19 European countries which we treat as one single country (i.e. the "United States of Europe"). All of them are EU member states, which is why we refer to this group as the EU, bearing in mind that some EU member countries are missing. We also consider the countries of the Euro area and refer to this group as 'Euro'. Figure 1 summarizes the results of our baseline simulation, which focuses on the income tax, social insurance contributions (or payroll taxes) paid by employees and benefits. Consider first the income shock. Approximately 38% of such a shock would be absorbed by automatic stabilizers in the EU (and Euroland). For the US, we find a slightly lower value of 32%. This difference of just six percentage points is surprising in so far as automatic stabilizers in Europe are usually considered to be drastically higher than in the US.[13] Our results qualify this view to a certain degree, at least as far as proportional income shocks are concerned. Figure 1 shows that taxes and social insurance contributions are the dominating factors which drive τ in case of a uniform income shock. Benefits are of minor importance in this scenario.

In the case of the unemployment shock, the difference between the EU and the US is larger. EU automatic stabilizers now absorb 48% of the shock (in the Euro zone, we are close to 50%) whereas the stabilization effect in the US is only 34%. This difference can be explained with the importance of unemployment benefits which account for a large part of stabilization in Europe in this scenario. Table 4 in the Appendix shows that benefits alone absorb 19% of the shock in Europe compared to just 7% in the US.

[12] Cf. Deville and Särndal (1992) and DiNardo et al. (1996). This approach is equivalent to estimating probabilities of becoming unemployed (see, e.g., Bell and Blanchflower (2009)) and then selecting the individuals with the highest probabilities when controlling for the same characteristics in the reweighting estimation (see Herault (2009)). The reweighting procedure is to some extent sensitive to changes in control variables. However, this mainly affects the distribution of the shock (which we do not analyze) and not the overall or mean effects which are important for the analysis in this paper.

[13] Note that for the US the value of the stabilization coefficient for the federal income tax only is below 25% which is in line with the results of Auerbach and Feenberg (2000).

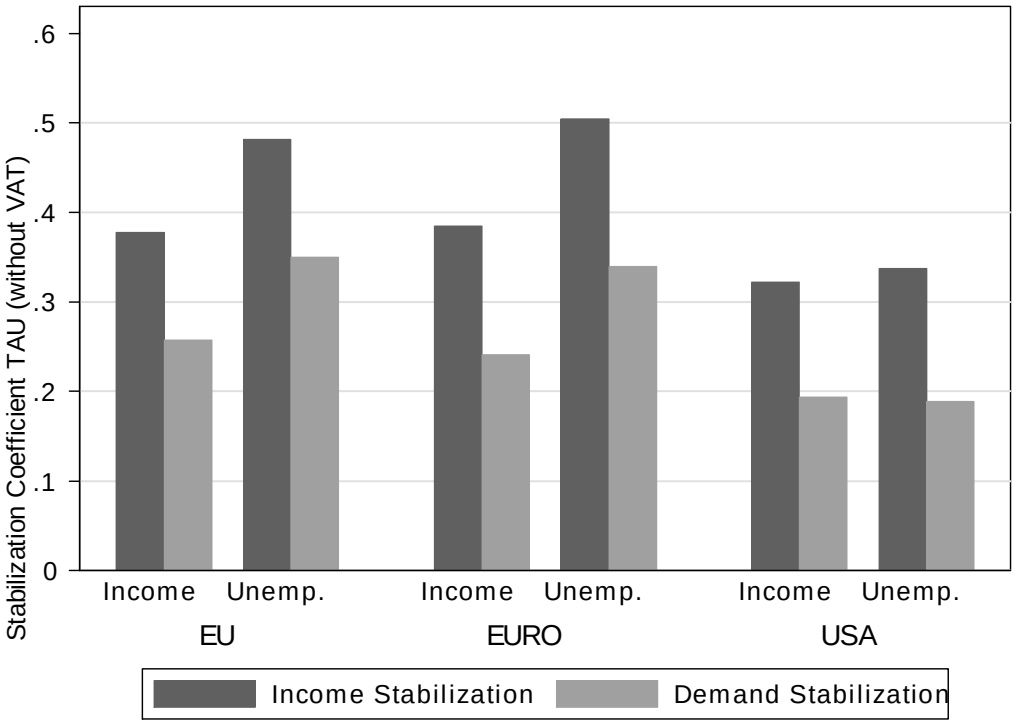
Figure 1: Decomposition of stabilization coefficient for both scenarios



Source: Own calculations based on EUROMOD and TAXSIM

How does this cushioning of shocks translate into demand stabilization? The results for stabilization of aggregate demand are shown in Figure 2. The demand stabilization coefficients are lower than the income stabilization coefficients since demand stabilization can only be achieved for liquidity constrained households. Therefore, the picture changes significantly. For the EU, the cushioning effect of automatic stabilizers is now equal to 26%. For the US, we find a value of 19%, 7 percentage points less than for the EU. For the Euro area, where fewer households are identified to be credit constrained, the demand stabilization coefficient (24%) is lower than for the EU-group. For the unemployment shock, the picture again changes completely. In the EU, the stabilization effect is equal to 35%, the Euro area is slightly lower (34%), whereas the value for the US (19%) is close to the value for the income shock. These results suggest that the transfers to the unemployed, in particular the rather generous systems of unemployment insurance in Europe, play a key role for demand stabilization and drive the difference in automatic stabilizers

Figure 2: Stabilization coefficient with and without liquidity constraints



Source: Own calculations based on EUROMOD and TAXSIM

between Europe and the US.

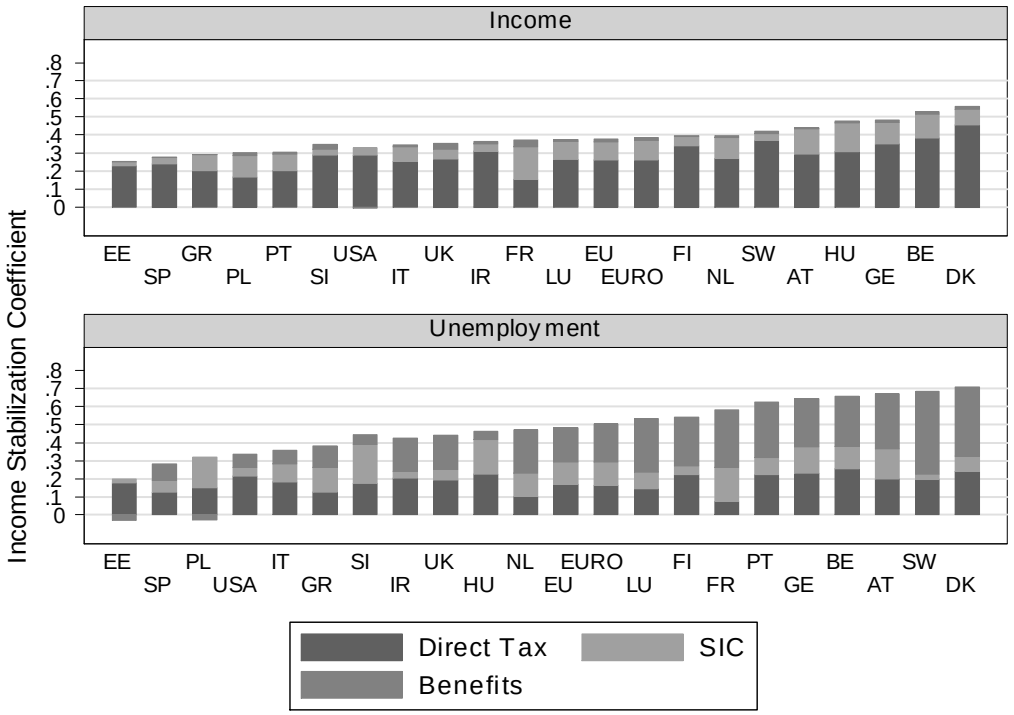
3.2 Country decomposition

The results for the stabilization coefficient vary considerably across countries, as can be seen from Figure 3 (and Tables 3 and 4 in the Appendix). In the case of the income shock, we find the highest stabilization coefficient for Denmark, where automatic stabilizers cushion 56% of the shock. Belgium (53%), Germany (48%) and, surprisingly, Hungary (48%) also have strong automatic stabilizers. The lowest values are found for Estonia (25%), Spain (28%) and Greece (29%). With the exception of France, taxes seem to have a stronger stabilizing role than social security contributions.

The picture again changes substantially in the case of the unemployment shock. Again, the highest value emerges for Denmark (71%), followed by Sweden (69%),

Austria (67%) Belgium (66%) and Germany (65%). The relatively low value of stabilization from (unemployment) benefits in Finland compared to its neighboring Nordic countries might be surprising at a first glance but but can be explained with the fact that Finland has the least generous unemployment benefits of the Nordic countries (see Aaberge et al. (2000)). Hungary (46%) is now below the EU average (48%) due to the very low level of unemployment benefits. At the other end of the spectrum, there are some countries with values far below the US level of 34%. These include Estonia (17%), Spain (28%), Poland (30%) and, to a lesser extent, Italy (36%). The negative stabilization coefficient for benefits in Estonia and Poland can be explained with the fact that the majority of benefits is conditional on working.

Figure 3: Decomposition of income stabilization coefficient in both scenarios for different countries



Source: Own calculations based on EUROMOD and TAXSIM

When looking at the personal income tax only, it is surprising that the values for the US are higher than the EU average. This qualifies to some extent the view that

tax progressivity is higher in Europe. Of course, this can be partly explained with the large heterogeneity within Europe. But still, only a few countries like Belgium, Germany and the Nordic countries have higher contributions of stabilization coming from the personal income tax.

How does this stabilization of disposable incomes affect household demand? In most Eastern European countries, households are more likely to be credit constrained than in Western Europe because financial wealth is typically lower. Our estimates confirm this. For this reason automatic stabilizers will be more important for demand stabilization in these countries. This explains why we find the highest modified demand stabilization coefficient for Hungary (46%) and why we find a stabilization effect which is above or near to the EU average even for Poland (30%) and Estonia (25%), although disposable income stabilization is below the EU average in these countries. Relatively low values for automatic stabilization effects of the tax and transfer systems on demand are now found in countries where households are relatively wealthy, so that credit constraints are less important. These include Sweden, with a stabilization coefficient of 26%, Germany (25%) and in particular France (16%). Our results, including those for other individual EU countries, are summarized in Table 1.[14]

4 Discussion of the results

In this section, we discuss a number of possible objections to and questions raised by our analysis. These include the relation of our results to widely used macro indicators of automatic stabilizers, the role of other taxes, the correlation between automatic stabilizers and other macro variables like e.g. openness and, finally, the correlations between discretionary fiscal stimulus programs and automatic stabilizers as well as openness.

4.1 Stabilization coefficients and simple macro indicators

One could argue that aggregate measures like e.g. the tax revenue to GDP ratio reveal sufficient information on the magnitude of automatic stabilizers in the different

[14]The results are robust to other definitions of liquidity constraints - at least with respect to cross-country rankings (see also Appendix Table 5). Of course, the higher the share of liquidity constrained households the higher τ^C.

Table 1: Stabilization of aggregate demand

	Share liquidity constrained		Income shock		Unemployment shock	
	Population	Income	τ Income	τ^C Demand	τ Income	τ^C Demand
AT	0.891	0.883	0.439	0.388	0.670	0.606
BE	0.706	0.639	0.527	0.348	0.657	0.466
DK	0.619	0.576	0.558	0.320	0.707	0.470
EE	0.984	0.969	0.253	0.246	0.168	0.162
FI	0.741	0.629	0.396	0.266	0.541	0.385
FR	0.479	0.420	0.370	0.161	0.582	0.341
GE	0.511	0.503	0.481	0.248	0.645	0.376
GR	0.854	0.822	0.291	0.234	0.383	0.310
HU	0.976	0.961	0.476	0.457	0.464	0.452
IR	0.736	0.646	0.363	0.228	0.425	0.315
IT	0.762	0.733	0.346	0.283	0.359	0.268
LU	0.773	0.768	0.374	0.284	0.533	0.419
NL	0.706	0.657	0.397	0.264	0.472	0.348
PL	0.985	0.982	0.301	0.296	0.295	0.288
PT	0.899	0.886	0.303	0.273	0.625	0.589
SI	0.743	0.632	0.317	0.112	0.425	0.245
SP	0.837	0.824	0.277	0.225	0.283	0.230
SW	0.630	0.599	0.420	0.257	0.685	0.501
UK	0.824	0.775	0.352	0.277	0.441	0.397
EU	0.717	0.686	0.378	0.258	0.482	0.350
EURO	0.657	0.626	0.385	0.242	0.504	0.339
USA	0.777	0.536	0.322	0.194	0.337	0.189

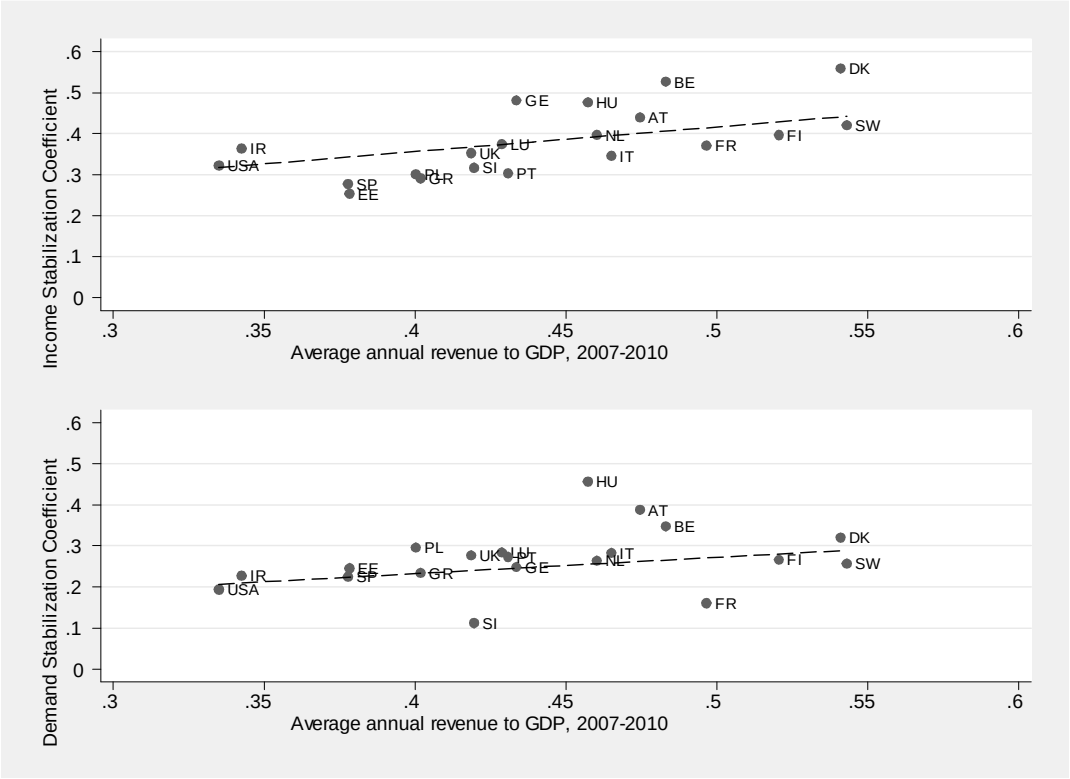
Source: Own calculations based on EUROMOD and TAXSIM.
Note: A household is defined as liquidity constrained if its capitalized wealth is less than the disposable income of at least two months (cf. Zeldes (1989)).

countries. For instance, the IMF (2009) has recently used aggregate tax to GDP ratios as proxies for the size of automatic stabilizers in G-20 countries. The upper panel of Figure 4 depicts the relation between the ratio of average revenue 2006-2010 to GDP and the income stabilization coefficient for the proportional income shock.[15] With a correlation of 0.58, one can conclude that government size is indeed a good predictor for the amount of automatic stabilization. The picture changes, however, if stabilization of aggregate household demand is considered, i.e. if we account for

[15] All figures and correlations in this section are population-weighted in order to control for different country sizes. However, results are similar to those without population-weighting. We also obtained similar results when using the government spending to GDP ratio instead of revenue as a measure of the size of the government.

liquidity constraints. As shown in Figure 4 (lower panel), with a coefficient of 0.33 government size and stabilization of aggregate household demand are only weakly correlated.[16]

Figure 4: Government size and income and demand stabilization coefficients



Source: Own calculations based on EUROMOD and TAXSIM, European Commission (2009a).

These simple correlations suggest that macro indicators like tax revenue to GDP ratios are meaningful indicators for the stabilization effect of the tax and transfer system on disposable income but can be misleading as indicators of the stabilization effect on household demand. The reason is that the latter depends on the presence of liquidity constraints. The income share of liquidity constrained households, however, is negatively correlated with the size of government. In our analysis, we find a correlation of -0.30 (see also Figure 7 in the Appendix).

Another interesting point arises from Figure 4 when making vertical comparisons between similar countries. For instance, Denmark and Sweden, and - to some extent

[16] The respective correlations for the unemployment shock are 0.72 and 0.52.

- Belgium and France have similar levels of revenue to GDP ratios. However, the stabilization is higher in Denmark and Belgium. In both countries, the importance of the (progressive) income tax is higher, whereas Sweden and France rely more on proportional social insurance contributions. Therefore, not only the size but also the structure of the tax benefit system are important for its possibilities of automatic stabilization.

4.2 The role of other taxes

Another objection to our results could be that we neglect some taxes which are potentially relevant as automatic stabilizers. These include consumption taxes like the value added tax or sales taxes, social insurance contributions or payroll taxes paid by employers, corporate income taxes and other taxes like e.g. property transaction taxes. Including some of these taxes like employer social insurance contributions or even consumption taxes would be possible technically. But the interpretation of these numbers would be less straightforward. Our measure of automatic stabilization effects refers to a counterfactual without taxes. We have assumed implicitly that market prices and wages would be the same in the absence of taxes. If we apply this to consumption taxes and employer social insurance contributions or payroll taxes, these taxes would stabilize corporate income, as does the corporate income tax.[17] The stabilization of cash flows of corporations has implications for aggregate demand which differ substantially from the implications of stabilizing household disposable income, and analyzing these implications would be beyond the scope of this paper.[18]

4.3 Automatic stabilizers and openness

It is a striking feature of our results that automatic stabilizers differ significantly within Europe. In particular, automatic stabilizers in Eastern and Southern European countries are much weaker than in the rest of Europe. One factor contributing to this is that government size is often positively correlated with per capita incomes,

[17] Due to a lack of space, we do not discuss these results here in more detail. But given these assumptions, the difference in the stabilization effect between the EU and the US would increase. This is due to the fact that EU countries have on average higher consumption taxes (and social insurance contributions) than the US states (see, e.g., European Commission (2009b) and McIntyre et al. (2003)).

[18] This issue is discussed in Devereux and Fuest (forthcoming) and Buettner and Fuest (2009).

at least in Europe. The stabilization of disposable incomes will therefore be higher in high income countries, just as a side effect of a larger public sector.

But differences in automatic stabilizers across countries may also have other reasons. In particular, the effectiveness of demand stabilization as a way of stabilizing domestic output is smaller, the more open the economy. In very open economies, domestic output will depend heavily on export demand and higher demand by domestic households will partly lead to higher imports. Clearly, openness of the economy has a number of other implications for the tax and transfer system, including the view that more open economies need more insurance against shocks as argued, e.g., by Rodrik (1998). Figure 5 depicts the relationship between income stabilization coefficients and openness as measured by the ratio of exports plus imports over GDP. As graph 5 shows, it is not the case that more open economies have weaker automatic stabilizers, the correlation is even positive (0.57). Our results thus support the hypothesis of Rodrik (1998) that income stabilization is higher in more open economies. For the demand stabilization coefficient, we find a similar correlation.

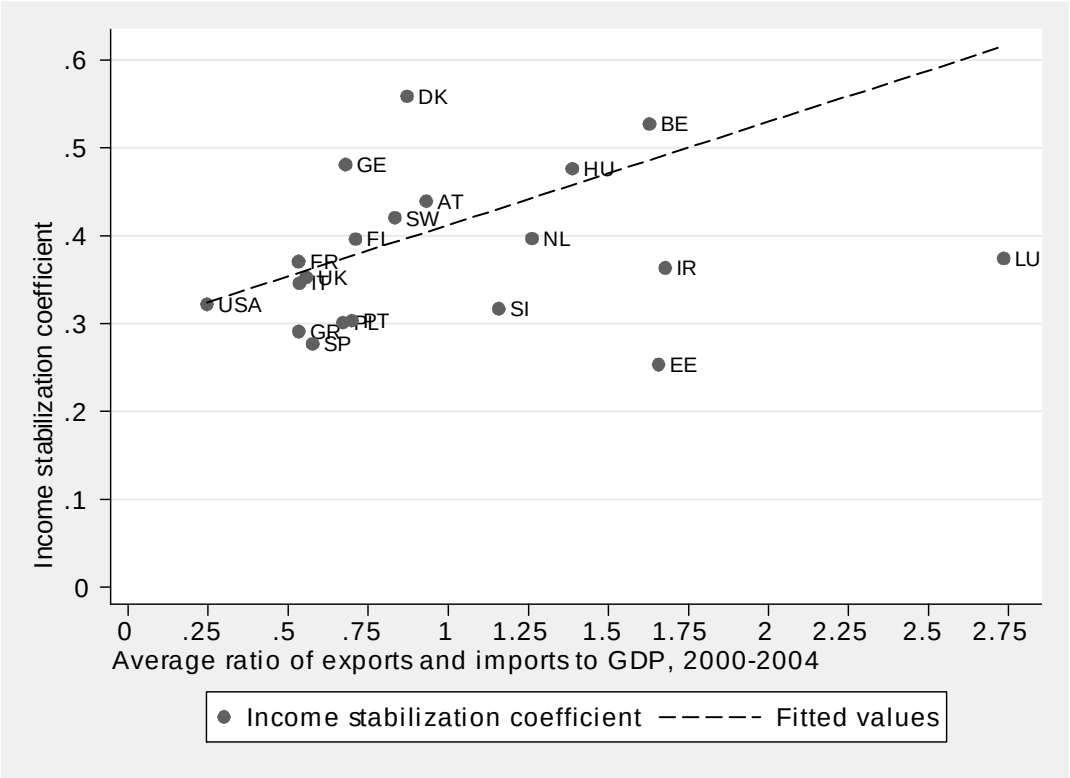
4.4 Automatic stabilizers and discretionary fiscal policy

In the debate on fiscal policy responses to the crisis, some countries have been criticized for being reluctant to enact fiscal stimulus programs in order to stabilize demand, in particular Germany. One reaction to this criticism was to point to the fact that automatic stabilizers in Germany are more important than in other countries, so that less discretionary action is required. This raises the general question of whether countries with weaker automatic stabilizers have taken more discretionary fiscal policy action. To shed some light on this issue, we relate the size of fiscal stimulus programs to stabilization coefficients.

Graph 6 shows that income stabilization coefficients are largely uncorrelated to the size of fiscal stimulus programs (-0.10). A positive, albeit also rather small correlation emerges when we consider demand stabilization coefficients (see Graph 8 in the Appendix). Our finding of a small correlation between automatic stabilizers and discretionary measures qualifies the view that countries with lower automatic stabilizers have engaged in more discretionary fiscal policy action (e.g., IMF (2009), p. 27).

A further concern in the policy debate put forward by supporters of large and coordinated discretionary measures is that countries could limit the size of their pro-

Figure 5: Income stabilization coefficient and openness of the economy



Source: Own calculations based on EUROMOD and TAXSIM, Heston et al. (2006).

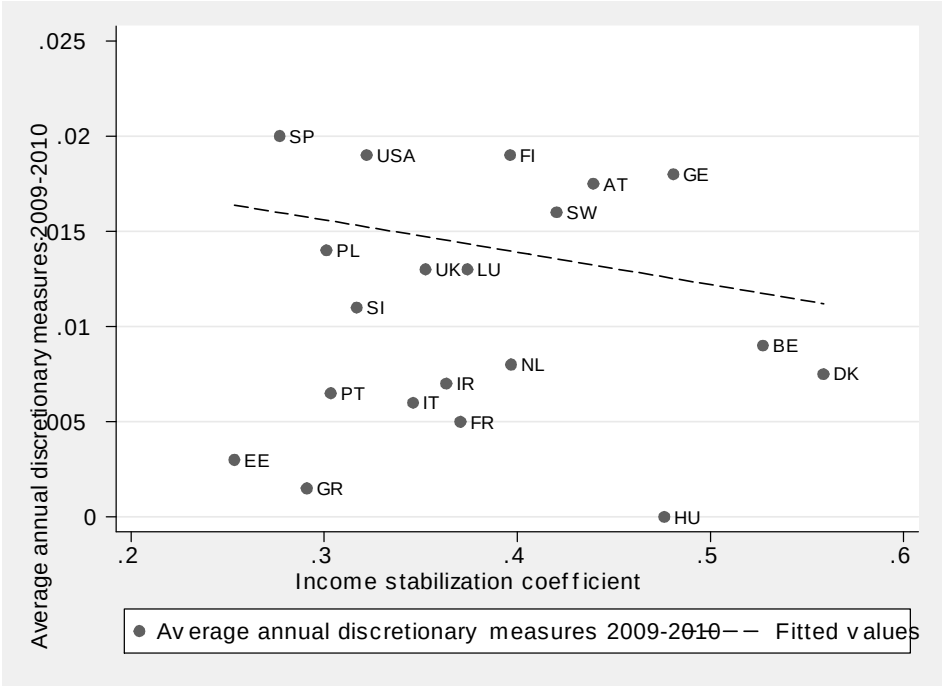
grams at the expense of countries with more generous fiscal policy responses. The idea behind this argument is that some countries might show a free-rider behavior and profit from spill-over effects of discretionary measures.[19] Therefore, we investigate the hypothesis if more open countries which are supposed to benefit more from spill-over effects indeed passed smaller stimulus programs. We find a negative correlation of -0.40 between the average annual discretionary measures in 2009 and 2010 and the coefficient for openness which supports the hypothesis.[20]

Table 2 shows the results of the regression of discretionary measures taken by the EU-19 countries and the USA on the income stabilization coefficients, a measure of openness of the respective economies and their governments' budget balance in 2007. Openness is again measured as the average ratio of exports and imports to GDP from

[19] In that sense, a fiscal stimulus program can be seen as a positive externality since potential positive effects are not limited to the country of origin.

[20] Cf. Graph 9 in the Appendix.

Figure 6: Discretionary measures and income stabilization coefficient



Source: Own calculations based on EUROMOD and TAXSIM, European Commission (2009c), IMF (2009) and International Labour Office and International Institute for Labour Studies (2009).

2000-2004. Due to the very small sample size, this inference should be interpreted with caution. Having this in mind, the coefficients of openness and the budget balance are significant indicating that in addition to the argument above about openness, some governments have been constrained by weak budget positions in their decision making about discretionary fiscal policy. The insignificant relationship between discretionary fiscal policy and the amount of automatic stabilization is also confirmed by the regression.

Table 2: Explanatory factors of disretionary fiscal policy

dep. var.: fiscal stimulus 2009-10	(1)	(2)	(3)
Income stabilization coefficient	-0.009		0.013
	(0.02)		(0.02)
Openness		-0.007*	-0.010**
		(0.00)	(0.00)
Budget balance 2007			0.149*
			(0.07)
Constant	0.018**	0.019***	0.017**
	(0.01)	(0.00)	(0.01)
adjusted R^2	0.011	0.160	0.353
F	0.193	3.420	2.912
N	20	20	20

Source: Own calculations based on EUROMOD and TAXSIM.
Note: standard error in parentheses. significance level: * p<0.10, ** p<0.05, *** p<0.01

5 Conclusions

In this paper we have used the microsimulation models for the tax and transfer systems of 19 European countries (EUROMOD) and the US (TAXSIM) to investigate the extent to which automatic stabilizers cushion household disposable income and household demand in the event of macroeconomic shocks. Our analysis has focused on the personal income tax, employee social insurance contributions and benefits. One of the key findings of our analysis is that the amount of automatic stabilization depends strongly on the type of income shock. In the case of a proportional income shock, approximately 38% of the shock would be absorbed by automatic stabilizers in the EU. For the US, we find a value of 32%. Within the EU, there is considerable heterogeneity, and results range from a value of 25% for Estonia to 56% for Denmark. In general automatic stabilizers in Eastern and Southern European countries are considerably lower than in Continental and Northern European countries.

In the case of an unemployment shock, which affects households asymmetrically, the difference between the EU and the US is larger. EU automatic stabilizers absorb 48% of the shock whereas the stabilization effect in the US is only 34%. Again, there is considerable heterogeneity within the EU.

These results suggest that social transfers, in particular the rather generous systems of unemployment insurance in Europe, play a key role for the stabilization of

disposable incomes and household demand and explain a large part of the difference in automatic stabilizers between Europe and the US. This is confirmed by the decomposition of stabilization effects in our analysis. In the case of the unemployment shocks, benefits alone absorb 19% of the shock in Europe compared to just 7% in the US, whereas the stabilizing effect of income taxes (taking into account State taxes in the US as well) is similar. This qualifies to some extent the view that the tax wedge is larger in Europe than in the US. This is only true when looking at the high tax countries like Belgium, Denmark, Finland, Germany or Sweden.

How does this cushioning of shocks translate into demand stabilization? Since demand stabilization can only be achieved for liquidity constrained households, the picture changes significantly. For the income shock, the cushioning effect of automatic stabilizers is now equal to 26% in the EU. For the US, we find a value of 19%, which is again rather similar. The value for the Euro area (24%) is close to the value for the EU. For the unemployment shock, however, we find a large difference. In the EU, the stabilization effect is equal to 35% whereas the value for the US (19%) is close to the value for the income shock.

Does this mean that the US economy is particularly vulnerable to the current economic crisis? To the extent that wages are more flexible than in Europe, one could hope that fewer jobs will be lost in the crisis, so that the proportional income scenario is more relevant. But US labor markets are also characterized by less employment protection, so that job losses occur more quickly. For instance, between April 2008 and April 2009, the US unemployment rate increased by 3.9 percentage points while the unemployment rate in the Euro area only increased by less than two percentage points. There is much less automatic stabilization of disposable incomes as well as household consumption demand than in Europe.

A second major result from our analysis is that demand stabilization differs considerably from disposable income stabilization. This has important policy implications, also for discretionary fiscal policy. As low income households are more likely to be liquidity constrained and have a higher propensity of spending an income increase, policies aimed at those households should lead to higher stabilizing effects. If liquidity constraints are low, reducing tax rates in order to tackle the crisis will not be successful in increasing aggregate demand (see also Shapiro and Slemrod (2009)). In this case, increasing government expenditure might me a more successful way of tackling the crisis.

A third important result of our analysis is that automatic stabilizers are very

heterogenous within Europe. Interestingly, Eastern and Southern European countries are characterized by rather low automatic stabilizers. This is surprising, at least from an insurance point of view because lower average income (and wealth) implies that households are more vulnerable to income shocks. One explanation for this finding could be that countries with lower per capita incomes tend to have smaller public sectors. From this perspective, weaker automatic stabilizers in Eastern and Southern European countries are a potentially unintended side effect of the lower demand for government activity including redistribution. Another potential explanation, the idea that more open economies have weaker automatic stabilizers because domestic demand spills over to other countries, seems to be inconsistent with the data, at least as far as the simple correlation between stabilization coefficients and trade to GDP ratios is concerned.

Finally, we have discussed the claim that countries with smaller automatic stabilizers have engaged in more discretionary fiscal policy action. According to our results, there is no correlation between fiscal stimulus programs of individual countries and stabilization coefficients. However, we find that more open countries and countries with higher budget deficits have passed smaller stimulus programs. All in all, our results suggest that policymakers did not take into account the forces of automatic stabilizers when designing active fiscal policy measures to tackle the current economic crisis.

These results have to be interpreted in the light of various limitations of our analysis. Firstly, the role of tax and transfer systems for stabilizing household demand, not just disposable income, is based on strong assumptions on the link between disposable income and household expenditures. Although we have used what we believe to be the best available method for estimating liquidity constraints, considerable uncertainty remains as to whether this method leads to an appropriate description of household behavior. Secondly, our analysis abstracts from automatic stabilization through other taxes, in particular consumption taxes, employer social insurance contributions and payroll taxes and corporate income taxes. Thirdly, we have abstracted from the role of labor supply or other behavioral adjustments for the impact of automatic stabilizers. We intend to pursue these issues in future research.

A Appendix:

A.1 Additional results

Table 3: Decomposition income scenario

	FEDTax	StateTax	SIC	BEN	TaxSicBen
AT	0.294	0.000	0.139	0.006	0.439
BE	0.382	0.000	0.131	0.014	0.527
DK	0.455	0.000	0.086	0.018	0.558
EE	0.228	0.000	0.021	0.004	0.253
FI	0.340	0.000	0.050	0.006	0.396
FR	0.153	0.000	0.181	0.036	0.370
GE	0.351	0.000	0.118	0.012	0.481
GR	0.203	0.000	0.088	0.000	0.291
HU	0.307	0.000	0.160	0.009	0.476
IR	0.310	0.000	0.039	0.014	0.363
IT	0.254	0.000	0.079	0.013	0.346
LU	0.265	0.000	0.097	0.012	0.374
NL	0.270	0.000	0.116	0.011	0.397
PL	0.168	0.000	0.118	0.015	0.301
PT	0.203	0.000	0.090	0.010	0.303
SI	0.289	0.000	0.031	0.028	0.317
SP	0.240	0.000	0.035	0.001	0.277
SW	0.368	0.000	0.040	0.012	0.420
UK	0.267	0.000	0.054	0.031	0.352
EU	0.260	0.000	0.100	0.017	0.378
EURO	0.263	0.000	0.108	0.015	0.385
USA	0.240	0.049	0.039	-0.006	0.322

Source: Own calculations based on EUROMOD and TAXSIM

Table 4: Decomposition unemployment scenario

	FEDTax	StateTax	SIC	BEN	TaxSicBen
AT	0.200	0.000	0.167	0.303	0.670
BE	0.257	0.000	0.124	0.276	0.657
DK	0.243	0.000	0.083	0.382	0.707
EE	0.178	0.000	0.022	-0.032	0.168
FI	0.224	0.000	0.050	0.267	0.541
FR	0.076	0.000	0.190	0.317	0.582
GE	0.231	0.000	0.145	0.268	0.645
GR	0.126	0.000	0.137	0.119	0.383
HU	0.227	0.000	0.190	0.047	0.464
IR	0.207	0.000	0.036	0.182	0.425
IT	0.183	0.000	0.101	0.076	0.359
LU	0.147	0.000	0.090	0.296	0.533
NL	0.103	0.000	0.131	0.239	0.472
PL	0.151	0.000	0.170	-0.027	0.295
PT	0.225	0.000	0.094	0.306	0.625
SI	0.175	0.000	0.216	0.054	0.425
SP	0.127	0.000	0.064	0.091	0.283
SW	0.197	0.000	0.029	0.458	0.685
UK	0.194	0.000	0.061	0.186	0.441
EU	0.172	0.000	0.121	0.189	0.482
EURO	0.166	0.000	0.129	0.210	0.504
USA	0.174	0.041	0.051	0.071	0.337

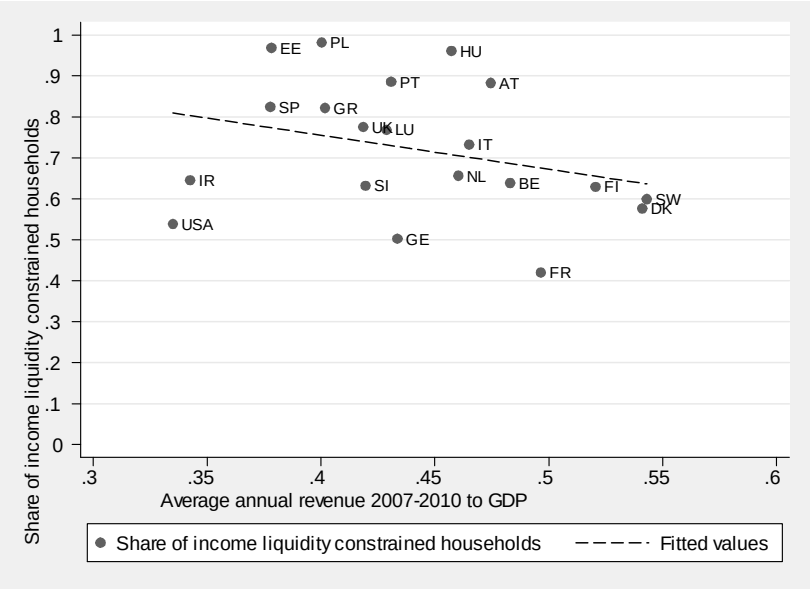
Source: Own calculations based on EUROMOD and TAXSIM

Table 5: Stabilization of aggregate demand

	Share liquidity constrained		Income shock		Unemployment shock	
	Population	Income	τ Demand	τ Income	τ Demand	τ Income
AT	0.750	0.408	0.172	0.439	0.396	0.670
BE	0.750	0.352	0.190	0.527	0.368	0.657
DK	0.750	0.387	0.205	0.558	0.392	0.707
EE	0.750	0.350	0.087	0.253	0.073	0.168
FI	0.750	0.364	0.136	0.396	0.314	0.541
FR	0.750	0.379	0.143	0.370	0.383	0.582
GE	0.750	0.374	0.172	0.481	0.366	0.645
GR	0.750	0.355	0.066	0.291	0.156	0.383
HU	0.750	0.322	0.120	0.476	0.151	0.464
IR	0.750	0.409	0.130	0.363	0.260	0.425
IT	0.750	0.372	0.116	0.346	0.139	0.359
LU	0.750	0.413	0.131	0.374	0.345	0.533
NL	0.750	0.467	0.168	0.397	0.283	0.472
PL	0.750	0.328	0.099	0.301	0.093	0.295
PT	0.750	0.371	0.083	0.303	0.216	0.625
SI	0.750	0.355	0.077	0.317	0.154	0.425
SP	0.750	0.408	0.091	0.277	0.147	0.283
SW	0.750	0.400	0.162	0.420	0.456	0.685
UK	0.750	0.388	0.133	0.352	0.260	0.441
EU	0.750	0.378	0.133	0.378	0.260	0.482
EURO	0.750	0.384	0.136	0.385	0.277	0.504
USA	0.750	0.310	0.089	0.322	0.128	0.337

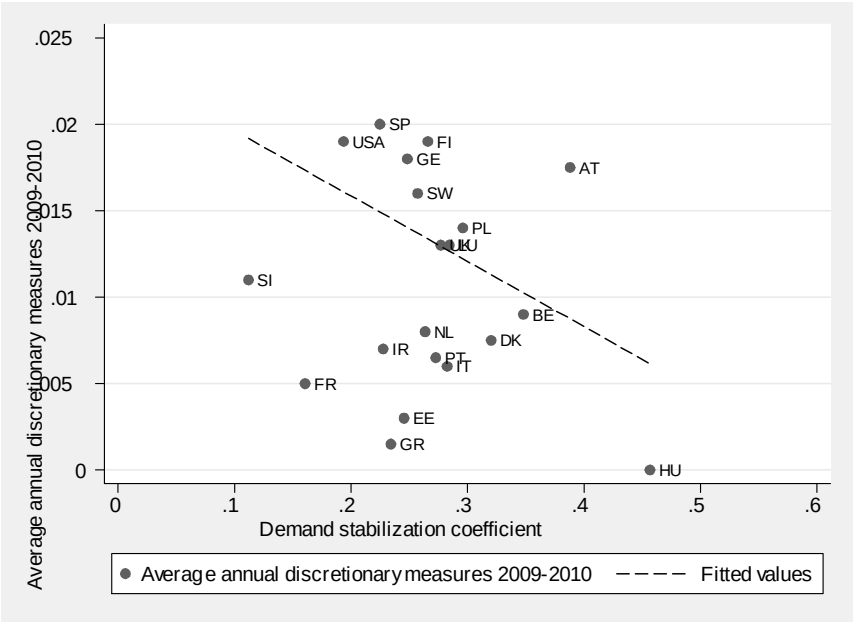
Source: Own calculations based on EUROMOD and TAXSIM. Note: Bottom 75% of gross income distribution are assumed to be liquidity constrained.

Figure 7: Income share of liquidity constrained households and government revenue



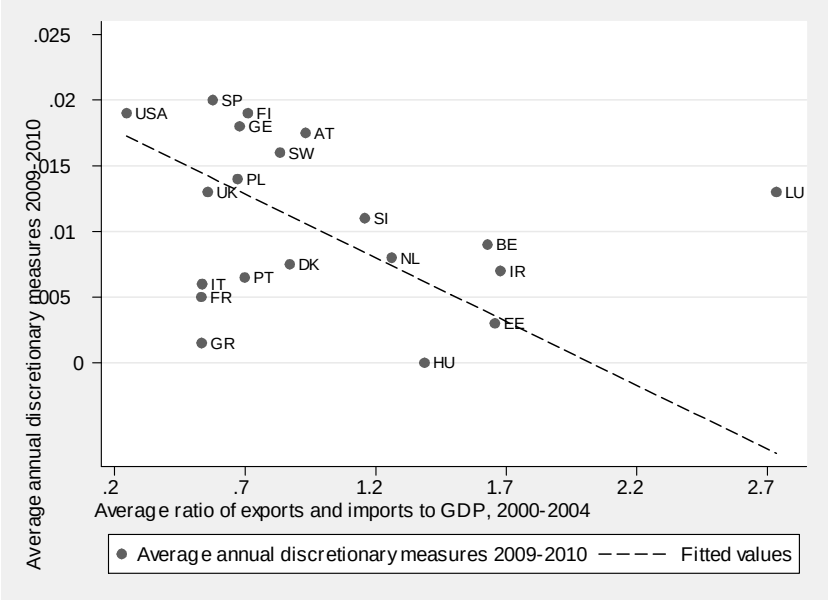
Source: Own calculations based on EUROMOD and TAXSIM, European Commission (2009a).

Figure 8: Discretionary measures and demand stabilization



Source: Own calculations based on EUROMOD and TAXSIM, European Commission (2009c), IMF (2009).

Figure 9: Discretionary measures and openness of the economy



Source: Heston et al. (2006), European Commission (2009c), International Labour Office and International Institute for Labour Studies (2009) and IMF (2009).

A.2 Reweighting procedure for increasing unemployment

In order to increase the unemployment rate while keeping the aggregate counts of other key individual and household characteristics constant, we follow the approach taken by Immvervoll et al. (2006). The increase of the unemployment rates is modeled through reweighting of our samples while controlling for several individual and household characteristics that determine the risk of becoming unemployed.

We follow Immvervoll et al. (2006) and define the unemployed as people aged 19–59 declaring themselves to be out of work and looking for a job. The within-database national 'unemployment rate' is calculated as the ratio of these unemployed to those in the labor force, defined as the unemployed plus people aged 19–59 who are (self)employed. The increased total number of unemployed people is calculated by adding 5 percentage points to the 'unemployment rate' within each country.

In EUROMOD, the baseline household weights supplied with the national databases have been calculated to adjust for sample design and/or differential non-response (see Sutherland (2001) for details). Weights are then recalculated using the existing weights as a starting point, but (a) using the increased (decreased) number of unemployed (employed) people as the control totals for them, and (b) also controlling for individual demographic and household composition variables using the existing grossed-up totals for these categories as control totals. The specific variables used as controls are:

- employment status
- age (0–18, 19–24, 25–49, 50–59, 60+)
- gender
- marital status and household size
- education
- region

This method implies that the households without any unemployed people that are similar to households with unemployed people (according to the above variables) will have their weights reduced. In other words, these are the households who are 'made unemployed' in our exercise.

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