Abstract

Introduction

The rise of the welfare state throughout the industrialised countries in the middle of the twentieth century was justified by social security and an improvement of living standards. Since then, government spending has continued to rise. Even in the 80’s and 90’s when a renewed conservatism unsuccessfully tried to limit social spending. Increasing government spending and redistribution seems to be an unstoppable tide. But will this continue? The likely answer is no!

Instead it is relevant to ask which factors will set a limits to social spending.

With improved living standards, comes increasing life expediency and thus more people relying on the generosity of government spending without participant in the production in the economy.

Lindert has famously argued that demography (the ratio of people over 65 to people in the working age) will set the limit to social spending – while controlling for rising deadweight costs due to higher taxation to finance increasing redistribution. Lindert focus was on demography versus deadweight costs from taxation thus excluding another very important factor limiting social spending. That factor is informality.

The aim of this paper is to shed light on the subject of limits to social spending by expanding the framework developed by Lindert to also including informality in the economy.

1. What effects social spending?

Social spending can be measured in numerous ways. In this paper, spending (measured in USD in constant 2005-prices) per capita will be used and we differ between social spending and non-social spending. Education will be included independently. Social spending will be divided into the subcategories pensions, health, welfare and unemployment. Non-social spending is defined as the residual between all spending and the sum of social spending and education. In order to compare across countries, the different types of spending are divided with the total population[[1]](#footnote-1) thus creating variables containing spending pr. capita.

To investigate the limit of social spending, the following competing theories are explained and the validity is explored: deadweight cost of taxation, informality in the economy and demography.

* 1. Burden of taxation: there ain’t no such thing a free lunch.

In economic theory, it is a general assumption that taxes are distortionary, and that taxes and transfers reduces productivity. It is straight forward to argue, that the limits to social spending is set by rising marginal deadweight costs of the redistributive welfare state: increasing taxation needed to finance the redistributive welfare state will choke of either the ability or the willingness to raise taxes and spending. Since the days of Adam Smith, warnings have been made, that costs rise on two fronts and distort labour-leisure choices both for the taxes and the subsidized – the welfare state creates its own limit.

It is not straightforward to measure the degree of distortion due to taxes and transfers. However, heavy distortionary due to taxes and transfers are ought to be visible through a negative effect on income.

* 1. Effect of informality

Taxes affects labour-leisure choices, but it also stimulates labour supply in the informal economy, here defined as the untaxed part of the economy. It has been argued that the main cause to the increase of the informal economy is to the rise of taxation and social security (Williams, Schneider, 2013). The argument is straight forward: as taxes are distortionary, the higher the tax rates, the more distortion and the bigger a shadow economy.

Others have argued that firms are willing to be taxed at reasonable rates, but unwilling to put up with over-regulation and corruption, and thus explaining the rise of the informal economy and decline of government revenue by poorly managed tax systems (Friedman, E. et al, 2000, La Porta et al, 1999).

No matter the reason, a rise in the share of the informal economy will by all likelihood decrease government revenue, especially the part of government revenue generated by income and profit taxation. This might result in a vicious circle where tax rates on the formal economy are increased to keep funding the public provision of goods – often combined with a decline in quality goods provided by the public sector and poor administration – with the consequence of additional growth in the informal economy (Enste, Schneider, 2000).

Following this line of argument is straightforward to argue that, informality will affect all government spending negatively. A high degree of informality might make it difficult to obtain a high level of government spending, as the share of people paying taxes and thus funding the welfare state is low.

* 1. Demography

An important factor for society’s priorities and government expenditure are the age distribution of the population. As the population grow older, the politics of social spending shift in favour of the policies catering to the needs of the elderly: health, pensions and welfare programs. The welfare state has been growing rapidly since life expectancy began to accelerate in the late nineteenth century (Lindert, 2004). The effects from an ageing population on social spending are twofold: when numbers of entitle recipient increase, the share of GDP spent on their support will rise even with unchanged policies. However, observing historical numbers shows that between the 1880 and the 1930 transfer per old person has increased. (Lindert, 2004). This gives reason to believe that an older population tips political and social sentiment in favour of granting security and income. The older the population (or median voter), the more the concern of the elderly will mobilize the old and middling age through the political system. However, as retirees becomes to numerous social spending catering to this group becomes very costly. Pensions are generally still financed through a pay-as-you-system and protest from the working adults would eventually stop the rise of pension benefits and thus the generosity of the programs will start to decrease. This implies, that the effect from the age distribution of the population could have non-linear effect on social spending.

1. Setting up the models

2.1. Variable selection

The two competing models, deadweight costs and age distribution, are well-developed. Both explanatory and control variables are chosen based on past literature and only a brief introduction to the setup is necessary. A short discussion on how to include a measure of informality in the analysis will be provided.

*Deadweight-cost* theories predict as mentioned that spending on various social programs are expected to have a negative effect on income in the economy, but government spending on investment in human capital (education) and infrastructure (non-social spending) are on the other hand likely to have a positive effect on income. Different types of government spending should then enter separately in the model. Income will be measured as the natural logarithm to GDP pr. capita measured in USD dollar in 2005 prices.

When investigating the theory of rising deadweight costs as a limit to social spending, it is essential to control for other factors effecting income-level. These factors include initial income-level, globalization, investment in real (and human) capital and whether or not national institutions are negotiating pay, employment and fiscal policies among organized representatives of labour, business and government.

Looking at the effect from *age-distribution* on social spending, it is obvious that various variables for the development of the demography should enter in the analysis: the ratio of young people (0-19), school\_age (5-19) and old (65 +) to people in the working age (20-64). Moreover, the ratio of young\_adult (20-39) to working adults over 39 should also enter. As mentioned earlier, the relationship between demography and social spending might as well be non-linear, and the squared term will also enter in the analysis. This give the variables the change to show that the effects either accelerates or reverse itself as age distribution continues to change. If a reversal is predicted by the data, at least a partial answer to the question of the limits arise.

Choosing control variables are based on literature that have argued that income level, income distribution and a number of political factors also affects social spending. It is often found, that higher average income raises both the level of government spending and the share of national income (Lindert, 1996). There is not consensus to why these “development” effects arise. Some argues positively that high income allows for social insurance, whereas other pessimistically argues that development and high income creates the need for insurance. No matter the reason, it is predicted that both total and share of government spending should rise with average income. Another interesting income-variable when trying to predict social spending is income distribution**,** especially the significance of the median-voter. The central question here is which group the median voter sympathizes with: the poor or the rich? The closer to the poor, the median voter feel, the more the median voter will favour redistribution and egalitarian spending. On other hand, if the median voter feels closer to the rich they will vote against taxation. (Meltzer and Richard, 1981 cited in Lindert, 1994).

Turning to political factors, the most relevant electoral variables for the period of interest are voter turnout and executive turnover. Both these variable might have a positive effect on redistribution and social spending. As voter turnout generally are more elastic among lower income voters, a high turnout tends to favour redistribution. Executive turnover is thought to be a measure of political stability, and fast turnover may raise spending.

Additional to these variables, this paper extents control variables to also including labour force participation for males. This variable is used as a proxy variable, in order to measure the degree of informality in the economy. Earlier studies have used the difference between the official and actual labour force (cited in Williams, Schneider, 2013). The weakness of this method is that the difference in the labour force may have other causes (i.e. norms for whether or not women are participating on the labour market). Moreover, people can work both the formal and the informal economy. As males still are the primary breadwinner, only using male labour force participation might be a better indicator for the size of the informal economy.

This variable will only enter as a control variable when explaining social spending and not when investigating the effect of rising deadweight costs on the income growth.

Some has argued that a big informal sector might dampen economic growth, as there might be a negative relationship between informality and investment in public infrastructure (Loayza, 1996). These findings are widely discussed, as it builds on the assumption that public investment in infrastructure is necessary to develop production technology and the data set only contains Latin American countries with poor institutions (Schneider et al p. 13, 2000), so the negative relationship might not be due to causality between informality and growth.

Controlling for the effect of these factors, the two competing theories can now be tested against each other to find the limit of social spending.

2.2. Data selection

The data set includes 31 OECD member states from the period from 1980 to 2011. This also includes 5 countries that used to be under Soviet control (Poland, Estonia, Slovak Republic, Slovenia and the Czech Republic). Data from these countries are unavailable for many variables before the beginning of the 90’s. Data from Chile, Israel, Mexico and Korea are also missing in the beginning of the period. This implies an unbalanced panel data set. The data is extracted from OECD.Stat when possible to ensure consistency in definitions, but supplemented by data from the World Bank and from Penn World data. Data sources and definitions are elaborated in the appendix.

2.3. Model selection

Working with a panel data set containing observations for each country and year, the error terms are likely to contain both international heteroscedasticity and serial correlation. To deal with serial correlation a 4-year average[[2]](#footnote-2) is calculated for all variables. As social spending will be effected by business cycles, averages over a time period removes some of these fluctuations. Thus, the data set contains 234 observations containing 4-year average of 31 countries rather than 934 observations containing annual observation for the same 31 countries.

International heteroscedasticity arises from the likely issue of some national differences that are not included, which will lead to omitted variable bias if random effect isn’t applied on the data.

2.2.1. Random effects

The observed national differences are called *c* and we are would like to hold this effect constant when obtaining partial effects of the observable explanatory variables. We suppose that these national effects are time constant and unobservable.

This panel data set contains both a cross-sectional and a time dimension. For any economic analysis of the data, we cannot assume that the observations across countries are independently distributed across time. Any national propensity toward one social program or national tax moral that effects social spending in the 80’s will most likely also affect the social spending in the 90’s. Within the sample there are big differences across countries.

Denmark and Switzerland are two countries that looks very similar in terms of income, population size and age distribution, but varies greatly when looking at the level of social spending. This is a strong argument for using random effect, as it gives us reason to believe that national differences play an important role in determining social spending. A requirement for using random effect is that the country specific error terms should be uncorrelated with each explanatory factor (Wooldridge, chp. 14). This is a rather strict assumption and requires good control in the equation. That fact that, some variables might not be available, can lead to omitted variable bias. Another drawback to using random effect, is that the interpretation of the coefficients is tricky, as they include both within-country effects and between-country effects. In the case of time series cross sectional data represents the average effect of the explanatory variable on social spending when the explanatory variable changes across time and between country by one unit. (Princeton, pp)

An alternative approach is using a fixed effect estimator, which would allow to assess the net effect from the predictors on social spending. This means, that we would estimate a parameter for each country. However, arguing that these country-specific really are uncorrelated with the explanatory variables, trying to remove these country specific effect would lead to inefficient estimators. (Wooldridge, chp. 14)

We can write our random effect model for each of the eight types of spending:

Where c\_i are the unobserved country specific heterogeneity and u\_it are the idiosyncratic errors and these changes across time as well as country. p = pensions, welfare, unemployment, education, non-social, health, all expenditure, social expenditure. i=country, t=time. x= explanatory variables briefly discussed above and presented in table 1.

By definition

Assuming that the error is uncorrelated with all explanatory variables in all time periods is a strict exogeneity assumption on the regressors. 10.8, 10.9 and 10.10 I voksen-wooldrigde

The key assumption here is that the unobserved country specific effect a\_i is uncorrelated with all explanatory variable in all time periods:

The ideal random effects assumption includes all fixed effect assumptions plus the additional requirement that a\_i is independent of the explanatory variables in all periods. (Wooldridge, chp. 14, assumption). These assumptions are presented in the appendix???

Testing for the presence of unobserved effect: Breusch Pagan Lagrange Multiplier test gives support to using random effect. The H\_0 is that variance across countries is zero and running the test in Stata gives the following results:

Tabel x:

Using the same line of argument, where national differences might be due differences in propensity toward one program, the model for the rising costs of social spending are:

The programs enter in quadratic form as the distortionary effect from taxes should be allowed to enter non-linear.

2.2.2. Shortcomings

Looking at the equation (1)-(8) and (10) it is clear that we are implicitly assuming that income and social spending are chosen simultaneous (jointly determined). As argued earlier, the extension of the welfare state financed by higher taxation, is distortionary and has negative effect on income. On the other hand, richer countries tend to have more redistribution. This implies that social spending is correlated with the error term in equation (10) or/and that income is correlated with the error term in equation (1) - (8), which will lead to simultaneity bias. (direction) Thus, there are reasons to explore simultaneous relations between income level and social spending.

A drawback to panel data are cross-country dependency (i.e. correlation between countries)

1. Presentation of results

The results from the panel regression are presented in Table 1 and Table 2.

3.1. Determinant of social spending

In each row the effect from one independent variable on the types of spending are presented. These effects will be reviewed:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| TABLE 1: | All gov't exp | | Nonsocial exp | | Social exp | | Pensions | | Welfare | | Unemployment | | Education | | Health | |
| VARIABLES | Coefficient | pval | Coefficient | pval | Coefficient | pval | Coefficient | pval | Coefficient | pval | Coefficient | pval | Coefficient | pval | Coefficient | pval |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ln(GDP/capita) | 0.893 | (0.142) | -4.237 | (0.327) | 5.653 | (0.193) | 0.592 | (0.377) | 4.576\* | (0.0699) | -0.766 | (0.795) | -1.544 | (0.308) | 0.547 | (0.385) |
| sqaured | 0.0747 | (0.376) | -0.0691 | (0.905) | 0.222 | (0.705) | -0.00137 | (0.988) | 0.413 | (0.216) | -0.215 | (0.580) | -0.345\* | (0.0774) | -0.0575 | (0.498) |
| Young adults (20-39) | -0.946 | (0.268) | 9.470 | (0.255) | -9.871 | (0.242) | 0.635 | (0.427) | -5.262 | (0.351) | -5.250 | (0.113) | -2.967\*\* | (0.0166) | -0.589 | (0.674) |
| squared | 0.304 | (0.456) | -5.911 | (0.181) | 5.944 | (0.184) | -0.263 | (0.498) | 3.023 | (0.312) | 3.264\*\* | (0.0466) | 1.434\*\* | (0.0186) | 0.175 | (0.810) |
| School age (5-19) | -1.112 | (0.405) | -1.653 | (0.826) | -0.356 | (0.964) | 2.173 | (0.207) | -8.075\*\* | (0.0232) | -1.955 | (0.719) | 1.675 | (0.243) | 7.295\*\*\* | (0.00163) |
| squared | 2.935 | (0.130) | 8.270 | (0.468) | -5.077 | (0.677) | -8.138\*\*\* | (0.00304) | 14.73\*\*\* | (0.00790) | 3.793 | (0.559) | -1.607 | (0.408) | -16.44\*\*\* | (0.000247) |
| Over 65’s | 8.938\*\* | (0.0221) | -80.73\* | (0.0669) | 85.65\* | (0.0549) | 14.76\*\* | (0.0277) | 44.63 | (0.217) | 37.28\*\* | (0.0412) | 13.78\* | (0.0715) | 4.439 | (0.583) |
| squared | -15.90\*\* | (0.0362) | 144.5\* | (0.0816) | -152.0\* | (0.0699) | -23.18\* | (0.0623) | -81.77 | (0.235) | -65.16\* | (0.0596) | -27.79\* | (0.0528) | -6.857 | (0.657) |
| Executive turnover | -0.00692 | (0.533) | -0.115 | (0.341) | 0.126 | (0.306) | -0.00940 | (0.295) | 0.0826 | (0.350) | 0.0435 | (0.293) | -0.00199 | (0.843) | -0.00977 | (0.326) |
| Voter turnout | 0.538\* | (0.0816) | 1.540 | (0.350) | -1.051 | (0.547) | -0.0842 | (0.799) | -0.787 | (0.308) | -0.503 | (0.687) | -0.433 | (0.169) | -0.360 | (0.221) |
| Inequality | -0.394\*\*\* | (0.00242) | 2.807\*\*\* | (3.84e-05) | -3.010\*\*\* | (6.54e-06) | -0.291\*\* | (0.0153) | -1.696\*\*\* | (1.93e-05) | -0.965\*\* | (0.0274) | -0.241 | (0.164) | -0.136 | (0.188) |
| Male labour force participation | 0.179\*\*\* | (0.00141) | 0.134 | (0.635) | 0.0474 | (0.881) | -0.0553 | (0.398) | 0.0388 | (0.798) | -0.0255 | (0.891) | 0.0542 | (0.450) | 0.101\* | (0.0649) |
| - squared | -0.00193\*\*\* | (0.000463) | -0.00154 | (0.599) | -0.000372 | (0.909) | 0.000507 | (0.418) | -0.000523 | (0.740) | 0.000541 | (0.776) | -0.000720 | (0.391) | -0.000964\* | (0.0806) |
| Constant | -1.741 | (0.282) | -45.26\*\*\* | (1.89e-10) | 44.24\*\*\* | (5.79e-09) | 9.485\*\*\* | (1.73e-05) | 17.94\*\*\* | (0.000265) | 4.849 | (0.409) | -3.737\* | (0.0627) | 7.085\*\*\* | (6.91e-06) |

Income effects, summarized in the first two rows, shows up only faintly. Spending on welfare programs are the only program where the income effect is significant – and only on a 10 pct. significance level. This implies zero (or small positive) effect from higher living standard on the size of the welfare state in general.

The effects from age distribution are reported in the next six rows. Age distribution plays several roles, each of which is quite easy to interpreter. The older the population, the more it takes from taxpayers to government spending, other things equal. Table 1 says to in serval ways. Each equation contains quadratic terms, to allow for either acceleration or reversal in the effects of each age-group share on social spending. The strongest effects are:

|  |  |  |
| --- | --- | --- |
|  | Sample range for the age ratio  (min. < mean < max.) | Expanding the age share relative to the working population would significantly: |
| School agers (5-19, per working adult) | (0.138 <0.232 < 0.632) | * Cut spending on welfare pr. person, but increase spending on health pr. person. These effects are reversed with increase in the ratio. Spending on health will increase until the ratio is 0.27, while spending on welfare will be cut until the ratio is 0.22. Coefficients are comparable and these effects seem to offset each other. (leading to insignificant effects on total spending and social spending) |
| Young adult (20-39, per adult over 39) | (0.664<1.032<1.953) | * Cut spending on education. This effect is reversed with an increase in ratio when the ratio of young adults to adult over 39 reaches 2.07. |
| Over 65’s (per working adult) | (0.087<0.225<0.389) | * Raise total government spending per person. * Raise total social spending per person and cut non-social spending per person until the ratio of elderly reaches respectively 0.28 of people in working age. * Raise spending on pensions, unemployment and education per person until the ratio of elderly to working age reaches 0.31, 0.29 and 0.25 respectively. |

The higher the share of elderly among adults, the more society devotes to social spending, especially pensions, unemployment and education. The relationship is reserved when the ratio of old to working age people reaches about 0.3. This point has been reached by many countries (Germany, Japan, Italy, France, Japan, Sweden, Greece) in the data set in the during the last part of the period covered by the data (since 2002). In these countries, the effect from an increasingly older population would thus limit government social spending on pensions, unemployment and education in particular. Other countries in the data set (Poland, Slovak Repulic, Netherlands, Luxembourg, Mexico, Turkey, United States) has not yet reached this point, so a rise in the over 65 share of adult could continue to raise social spending per person. SOMETHING ABOUTH EXPENDITURES PER ELDERLY

For the two other demographic groups, the effect on spending are that quite as clear. A population with more young adult per middle-aged adult will spend less on education, while the effect on all other types of spending is insignificant. The effect of school-agers to working age are positive on health, while negative on welfare spending.

Electoral variables not showing any significant effect on social spending. Only for total spending are the effect from voter turnout significance, but very small (and economic irrelevant) effects.

Looking at the effect from the income distribution, it is important to remember that data constrain are severe. Inequality is here limited to income skewness toward the rich, but ideally a better measure would have been lifetime earning power. In general, the quality of international data in this area is quite bad and not consistent in dealing with part time workers, pensioners and students. The hypothesis that income inequality should rise social spending due to a preference to equalitarian spending though taxation of the rich, cannot be supported by table 1. In fact, both total and social spending, especially welfare, unemployment and pensions, seem to fall with inequality, while only non-social spending seem to rise with inequality. ???????  
Lastly, male labour force participation has only little effect on government spending. The results are only significant for total spending and health, but as expected the sign is positive and thus lending support to the hypothesis that the size of the informal economy effects social spending. However, the size of the coefficients implies that the effect is minor compared to other factors.

So far, it appears that the age distribution are prime suspects when explaining the development in social spending. Before crediting these factors with setting the real limits to social spending, the traditional argument about deadweight costs must be investigated. As mentioned, this will be tested by looking at the potential negative effect from social spending on income. If it can be shown that social spending cuts income, then there is reason to believe that the income loss would lower the willingness and/or ability to social spending. Table 2 explores the determinants of the income level.

3.2. Determinants of income level

Two different equations are estimated, the first one only containing the sum of social spending, whereas the other contains the different types of social spending. In the second equation past investment and income level is omitted argued by the fact that they are shaped by other more basic forces such as government spending and human capital.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| TABLE 2 | EQ. 1 |  | EQ. 2 |  |
| VARIABLES | Coefficient | pval | Coefficient | pval |
|  |  |  |  |  |
| ln(GDP/cap), t-10 | 0.288\*\*\* | (4.68e-05) |  |  |
| ln(real investment), t-1 | 0.129 | (0.151) |  |  |
| Openess | -0.00289 | (0.812) | 0.00551 | (0.729) |
| Young (0-19) / workage | -0.976\*\*\* | (2.01e-05) | -0.558\*\*\* | (0.00911) |
| Young adult (20-39) / workage | 0.00670 | (0.962) | 0.0113 | (0.925) |
| Over 65 / workage | -0.531 | (0.294) | -0.234 | (0.636) |
| Health exp |  |  | 0.236 | (0.555) |
| squared |  |  | 0.0114 | (0.714) |
| Pension exp |  |  | -1.403\*\*\* | (0.000104) |
| squared |  |  | 0.0925\*\*\* | (0.000329) |
| Welfare exp |  |  | -0.0640 | (0.561) |
| squared |  |  | 0.00927 | (0.377) |
| Unemployment exp |  |  | 0.179 | (0.410) |
| squared |  |  | -0.0235 | (0.274) |
| Nonsocial exp | -0.658 | (0.577) | 0.230 | (0.450) |
| squared | -0.0117 | (0.582) | 0.00482 | (0.409) |
| Educational exp | 0.591\*\* | (0.0144) | 0.0183 | (0.929) |
| squared | 0.0608 | (0.183) | -0.0284 | (0.464) |
| Social exp | -0.763 | (0.461) |  |  |
| squared | 0.0144 | (0.443) |  |  |
| Constant | -0.359 | (0.879) | 2.204 | (0.350) |
|  |  |  |  |  |
| Observations | 224 |  | 224 |  |
| Number of country\_num | 31 |  | 31 |  |

The top row shows the effect from past income level. Remembering convergence literature, one would expect effect from past income to carry over in the present, but with an elasticity below unity. The age effects are only significant for the number of people below 20, lowering GDP per. capita. This makes sense, as young people only takes limited part in the production: they neither contribute labour input nor own capital. HUMAN CAPITAL?????

In order to support the hypothesis that government spending eventually would cut national income implies that squared terms should be negative. This is not the case. Only pensions have both negative and significant effects, while spending on education actually have significant and positive effect in the first equation.

1. Discussion, comparing to other literature

Key to the free lunch: bigger welfare states choses less distortionary tax systems, ensures that young people don’t avoid training and work. Transfers to retirement and unemployment benefits ensure higher productivity in the active labour force (Lindert, 2004, p. 227)

Besides the total tax burden, the system that a government uses to collect tax have an effect on the deadweight costs. Countries with a high degree of re-distribution in general chooses a mix of taxes that are less distortionary, compared to countries with smaller welfare states, while also developing tools to ensure young adults do not avoid training and work. (Lindert, 2004).

As plausible as these ideas seems to be, they have failed to explain the great difference in size of the welfare state among industrialised countries.

* 1. Improving method of estimation

As mentioned, social spending and income are chosen simultaneous, but are ignored throughout this analysis. The appropriate way of dealing with simultaneity is through a simultaneous-equation model: in one equation spending is allowed to depend on income, and in another spending is allowed to effect income negatively. Thus, we treat social spending and income as endogenous variables and all other variables as exogenous variables. In this case we have six equations for spending and one for income, making the SEM rather complicated.

When using SEM we need to make sure that the model meets the rank condition, which states that “*the first equation in a two-equation simultaneous equations model is identified if, and only if, the second equation contains at least one exogenous variable (with a nonzero coefficient) that is excluded from the first equation”* (Wooldridge, p. 554). We the number of equations excess two, identification is not that straight forward and there are many subtle ways that identification can fail in complicated SEMs. As we have 7 equations, SEM rather complicated in this case. Thus, for simplicity we look solely at the sum of social spending, giving us the model:

Z is a vector containing the exogenous variables used in the panel regression and as Z\_1!=Z\_0 the rank condition is met for both equations, implying that both equations are identified. The equations can now be estimated by 2SLS, where instrument variables consist of the exogenous variables in Z\_0 or Z\_1, where the first stage entails GLS of ln(Y) on social spending and the second stage combines the resulting predicted values (the hat’s) and their squared terms with the other variables in a GLS. This approach deals with simultaneity, heteroscedasticity and serial correlation. (must be tested, chp. 15, Wooldrigde)

* 1. Comparing to other literature

1. Conclusion

References

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Appendix A: Data

Most of the data is extracted from OECD.Stat. This includes data on government expenditures, GDP, demography, income inequality, voter turnout, unemployment, taxation and labour force participation. Expenditures, tax revenue and GDP are measured in USD in 2005-prices.

As a measure for inequality the P90/P50 ratio is used. This is the ratio of the upper bound value of the ninth decile to the median income. An increase in the ratio will imply more distance between the median voter and the rich.

The variable of interest, social expenditures, are divided into the sub-categories health, welfare, unemployment and pensions. All categories include both benefits in cash and benefits in kind. Social expenditures are the sum of these expenditures, thus excluding spending on housing and education. Non-social expenditures are defined as the residual of total government spending. These expenditures are divided by population, also extracted from OECD.Stat, to obtain spending per capita.

Data on expenditures on education and number of student enrolled are extracted from the World Bank. Data on import, export and capital formation are extracted from Pen World Tables. The variable open is defined as sum of export and import as a share of GDP. Corporatism is a crude index developed by Bruno and Sachs [1985] and Schmitter [1989] of national institutions negotiating pay, employment and fiscal policies among organized representatives of labour, business and government. Executive turnover is measured as the number of changes in president/premiere minister over the last decade and The Archigos data set “A Data Base on Leaders” is used. The variables linc is the natural logarithm to GDP pr. capita.

Appendix B: Assumptions:

1. An alternative measure could be expenditure divided with the population in the target group if one wanted a stronger focus on how the specific program affects incentives of those being eligible for it. [↑](#footnote-ref-1)
2. Comparing to 3- or 5-year average, …. [↑](#footnote-ref-2)