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The Political Setting of Social Security Contributions in Europe in the Business Cycle^{*}

Abstract

Social security revenues are influenced by business cycle movements. In order to support the working of automatic stabilizers it would be necessary to calculate social insurance contribution rates independently from the state of the business cycle. This paper investigates whether European countries set social contribution rates according to such a rule. By means of VAR estimations, country-specific effects can be analyzed – in contrast to earlier studies which used a panel design. As a result, some countries under investigation seem to vary their social contribution rates in a procyclical way.

Keywords: welfare state, procyclical policy, automatic stabilizers, social insurance, fiscal policy, European Union, business cycle

JEL classification: E62, H53, H55, H75, J32

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Die Anpassung der Sozialversicherungsbeiträge in Europa im Konjunkturzyklus

Zusammenfassung

Die Einnahmen der Sozialversicherung unterliegen dem Einfluss des Konjunkturzyklus. Soll die Beitragserhebung der Sozialversicherung nicht prozyklisch schwanken, muss die Höhe der Beitragssätze zyklusübergreifend festgelegt werden. Diese Arbeit geht der Frage nach, ob die Änderungen der Beitragssätze zur Sozialversicherung in europäischen Ländern diesem Grundsatz folgen oder im Gegensatz dazu in Abhängigkeit von der jeweils aktuellen Wirtschaftslage festgelegt werden. Mit Hilfe von VAR-Schätzungen werden dabei – anders als in bisherigen Panel-Studien – die Zusammenhänge länderspezifisch erforscht. Ergebnis der Studie ist, dass einige Länder ihre Sozialversicherungsbeiträge prozyklisch anpassen.

Schlagwörter: Sozialstaat, Konjunkturpolitik, automatische Stabilisatoren, Sozialversicherung, Finanzpolitik, Europäische Union, Konjunkturzyklus

JEL-Klassifikation: E62, H53, H55, H75, J32

1 Introduction

In this contribution we discuss an aspect of the interaction between business cycle fluctuations and the social insurance system in Europe. Our starting point is the observation that GDP growth correlates negatively with cyclical ups and downs of social security contribution rates for a considerable fraction of European states.¹ Moreover, recently the introduction of a European Unemployment Insurance Scheme has been proposed to strengthen automatic stabilizers at the European level. Dullien and Schwarzer (2009) argue that such a scheme of stabilization policy should be placed at the European level since the member states lack the incentive for counter-cyclical behaviour. Thus, it is interesting to see whether procyclical policy is present in this policy domain, given the national responsibility for stabilization policy.

Since the expenditures for pensions and health care services are predominantly independent from business cycle fluctuations, the ups and downs of economic activity lead to analogous budget imbalances of the social insurance system. Furthermore, in times of an economic downturn the unemployment insurance system suffers from an increase in expenditure, reinforcing cyclical fluctuations of the budget balance of the social insurance system (as far as unemployment benefits are financed by social insurance contributions).

If the social security contributions were calculated to finance simultaneous expenditures, it would be necessary to raise contributions in economic downturns and to cut them in economic good times. Such a policy would necessitate frequent changes of the contribution rates, amplifying the intensity of business cycle fluctuations since it implies a contribution rise just during the downturn.²

In order to avoid such pro-cyclical effects it is necessary to calculate social security contribution rates according to medium term financial flows. As a consequence, the social insurance system has to generate surpluses in good times in order to finance deficits during the next economic crisis. In this way the social insurance system even acts as an automatic stabilizer of the economy since unemployment benefits strengthen the purchasing power of people losing their jobs. The automatically

¹ Annual changes of social contribution and lagged GDP growth show a contemporaneous and significant correlation on the 5% level for 6 out of 30 EU and European Free Trade Association (EFTA) countries – which seems high, bearing in mind that the median n is 17 only.

² In the VAR estimations of section 2 it turned out for many EU member states that variations of the social contribution rate had a significantly negative impact on the output gap.

stabilizing effect requires the system of taxes, social contributions and social benefits remaining unchanged during the entire business cycle. This precondition is violated when the government behaves in a procyclical manner, e.g. by raising social security contributions or taxes in times of economic crisis in order to balance the budget.

Such a policy requires a lot of political discipline. For politicians it might be tempting to use surpluses in good times for contribution cuts or an increase in expenditures. And in bad times it might be easy for politicians to raise social insurance contributions, arguing that everybody has to bear a part of the burden. In this paper we test whether the European governments resist the temptation to change social insurance contributions in line with business cycle fluctuations.

Until now the literature concerning the role of fiscal policy as an automatic stabilizer concentrates mostly on the stabilizing effect of the aggregate fiscal stance on the business cycle. Some authors calculate changes in structural budget balances which may reinforce or counteract the effect of automatic stabilizers, for instance Noord (2000) and Gali and Perotti (2003). They use the total fiscal balances to evaluate whether and in what direction discretionary fiscal decisions react to the swings of business cycles. Turrini (2008) analyzes revenues and expenditures separately. In his analysis the European governments change cyclically adjusted revenues in a counter-cyclical manner whereas public expenditures follow a procyclical pattern. In economic good times the procyclical behaviour of expenditure is so strong that the budget balance as a whole shows a procyclical reaction on the output gap.

Generally, the above-mentioned branch of literature does not cover our specific area of interest, namely the setting of social insurance contribution rates in the business cycle. To our knowledge, the most differentiated analysis of the cyclical behaviour of components of the governments' budgets is the study of Agnello and Cimadomo (2009). These authors investigate the effects of business cycle fluctuations on different kinds of government revenues. The result of an unbalanced panel analysis, covering 27 EU countries in the time between 1998 and 2008, is a strongly procyclical response of legislated changes of income taxes and social contributions to the business cycle. The panel design of the study does however not allow analyzing country-specific effects.

In this paper we examine some aspects more precisely which Agnello and Cimadomo (2009) do not investigate in depth. By means of applying a vector autoregressive (VAR) model we take time-lags of policy reaction into account and analyze the time

structure of reactions on output variations. Furthermore our analysis differentiates between countries and measures country-specific differences in the reaction of policymakers to business cycle fluctuations.

The text is structured as follows. In section 2 we present our econometric method and give a short overview of our results. In section 3 we discuss the economic implications of our findings.

2 Econometric Implementation and Results

For our empirical investigations we have chosen to make use of VAR estimations. More specifically, we perform subset model VAR estimations. We decided against panel data estimation as the welfare state finance in the EU is diverse and possibly reacts differently to the cycle depending on the institutional setup. The reason for choosing the VAR estimation method is thus that we can give an overview how European welfare states operate differently in the cycle. Furthermore, by this means it is easy to control for endogeneity issues as repercussions from one variable to the other are generally possible. Thus, our econometric estimation is based on a bivariate vector $x_t = (s_t, y_t)'$ autoregressive process of a social contribution rate variable (s_t) and a business cycle variable (y_t):

$$x_t = \begin{pmatrix} c_1 \\ c_2 \end{pmatrix} + \sum_{i=1}^k A_i x_{t-i} + u_t, \quad u_t \sim N(\Sigma_u, 0), \quad (1)$$

where c_1 and c_2 are the constants, A_i represent the autoregressive matrices and u_t are the stochastic innovations, which are assumed to be IID.

We did not use a measure for the output gap as the business cycle variable y_t . There are two reasons for this. First, model-based output gap data from the EU commission is only available from 1980 onwards which would lead to a significant decrease of the number of observations. Second, if the output gap is calculated with a Hodrick-Prescott filter, for example, observations would have to be cut on the brink due to a possible bias. Thus, we used GDP growth as the business cycle variable.

Total social security contribution rates s_t are calculated by dividing the government's revenue of social security contributions by the total employees' compensation of the whole economy. This measure rests on the assumption that total social contributions

have elasticity with respect to changes in total employees' compensation of 1. Strictly speaking, this assumption is only true under the condition that social contributions are raised without a contribution assessment ceiling as well as without progressive contribution rates. It might be approximately true insofar as variations of total employees' compensation are driven by variations in employment rather than wages per worker. This is at least partly characteristic for swings during the business cycles.³ A comparison of our calculated contribution rates with the statutory total contribution rates for Germany reveals a strong and significant positive correlation. Thus, the calculated contribution rates seem to be a good approximation of the politically determined contribution rates.

Annual data for social contributions, total wages and the real GDP of EU and EFTA members were taken from the AMECO database of the European Commission and start at various dates. We used the time series for total social contributions and the total wage bill (including social contributions) to calculate an average social contribution rate of wages. Generally, the time series for social contribution rates are shorter than the GDP series thus ranging from only $n=28$ in Italy to $n=46$ in Norway. We use only data for countries with n close to 30 or above as shorter time series might be subject to substantial small sample bias.⁴ The considered time spans begin between the 1960's and the 1980's and end in any case in 2008. They encompass between three and five business cycles, depending on the time span and the country.

As a consequence, we do not consider Central and Eastern European Countries in our investigation. We include linked series for Germany in our estimation (annual data for West Germany until 1991 and for reunified Germany from 1992 on), bearing in mind that at the time of reunification West German institutions were simply expanded to East Germany. Thus, it is reasonable to assume that the institutional behaviour remained the same in reunified Germany as in West Germany before reunification.

As a first step we took a closer look on the data to detect possible outliers. We found that some time series of the social contributions show substantial variations. In some countries social contribution rates show a considerable volatility (e.g. in the

³ For example, Knoppik and Beissinger (2009) find evidence for downward nominal wage rigidity in of varying degree in many EU member states.

⁴ The small sample bias in time series estimations has been known since long time, see Quenouille (1949), for the VAR case references are given in Kilian (1998). To control for the effects of small sample bias we additionally performed simulations for some parameter scenarios, see below.

Netherlands or Finland), in other countries they remain relatively constant over time (e.g. in Austria and the United Kingdom). In France and Italy contribution rates were cut by 4 percentage points in 1998, whereas these countries hold their contribution rates relatively constant otherwise. These outliers might reflect structural reforms like privatization of certain social expenditure items and thus do not stand for the typical cyclical changes of social contribution rates. However, also structural reforms could be the result of high cyclical pressures and therefore we have decided not to drop these observations but to truncate values in cases where the requirement of normally distributed residuals is violated. Eventually we have truncated only three observations (Portugal 1986, France and Italy 1998) at the level of 2 percentage points. Additionally, time series were also tested for unit roots which we could not detect on the 10% probability error level.⁵

The next step is the selection of the proper lag length. As the maximum lag length we have chosen 2 as we deem longer-lasting direct effects of the business cycle on the setting of social contribution rates implausible. Thus, we assume that a business cycle impulse has a direct effect on the setting of social insurance contribution rates after two years, the latest.

In order to choose the number of lags we have decided for the Hannan-Quinn Criterion (HQ) as this seems to be the criterion most suitable for our data with a low number of observations. Lütkepohl (2005: 153pp.) shows simulation results for $n=30$ which suggest that other lag length criteria like the Schwarz Criterion (SC), the Akaike information Criterion (AIC) and the Final Prediction Error Criterion (FPE) perform worse under these conditions as they either systematically underestimate the lag length (SC) or have a slightly worse normalized average squared forecast error, which results from overfitting especially in the case of the FPE and AIC.⁶ For three of our eleven countries - Denmark, France, and Italy - the calculated optimal lag length is zero. Thus, we conclude that these countries do not show any significant correlation between economic growth and social contribution rates. For these three countries we do not perform the following VAR estimation.

⁵ Fisher ADF Statistics for the model with intercept are listed in Table 1. These however have to be interpreted cautiously because of a relatively low n (more so in the case of the social contribution rates than for GDP for which there is an n of 48 across the board). The same applies for the other diagnostic statistics.

⁶ Underfitting is a problem for consistency of estimates. Overfitting might easily result in excluding countries because of too many estimated coefficients as compared to the number of observations. The choice of the HQ criterion for our paper is thus pragmatic.

For the remaining eight countries we performed subset model VAR estimations following the system testing method. In this estimation procedure variables with low t-statistics (less than 2 in our case) in the first round of VAR estimations are restricted to zero in a subsequent VAR estimation.⁷ Following this approach, in four countries the lagged GDP variable was dropped due to missing significance. We conclude that also in these countries social contribution rates are set in a non-cyclical way. However, the remaining four countries reveal a significant procyclical effect of lagged GDP growth on social contribution rates (see Table 1). Thus, in about one third of the chosen countries the social contributions react significantly negative to an upswing of the business cycle and vice versa. This happens to be the case in Germany, Finland, the Netherlands and the United Kingdom.

Table 1: Results of subset VAR estimations for social contribution rates, SOC: social insurance contribution rate, CYC: GDP growth rate
 ***/**/*: 1%/5%/10% level of significance

Country	n	Fisher ADF unit root test p value d(SOC)	unit p value CYC	HQ Crit. optimal lag	Reaction to cycle (1 lag)	Jarque- Bera p value	Porteman- teau p value (2 lags)
Austria	32	0.06	0.00	1		0.50	0.94
Belgium	38	0.01	0.00	1		0.90	0.27
Denmark	37	0.00	0.00	0			
Finland	33	0.02	0.01	2	−0.21***	0.74	0.29
France	30	0.00	0.02	0			
Germany	38	0.02	0.00	2	−0.16***	0.78	0.53
Italy	28	0.00	0.00	0			
Netherlands	39	0.00	0.01	1	−0.33**	0.89	0.95
Norway	46	0.01	0.01	1		0.21	0.50
Portugal	31	0.00	0.01	1		0.10	0.17
UK	31	0.01	0.00	1	−0.11***	0.27	0.06

Table 1 shows the results of both the HQ-calculation of the proper lag length and the results of the subset VAR models concerning the effect of the lagged business cycle variable on social contribution rates. In the table we omit the coefficients of other variables and the constants since they do not matter for our question. For three countries we conclude a non-cyclical setting of social insurance rates due to an optimal lag length of zero, for further four countries we find a non-cyclical behaviour in the subset model selection. We also report p values for the test statistics of the Jarque-Bera test for normality and of the Portmanteau test for autocorrelation of

⁷ See Lütkepohl (2004: 123pp.).

the residuals. In any case the Null hypotheses, i.e. normally-distributed and not auto-correlated residuals, cannot be rejected on the 5% level.

The results of these estimations do not differ qualitatively from unrestricted VAR estimations in our case, however subset model estimations are proposed in the literature to avoid biased estimates.⁸ Additionally we also checked for the potential small sample bias under our data characteristics as there are only few studies covering small sample properties of VAR estimations.⁹ Small sample bias seems to be a minor problem with the given data characteristics as the results described in Annex A1 indicate.

3 Interpretation of Results

Procyclical variations of social security contribution rates are not a predominant feature of social policy in Europe. In the majority of the countries investigated in this paper we could not find a significant reaction of contribution rates to business cycle fluctuations. Most governments seem to calculate social contribution rates independently from the current economic situation and in accordance with the trend of economic growth. As far as contribution rates are concerned the social insurance system can play its role as an automatic stabilizer of the business cycle in the majority of countries. Thus, generally speaking our results give only limited support for a European centralization of this type of automatic stabilizers.

But there are some remarkable exceptions. In four countries we find a procyclical behaviour of contribution rates. These are Finland, Germany, the Netherlands, and the United Kingdom. It is hard to find a common characteristic of these countries that can explain their procyclical behaviour in this special field of revenue policy.

One could think that small open and export-oriented economies might be inclined to reduce contribution rates under any circumstance since this strengthens their competitiveness whereas export markets are not affected by rising costs. Since they are interested in export markets they neglect the automatic stabilizing effect of the domestic social insurance system. One could argue that even Germany complies with this rule since it follows also an export-oriented strategy. However, the United

⁸ See Breitung (2004:p. 179).

⁹ See Kilian (1998).

Kingdom does not conform to this explanation. And on the other hand there are a number of small open economies which do not show this behaviour.

Lastly, we do not find any significant evidence for counter-cyclical adjustments of social contribution rates. While contribution rates are in the majority of countries not adjusted in a way that boosts the ups and downs of the business cycle, they are also nowhere used as an instrument of counter-cyclical fiscal policy.

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Annex A1

In order to check for possible small sample bias we estimated unrestricted VARs of simulated ideal types of the data generating process. For the selection of ideal types we used our estimated parameters from the subset models from Table 1. Firstly, median parameters of the 6 countries with a chosen lag length of 1 were used together with the median of sample standard deviations of the underlying time series to simulate a VAR process with median time series length (for the 6 countries: 38) 1000 times. Subsequently, the generated time series were estimated with a VAR of order 1 (the lag length selection was not subject to simulation).

The median of the estimated parameters for the influence of growth on the social contribution rate of the 6 countries with a VAR lag 1 from Table 1 is 0. Thus, the simulated time series should not reveal procyclical behaviour. As a result of the VAR estimations it turned out, that the median of the estimated parameter for the influence of growth on the social contribution rate was indeed 0. Furthermore, the t-Statistic of this parameter was in support of significance in 6% of simulated cases only.

As a second step, we slightly modified the simulation by inserting the average parameter for the influence of growth on the social contribution rate in the Netherlands and the United Kingdom. This is an interesting ideal type as these countries with a 1 lag VAR showed a significant reaction in our subset model estimations of Table 1. The median of our parameter of interest is now downward biased by 0.7% of the parameter value (-0.20) which we used for the simulation. However, in 96% of the simulated cases the t-Statistic was in support of a significance of this parameter.

As a third ideal type we averaged the countries with a chosen VAR lag length of 2 from Table 1 (Finland and Germany). The simulations and subsequent estimations revealed that the median parameter of the reaction of growth on the social contribution rate was upwards biased by 0.1%. In all simulated cases the t-Statistic was in support of a significance of this parameter. However, as both countries, which were used for the construction of ideal type 3, showed a significant reaction of growth on the social contribution rate, we also did a simulation with a 0 value of this parameter in order to judge whether a biased parameter estimate could lead to a seemingly procyclical policy judgement under these circumstances. The median estimated parameter in this model was 0 and in 5% of cases the t-Statistic was in support of a significant

procyclical policy. Thus, the results of Table 1 can be interpreted in the usual careful way as the small sample bias does not seem to lead to large shifts of the parameter of interest and its significance level.