Determinants of public education spending in 21 OECD democracies, 1980–2001

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ABSTRACT This paper focuses on the analysis of determinants of public education spending in OECD countries. It starts out by reviewing and replicating the model presented by Castles (1989, 1998), finding that only a few of his explanatory variables remain significant in a pooled time-series framework. I present an alternative model that contains socio-economic, political, and institutional variables: the level of economic development, the magnitude of demographic demand, the constitutional veto structure, the level of public social expenditures, the degree of tax-revenue decentralization as well as government participation of conservative parties.

KEY WORDS Comparative public policy; education spending; OECD countries; pooled time-series analysis.

1. INTRODUCTION¹

Much ink has been spilled on the analysis of political, institutional, and socio-economic determinants of social spending (see among many others: Siegel 2002; Huber and Stephens 2001; Kittel and Obinger 2003). In contrast, education policy has been largely neglected by political scientists. Scholars of economics and sociology have looked at education policy much more intensely, discussing issues like educational participation, human capital, or the comparative analysis of education systems (Allmendinger and Aisenbrey 2002; Timmermann 2002). This is surprising, because the levels of public (and private) education spending vary considerably between member countries of the Organization for Economic Co-operation and Development (OECD) (see Figure 1).²

Only a comparatively few studies have dealt with the analysis of education spending explicitly and these can be categorized into three groups. First, there are studies that approach the international comparison of education expenditures from the perspective of a single country, so as to better determine the relative position of the country in question (from the perspective of Germany: Färber 2000; Klemm 2003; Hetmeier and Weiß 2001; the United Kingdom (UK): Glennerster

Figure 1 Variation of education spending in OECD countries, 2002

Note: Public spending on educational institutions includes public subsidies to private spending, which is directed at educational institutions. Canada: missing data.

Source: OECD (2005: 184).

2001; the United States of America (USA): Nelson 1992, 1996). Secondly, there are a number of studies with a theoretical background in economics that analyse the dynamics of education spending in international or intranational comparison (Hanushek and Rivkin 1996; Fernández and Rogerson 1997; Ram 1995; Morgan *et al.* 2001). From a political science perspective, the weakness of these studies is that they neglect the impact of political and institutional variables on spending. Instead, they focus on socio-economic variables like gross domestic product (GDP) per capita, enrolment, number of teachers, etc. Thirdly, there are a small number of studies dedicated to the study of education spending from the perspective of comparative public policy. Early works of this kind have made the potential explanatory contribution of political variables *vis-à-vis* socio-economic variables one of their most important research questions (Verner 1979; Dawson and Robinson 1963; Gray 1976; Klass 1979). Cameron and Hofferbert (1974) have contributed in an inspiring way by attempting to link international to intranational comparison in order to determine the impact of federalism on education spending. More recent studies have discussed the role of investments in human capital, the more modern synonym for 'education spending', as part of a social-democratic supply-side strategy (Garrett and Lange 1991; Boix 1997, 1998), or its relation to globalization (Kaufman and Segura-Ubiergo 2001). Last but not least, the work of Manfred G. Schmidt and of Francis G. Castles represent the most encompassing analysis of the determinants of education spending so far (Castles 1982, 1989, 1998; Schmidt 2002, 2003a, 2004, 2006; Schmidt *et al.* 2006; Busemeyer 2006; Nikolai 2006; Wolf 2006). Castles' work and theoretical model have inspired others (Hokenmaier 2002; Hega and Hokenmaier 2002) to follow suit. Therefore, the explanatory model proposed by Castles (1989, 1998) is also the point of departure for my analysis.

More specifically, I try to answer the following questions: Which factors explain the considerable variation of education spending in OECD countries? What is the relative impact of socio-economic, institutional, and political (partisan) factors? Do the core variables identified by Castles (1989, 1998) have the highest explanatory power, or is it possible to devise an alternative model that captures the variation of education spending more accurately?

In the next section, I present Castles' theoretical model as well as alternative hypotheses. The third section contains a replication of Castles' analysis and an extension of Castles' model to the framework of pooled time-series analysis. The fourth section presents an alternative model, and the last section concludes this paper.

2. HYPOTHESES ON THE DETERMINANTS OF EDUCATION SPENDING

In his seminal contributions to the study of education spending (Castles 1989, 1998), Castles identifies a set of core variables that capture the variation in public education spending to a varying degree, depending on the year of the analysis. According to Castles, the most important explanatory variables are a tradition of Catholicism, government participation of rightist parties, student enrolment in the tertiary education sector, and – predominantly in the 1990s – the constitutional veto structure of a country (Castles 1998: 180ff.; 1989: 440ff.). In the following, I will present each of Castles' core variables, discuss the underlying theoretical arguments, and add other hypotheses where appropriate. For clarification, I subsume the discussion under the headings of socio-economic, political (partisan), and institutional determinants of public education spending.

Socio-economic determinants

The impact of changes in the socio-economic environment has been regarded as an important variable since the beginning of research in the field of comparative public policy (Zöllner 1963; Wilensky 1975). In his analyses, Castles considers the impact of tertiary enrolment on education spending. He finds a positive association between education spending and student enrolment in the tertiary sector (Castles 1989: 436; 1998: 180). But why should we look at *tertiary* sector enrolment alone? The reason lies in the assumption that the provision of basic educational services (predominantly in the primary and secondary sectors) is part of a standard set of public goods provided by any modern industrial state. Indeed, we can observe that spending for primary, secondary, and non-tertiary post-secondary education varies to a lesser extent (variation coefficient: 0.17) than public spending on tertiary education (variation coefficient: 0.35). What is more, in most of the 21 OECD nations under inspection here, primary and secondary education had been or became universal in the immediate post-war decades. However, the establishment of public tertiary

institutions and higher education systems has been pursued later and with varying intensity. Because spending on primary and secondary education remains largely constant and because enrolment in these education sectors is nearly universal as well, the degree to which a country pursues a course of public investment in higher education largely determines its relative position in total education spending. Tertiary enrolment might be an indicator of a country's willingness to pursue such a course. Consequently, Castles expects a positive association between tertiary enrolment and total public education spending.

Yet it can also be argued that tertiary enrolment alone does not determine the total education spending of a country, because the variation in the demand for primary and secondary education is too large to be ignored. In our sample of 21 OECD countries, the share of the population between the ages of five and 29 varies from about 40 per cent in Ireland, to about 27–28 per cent in Japan, Italy, and Germany (figures for 2002). Therefore, even if enrolment in primary and secondary education is nearly universal in most industrial nations, the variation in the population share of the young constitutes a significant variation in the demand. In addition, public spending on primary, secondary, and post-secondary non-tertiary education constitutes about 75 per cent of total public education spending in OECD countries (OECD 2005: 185). Consequently, it can be expected that the variation in the percentage of young people relative to the total population is a more important determinant of total public education spending than tertiary enrolment.

Besides demographic variables, Castles does not explicitly consider the impact of economic variables. Yet we could expect that the economic environment has an impact on education spending as well. First, the degree of economic development, measured through GDP per capita, influences the availability of economic resources on hand for the purposes of public spending. It is important to distinguish cross-sectional from over-time effects. On the one hand, Wagner's law stipulates a positive association between economic development and public spending as a percentage of GDP that unfolds over time. The cross-sectional perspective, on the other hand, emphasizes the association between economic development and spending in a given time period (Wilensky 1975, 2002). Societies on different levels of economic development exhibit differences in the demand for skilled labour. Economically advanced, 'post-industrial' economies demand a higher share of skilled labour and emphasize the provision of higher education, whereas in countries with a lower GDP per capita, demand for education services is not as pronounced.³

Whereas the degree of economic development captures the long-term impact of economic factors on education spending, real GDP growth captures the short-term fluctuations of the business cycle. The central question here is whether education spending behaves counter- or pro-cyclically. Social spending, for example, is aligned with the development of the business cycle, because deterioration in the economic environment (for example, an increase in unemployment) has a direct impact on the development of social spending. In education spending, however, the connection between spending and the

development of the business cycle is more indirect in nature: a regular economic downturn does not directly lead to school closure or the firing of teachers. Laws and regulations of the education system do not exhibit the same direct connections to the economic environment as some social policy provisions do. If the impact of economic factors on education spending is more indirect and long term in nature, the analysis of cross-sectional differences rises in importance in relation to pure time-series analysis.

In addition to economic and demographic variables, the cultural heritage of a country can be regarded as another important element of the socio-economic environment. In line with his work on the impact of religion on public policies (Castles 1994), Castles argues that a tradition of Catholicism inhibits the establishment of an extensive public services sector because, according to the subsidiarity principle, the provision of services is delegated to families and households or private associations (Van Kersbergen 1995). Furthermore, during and after the nineteenth century, the Catholic Church was reluctant to hand over responsibility for education of (Catholic) children to the state (Castles 1989: 438). A similar argument has been made for the United States where, in the middle of the nineteenth century, Catholics often protested against the predominance of mainstream Protestantism in American public schools (Jorgenson 1987). In Protestant countries like those in Northern Europe (Scandinavia), religious forces aligned themselves with the state and were able to exercise their influence on education and social policy through state institutions (cf. Manow 2004). Therefore, one can argue that public education expenditure in a country with a strong Catholic heritage and a large Catholic share of the population will be lower than in other countries. Whereas Catholic schools in the United States are still largely independent from public funding, many Catholic schools in European states (mainly in France, Belgium, partly in Germany) remain autonomous for the most part only on paper and are highly dependent on state funding. This blurring of lines between public and private funding can be expected to weaken the association between Catholicism and public education spending, if there is nothing else in Catholic countries to make them oppose a generously funded public education system (for example, a general disinclination toward the state as a service provider).

Partisan factors

In the Castles' model, government participation of rightist parties is an important explanatory variable. In the words of Castles, the hypothesis is simple: '[T]he Right spends less, the social democrats are more generous' (Castles 1982: 71). In other words, there is a negative association between public education spending and the percentage of cabinet seats held by right-wing parties (cabinet share). Following Hibbs (1977), the reason for this difference in preferences between right-wing and left-wing parties lies in the respective electoral base of the parties. Left-wing parties have their electoral base in the lower income classes

and are therefore keener on redistribution through social policies and, in addition, through an extensive, publicly funded education system. The electoral base of right-wing parties is located in the middle and upper income classes, which have an interest in minimizing their tax contribution. With regard to education policy, they might be interested in the creation of some higher educational institutions and a generally lower educational participation of lower classes, but not in the creation of a system of universal education for everyone.

Summing up, according to Castles, government participation of right-wing parties is associated with lower spending in general and lower education spending in particular. However, three caveats have to be added. First, Castles has argued that in countries lacking a large secular conservative party (mainly Germany, Austria, and Italy before the 1990s), Christian democrats can be regarded as 'bourgeois' or rightist parties (Castles 1982: 58–60). Contrary to this hypothesis, a large body of literature has argued that Christian democratic parties pursue an ideology that is inherently different from secular conservatism, mainly in its inclination towards higher social spending resulting from the tradition of social Catholicism (Wilensky 1981: 354; 2002: 239; Wilensky *et al.* 1987: 399; Kohl 1981: 324; Hicks and Swank 1984: 105; Van Kersbergen 1995). Therefore, instead of categorizing government parties in a simple left/right dichotomy, it is more sensible to distinguish between a plurality of party families (for example, social democratic, liberal, conservative, Christian democratic; cf. Schmidt 1996, 2003b).

Secondly, Castles argues that the weakness of the rightist parties has been a more decisive factor of welfare state developments than the strength of the left (Schmidt 1998: 203; Hicks and Swank 1984: 100, 104). Yet a large number of studies, most importantly of the 'power resources' kind, argue that the strength of the left (social democratic parties and labour unions) is the driving force behind welfare state expansion (Esping-Andersen 1985; Huber and Stephens 2001). What is more, given the force of economic internationalization, social democratic parties are found to follow a 'supply side' strategy of social investment (Boix 1997, 1998; Garrett and Lange 1991; Garrett 1998). In the face of a weakening association between social democratic government participation and social spending, these studies expect a positive impact of social democracy on education spending and public investment (Boix 1997; Darby *et al.* 2004: 170–1).

Thirdly, a more general critique of the measurement and operationalization of the impact of partisan variables on policy outcomes is justified. Most studies employing the statistical framework of pooled time-series analysis include the current partisan composition of the government in the regression analyses. Given that welfare state developments exhibit a high degree of path dependence (Pierson 2001, 2004), it is not surprising that the current partisan composition of the government loses much of its explanatory power (Kittel and Obinger 2003), for which economic internationalization might not be the sole or even most important reason (Iversen and Cusack 2000). It is necessary to trace the

developmental path back to critical junctures where partisan forces have had a stronger direct impact, so that we may assess the impact of partisan factors on welfare state development. The cross-sectional comparison of countries in the current time period is an indirect method of observing differences in welfare state development that can at least partly be attributed to partisan forces.⁴ In my analysis, I employ moving averages instead of the current-year partisan composition of government as a 'second best' option to take partisan heritage into account.

Institutional determinants

Socio-economic variables delimit the general demand and amount of available resources for political action; partisan factors capture the actor's interests and motivations. Institutional variables shape the concrete constraints and resources of actors. For example, Castles discusses the impact of the constitutional veto structure on education spending and finds that a strong veto structure leads to lower public education expenditures (Castles 1998: 181). From the analysis of welfare states and social expenditures, it is well known that a state structure with many institutionalized veto points slowed down the expansion of the welfare state (Hicks and Swank 1992; Huber *et al.* 1993; Huber and Stephens 2001), because attempts to institutionalize ambitious social policy schemes often went along with centralization on the national/federal level, which was fought by actors with veto power.

For the case of education policy, one can make two points: first, a strong veto structure could be negatively associated with public education spending because it has slowed down the expansion of the public sector in general. Lower education spending is one of the different manifestations of this fact. If this thesis is true, low public education spending would go along with lower public spending in general as well as lower social expenditures. Secondly, the negative effect on education spending is due to specific types of veto institutions, namely autonomous social insurance institutions and federalism. With regard to the impact of these institutions, there are significant differences between education and social policy. Autonomous social insurance institutions have sources of income independent from the fiscal state of the public purse in the form of contributions. What is more, in the case of pension policies, these contributions do not have the character of 'insurance premiums', but establish future benefit claims which cannot be waived. Consequently, one could argue that in welfare states with autonomous social insurance institutions, the fiscal leeway for education policy is severely constricted because expenditures for social policies are prioritized. In welfare states, where social and educational policies are financed out of the same 'big bucket' (the general budget), a redistribution between different policy fields will be more feasible. In times of fiscal austerity, expenditures for social insurance policies like pension or unemployment insurance can effectively limit the fiscal leeway for social investment policies like education (Schmidt 2006). Because the tax-payer's overall willingness and

ability to pay is not unlimited and because the types of social expenditures mentioned above are mandatory rather than discrete, social and education spending are in a state of 'fiscal concurrence' (Lepenies 2003). Education is likely to lose this battle for scarce public resources, and part of the explanation lies in the institutional structure of the welfare state.

What is the impact of federalism and fiscal decentralization on education spending? In the case of social policy, federalism has inhibited the emergence of a strong welfare state because its creation was not only a political struggle between left and right, but also between different levels of government (Obinger and Wagschal 2000). More specifically, the creation of a welfare state necessarily entails some centralization of competencies, which had been fought by lower levels of government in strong federalist countries like Switzerland or the United States. In the case of education policy, one could make an even stronger case for the negative impact of federalism. Because education policy is more decentralized than social policy, lower levels of government are even more reluctant to delegate competencies to higher levels of government. This conflict is still raging today, as was recently obvious in the struggle over education policy competencies in Germany. Fiscal centralization and the centralization of competences at the national level could be associated with higher education spending, because the 'growth sectors of education policy' (research and development, higher education) require an inter-regional or international perspective as well as strong financial backing, which is, for public sector institutions, generally not available on the local or regional level.

However, it could also be argued that fiscal decentralization is positively associated with public education spending. In order to make that claim, it is necessary to distinguish between constitutional and fiscal federalism. As Stegarescu (2004) has shown, the degree to which tax revenue is decentralized, that is, the degree to which lower levels of government can decide autonomously on tax rates and the tax base, is not necessarily the highest in constitutionally federalist countries. In contrast, some unitary countries, like the Scandinavian nations, tolerate a high level of tax autonomy at the local level, while some federalist countries like Germany exhibit a strong degree of interconnectedness between different levels of government, so that none can act autonomously (Stegarescu 2004: 9). Not surprisingly, early studies of the association between federalism and education spending find no difference in spending between federalist and unitary countries (Cameron and Hofferbert 1974). I argue that fiscal decentralization is associated with higher levels of education spending because lower levels of governments (localities) enter a state of competition that results in a 'race to the top'. On the local level, individuals have real exit options at their disposal: to move from one district to another because of better schools is not a far-fetched alternative. When local governments have a high degree of fiscal autonomy, they will try to offer attractive bundles of public goods in order to attract residents. This process of a 'race to the top' might even be fuelled by the logic of 'fiscal illusion'. Therefore, I expect a positive relationship between education spending and fiscal decentralization.

Finally, in Castles' models for the earlier time periods, electoral turnout features prominently as an indicator of the degree of democratization. Whether electoral turnout can really act as a reliable indicator for democratization (especially because we have more reliable measurements by now) is questionable. It might capture the differences between democratized European countries and the autocratic regimes in Southern Europe (Greece, Portugal, Spain) in the 1960s and 1970s, but thereafter its reliability is not good. A theoretical reason why progress in democratization should lead to higher levels of education expenditure is given by the Meltzer–Richard model on redistribution (Meltzer and Richard 1981). This model expects increasing redistribution as the franchise expands down the income ladder, because lower income voters have an incentive to vote for more redistribution. Redistribution, then, might come in the form of social policies; it might also come in the form of public education. Therefore, according to Castles, progress in democratization is expected to be positively associated with education expenditure.

3. REPLICATION AND EXTENSION OF CASTLES' MODEL

Thankfully, Castles (1998) provides the reader with almost all of the data he used to estimate his cross-sectional models and thereby makes it easy to replicate his regression models. Table 1 presents the replication of the Castles' model. In addition to the results of the replication of the simple cross-sectional regression analyses, I present models that were re-estimated using the (non-parametric) bootstrap procedure.⁵ The bootstrap procedure is superior to simple cross-sectional regressions when the number of cases is low (in our case: 21). The variance contained in the original sample is spread out over a large number of redrawn samples like 'butter on bread'. Consequently, it is easier to separate robust from non-robust coefficient estimates. What is more, the applicability of the bootstrap method is especially high in the case of cross-country aggregate data analyses, because the original 'sample' of cases is in truth a population (for example, of well-established OECD democracies, as in our case).

The replicated estimates are very close to Castles' original values and confirm the hypotheses outlined above: Catholicism has a negative impact as does the share of cabinet seats held by rightist parties. However, Castles does not control for the level of economic development. Because some of the most Catholic countries at that time (Greece, Portugal, Spain, and Ireland) also exhibited a below-average level of economic development, the Catholicism variable captures this economic effect, at least in part.

Tertiary enrolment is positively associated with public education spending as is electoral turnout (in the 1974 model). A strong constitutional veto structure corresponds to lower public education expenditures.

The coefficient estimates and the t-values of the bootstrapped estimates show minor deviations from the simple regression estimates for most variables. Usually, statistical significance (t-values) is slightly reduced. The magnitude of the coefficient of 'constitutional veto structure' is increased by about 15

Table 1 Replication & bootstrapped estimates of Castles' (1998) models

		<i>Castles' coefficient</i>	<i>Replicated coefficient</i>	<i>Bootstrap coefficient</i>	<i>Castles' t-values</i>	<i>Replicated t-values</i>	<i>Bootstrap t-values</i>
<i>1960</i>							
Constant		4.621	4.893	5.002		11.458	7.203
Catholicism		-0.014	-0.021	-0.021	2.42	-3.754	-3.151
1950-59 right cabin seats		-0.014	-0.011	-0.010	2.54	-2.067	-2.170
1960 tertiary enrolm ratio		0.102	0.063	0.047	2.782	2.909	0.658
<i>1974</i>							
Constant		4.072	4.114	4.129		4.822	5.410
Catholicism		-0.014	-0.014	-0.013	2.667	-2.602	-2.792
1974 electoral turnout		0.027	0.027	0.025	3.995	4.054	3.319
1950-73 right cabinet seats		-0.016	-0.016	-0.017	3.007	-3.003	-2.749
1974 tertiary enrolment ratio		0.041	0.038	0.045	2.05	2.093	1.571
<i>1993</i>							
Constant		6.381	6.48	6.351		8.459	6.349
Catholicism		-0.015	-0.015	-0.015	3.524	-3.106	-2.986
1950-93 right cabinet seats		-0.018	-0.023	-0.021	3.053	-3.583	-3.352
Constitutional structure		-0.289	-0.285	-0.327	3.412	-2.997	-2.171
Early 1990s tertiary enrolment ratio		0.034	0.033	0.036	3.519	2.575	1.908

per cent. Apart from this, the divergence is largest for the variable 'tertiary enrolment'. In the bootstrapped 1960 model, this variable loses statistical significance completely ($t = 0.658$) and the magnitude of the coefficient is largely reduced (from 0.102 to 0.047). The statistical significance of this variable is also reduced considerably in the 1974 and 1993 models. These results indicate that 'tertiary enrolment' might not be a robust determinant of education spending. The bootstrap method is a useful tool to test the robustness of coefficient estimates: as is obvious from Table 1, some variables have passed the robustness test, while others have failed.

In sum, the replication of the Castles' models was successful since most variables remained statistically significant and confirmed the hypotheses outlined above. But how do these explanatory variables hold up in a larger model, namely, one that combines cross-sectional with time-series analysis?

The Castles' models have some weaknesses that combined cross-sectional time-series analysis can allay. Firstly, all these models are based on the analysis of education expenditure data for a single year only (1960, 1974, and 1993). While this might be a first step toward analysing cross-sectional variation and could become necessary if the data needed are not available or are costly to acquire, it is not obvious why we should restrict ourselves to a one-year, cross-sectional analysis in the case of education expenditure. Admittedly, early years pose some problems because of missing data, but since the 1970s and especially the 1980s, data on public education expenditures are available for almost every year. To arbitrarily select one-year cross-sections, even if more data are easily available, unnecessarily introduces noise and bias into the estimates obtained, as these are not cross-sectional averages taken over longer periods of time, but 'random samples' from the pool of cross-sectional data.

Secondly, this shortcoming is even more remarkable because Castles makes extensive use of long time-period averages in the selection of his independent variables; for example, the share of rightist parties in cabinet seats. Yet in others he uses one-year cross-sections again (electoral turnout, tertiary enrolment). From a theoretical standpoint, we could argue that it makes sense to use long-term averages for rightist parties to determine the impact of the position of the political centre of gravity on today's policy outcomes. However, if we are only interested in the cross-sectional variation, which seems to be the case for the Castles' models we study here, it would make sense to use long-term averages for the other independent variables, too.

Thirdly, as Castles tests cross-sectional models for different time periods (1960, 1974, and 1993), he seems to be interested not only in the cross-sectional variation, but also in the over-time variation. More precisely, he is interested in finding out whether education expenditures are driven in later time periods by the same determinants as in earlier ones. For example, the variable 'constitutional structure' is statistically significant in the 1993 model. It is remarkable, however, that it does not change at all over time. Thus, the variable is the same for the 1960 model as for the 1993 model. We are therefore confronted with the puzzle that this variable could not 'explain' the variation in education

Table 2 The Castles' model in pooled time-series version, 1980–2001

Dependent variable	Public education spending as percentage of GDP				
	(1)	(2)	(3)	(4)	(5)
Catholicism (Castles' 1994 dummy)	–0.121 (0.81)	–0.183 (1.11)	–0.017 (0.03)	–0.167 (1.20)	0.423 (0.73)
Cabinet share of right parties (Castles' definition)	0.000 (0.01)				
Cabinet share of right parties (moving average)		–0.004 (2.12)*	–0.001 (0.70)	–0.006 (3.07)**	–0.002 (1.31)
Tertiary enrolment	–0.001 (0.91)	–0.001 (0.91)	–0.001 (2.04)*	0.000 (0.22)	–0.000 (0.09)
Constitutional veto structure	–0.090 (2.13)*	–0.088 (1.90)	0.072 (0.51)	–0.089 (2.32)*	0.216 (1.47)
Constant	5.811 (19.51)**	5.959 (17.53)**	4.594 (5.26)**	0.000 (·)	0.000 (·)
Fixed-effects	No	No	Country	Time	Country/Time
Observations	427	427	427	427	427
No. of countries	21	21	21	21	21

Panel-corrected z-statistics in parentheses.

*significant at 5 per cent; **significant at 1 per cent.

Note: The dependent variable is public spending on educational institutions including public subsidies of private expenditures to educational institutions, taken from the OECD Education at a Glance database. Linear interpolation was used to fill in values for 1997 and a few earlier years. For Denmark and Spain, no data were available in the 1980s. 'Catholicism' is a dummy variable based on Castles (1994). Cabinet share of right parties is the share of conservative parties in cabinet seats (data from Schmidt 2003b), except for Germany, Austria, and Italy, where Christian democratic parties are counted as 'right parties'. Tertiary enrolment is given in percentage of total population. Alternatively, tertiary enrolment was included as the percentage of those between the ages of 5 and 29. The obtained results do not differ much. The veto index is taken from Schmidt (2000: 352–3). To correct for panel heteroscedasticity, panel-corrected standard errors (Beck and Katz 1995, 1996) were calculated using the *xtpcse* STATA command. An AR(1) error correction process was included to control for serial autocorrelation. Alternatively, a lagged dependent variable (LDV) specification was tested, in which the statistical significance of all independent variables except the LDV was very low.

expenditure back in the 1960s, but that it can in the 1990s, even though it has not changed much. How can a constant that is not changing over time explain this change in explanatory power? We might be observing a spurious relationship here.

The next step is to extend the scope of the analysis by testing the set of core variables identified above in a cross-sectional time-series model for 21 OECD

countries⁶ for the years 1980–2001. The use of pooled time-series analysis has advantages over simple cross-sectional analysis: the ‘pooled’ coefficient estimates capture the average effect of changes over time and the differences between countries in one independent variable on the dependent variable, controlling for the other independent variables. This avoids the arbitrariness associated with the selection of specific years for cross-sectional analyses. The ‘artificial’ extension of the number of cases achieved by pooling countries and years also enhances the robustness. Table 2 shows the results obtained from a pooled time-series regression using Castles’ main explanatory variables. Different specifications were tested (see notes of Table 2).

The most important finding is that almost none of Castles’ core variables maintain their explanatory power. ‘Catholicism’ fails to reach conventional levels of statistical significance. Both the magnitude and the sign of the coefficient estimate change depending on the fixed-effects specification.

‘Right cabinet seats’ suffers similarly, although the Castles’ definition of ‘right parties’ is used: the indicator covers cabinet shares of conservative parties, except in Germany, Austria, and Italy, where Christian democratic parties are counted as ‘right parties’ because these countries do not have another strong secular right-wing party. Only when the moving average of right-party cabinet seats is used (non-weighted average of partisan composition of government within a ten-year time frame) instead of the current partisan composition I find a discernible negative impact. However, when country fixed-effects are included, this effect disappears. This suggests that the cross-sectional (‘between’) effect is stronger than the time-wise (‘within’) effect, i.e. differences between countries with different levels of rightist government participation have more explanatory power than changes of government from social democratic to conservative within a given country.

The impact of the variable ‘tertiary enrolment’ is contrary to Castles’ hypothesis. In contrast to the expected positive association, it is negatively associated with public education spending in most models and fails to reach conventional levels of statistical significance. Only in the model with country fixed-effects (least squares dummy variable (LSDV) model) do we observe a statistically significant relationship, albeit a negative one. How can this puzzling finding be explained? Demand for highly skilled labour is especially strong in mature, post-industrial nation states with a high degree of economic development. For reasons too complex to discuss here, the share of the young population is larger in countries on a lower level of economic development (bivariate correlation of -0.5). As I hypothesized above, total public education spending will be influenced more by the demand for primary and secondary education than for higher education. Therefore, in those economically mature countries with a high rate of tertiary enrolment, the share of the young population is below average as is the demand for public education spending, given the other control variables. The fact that the negative association is significant in the LSDV specification is only an indication that the cross-sectional effect carries less weight than the over-time effect. In other words, the share of the

young population in countries with an increasing tertiary enrolment has declined (bivariate correlation: -0.4) and, with it, the total demand for public education spending. The results suggest that, controlling for the other variables, the expansion of the higher education sector did not necessarily go along with an increase in total public education spending. More on this will be said below.

The variable 'constitutional veto structure' is the only variable that behaves as expected by the Castles' model. Because this variable does not vary over time, it loses statistical significance when country fixed-effects are included. However, in the models 1 and 4 (without country fixed-effects), we find a statistically significant and negative association with public education spending, which is in line with the theoretical expectations.

4. DETERMINANTS OF PUBLIC EDUCATION SPENDING: AN ALTERNATIVE MODEL

This section builds on the previous discussion and continues the search for the determinants of public education spending. Results for a pooled time-series analysis of public education spending as a percentage of GDP in 21 established OECD democracies from 1980 to 2001 are presented in Table 3. The relevant theoretical hypotheses were introduced in the context of the discussion of Castles' hypotheses in section 2.

Data and methods

First of all, it is important to emphasize that aggregate data models like the one presented in the following can never be causal models in the strict sense. Problems of endogeneity and post-treatment bias abound (see also Kittel 2006) when macro-economic variables like economic growth are seen as determinants of spending in some studies (as here) and the impact of government policies (and spending) on economic growth is analysed in others (Obinger 2004). The nature of the data often precludes the application of more complex estimation techniques like instrumental variables estimation because of a lack of appropriate instruments. The answer to this general problem is to scale down claims of causality. In the end, aggregate data models point out interesting connections based on a heuristic framework of hypotheses.

Data sources and definitions are given below the tables and in the appendix. Indicative tests suggested the presence of autocorrelation and panel heteroscedasticity. Therefore, I calculated panel-corrected standard errors and included a lagged dependent variable (LDV) in the models following Beck and Katz (1995, 1996). A generalized least squares (GLS) regression with an autoregressive (AR(1)) correction process was also estimated, but the results do not differ much from the original baseline model. Models 4 and 5 test the impact of country and time fixed-effects on the coefficient estimates. The inclusion of country fixed-effects reduces the statistical significance of variables

Table 3 Pooled time-series analysis of education spending as a percentage of GDP (levels)

Dependent variable	F	Predicted change in public education spending as percentage of GDP		Change in public education spending (first differences)	Predicted change in public education spending as percentage of GDP				
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lagged predicted change in public education expenditure		0.822 (5.39)***	0.853 (27.80)***		0.590 (9.57)***	0.578 (9.39)***	0.814 (24.05)***	0.639 (11.65)***	0.912 (20.26)***
GDP per capita in 1,000\$		0.035 (4.63)***	0.025 (3.61)***	0.011 (1.70)*	-0.023 (2.44)**	-0.054 (4.28)***	0.035 (4.65)***	0.113 (7.95)***	0.006 (0.60)
Population share of those aged 5 to 29		0.023 (4.34)***	0.022 (3.85)***	0.009 (1.81)*	-0.018 (2.01)**	0.029 (1.57)	0.024 (4.42)***	0.059 (5.25)***	0.012 (1.45)
GDP growth		-0.061 (6.37)***	-0.040 (4.15)***	-0.045 (4.47)***	-0.055 (6.33)***	-0.053 (6.09)***	-0.060 (6.25)***	-0.080 (7.72)***	-0.045 (3.49)***

Veto index	0.066 (4.68)***	-0.052 (4.17)***	-0.019 (1.68)*	-0.169 (4.86)***	-0.226 (4.96)***	-0.066 (4.63)***	-0.186 (6.16)***	-0.017 (0.89)
Tax revenue	0.003	0.003	0.000	0.001	0.002	0.003	0.008	0.001
decentralization	(2.76)***	(3.00)***	(0.17)	(0.39)	(0.49)	(2.78)***	(4.03)***	(0.83)
Change in public		0.075						
social		(7.72)***						
expenditure								
Cabinet share of						-0.001		
right parties						(1.66)*		
(Castles'								
definition)								
Cabinet share of							0.003	-0.000
Christian							(3.58)***	(0.18)
democrats								
Cabinet share of							-0.001	-0.000
conservative							(1.37)	(0.65)
parties								
Constant	-1.134 (4.79)***	-1.032 (4.19)***	-0.347 (2.00)***	1.741 (3.35)***	-56.203 (2.91)***	-1.179 (4.81)***	-3.452 (6.27)***	-0.375 (1.16)
Time period	1980-2001	1980-2001	1980-2001	1980-2001	1980-2001	1980-2001	1980-1989	1990-2001

(Table continued)

Table 3 Continued

Dependent variable	F	dicted change in public education spending as percentage of GDP		Change in public education spending (first differences)	Predicted change in public education spending as percentage of GDP				
		(1)	(2)		(4)	(5)	(6)	(7)	(8)
Fixed-effects					Country (LSDV)	Country/Time			
Observations		421	421	421	421	421	421	188	233
No. of countries		21	21	21	21	21	21	19	21

Panel-corrected z-statistics in parentheses.

*significant at 10 per cent level; **significant at 5 per cent level; ***significant at 1 per cent level.

Notes: See also notes for Table 2. Data on GDP per capita (in Geary-Khamis dollars) are taken from A. Madison (2003): *The World Economy: Historical Statistics*. Demographic data are taken from the OECD Education at a Glance series (several years). Data on GDP growth are taken from the OECD Economic Outlook Database. Data on public social expenditure and on public expenditure on pensions and unemployment are taken from the OECD Social Expenditure Database and the OECD Health Data 2005. Cabinet shares of parties are drawn from Schmidt (2003b). The veto index is taken from Huber *et al.* (1993). The indicator of fiscal decentralization measures the degree of real tax revenue decentralization (Stegarescu 2004). The number of countries is reduced to 19 for models 3 and 4 because of missing data in the dependent variable for Denmark and Spain. Because the LDV is included in all specifications, the R^2 of all regressions is significantly larger than 0.9 (and is therefore not reported here).

that do not change much over time (constitutional veto structure, degree of tax-revenue decentralization). What is more, the inclusion of country fixed-effects significantly changes the nature of the model from one that estimates the 'pooled' cross-sectional and over-time effect to one that estimates the over-time effect only ('within effects' model). From a purely methodological point of view, the inclusion of country fixed-effects in cross-country analysis makes sense. But from a substantive point of view, this inclusion is questionable because it eliminates purely cross-sectional effects that are highly interesting from the perspective of comparative public policy research.⁷ Therefore, in most of the models presented here, I did not include country fixed-effects. When interpreting the coefficient estimates, however, we must keep in mind that the impact of the independent variables results from cross-sectional and over-time effects. The inclusion of country fixed-effects does make sense in order to separate out effects in the two dimensions.

In addition, Fisher tests of stationarity using the augmented Dickey–Fuller and the Phillips–Perron tests were applied to the dependent and some independent variables. The Fisher tests indicate that non-stationarity is not an insurmountable problem in the current analysis: the null hypothesis of non-stationarity can be rejected on a high level of statistical confidence. However, the examination of individual time series in the panel and the inability to reject the null of non-stationarity for trended data suggest that we cannot completely ignore the problem. The standard approach to dealing with non-stationarity (using first differences) has the downside that it fundamentally alters the research question. Cross-sectional differences in levels of spending are neglected in favour of over-time variation, but I am interested in identifying determinants of spending across *countries* as well as over time. To alleviate potential problems of non-stationarity, I calculated the predicted changes of public education spending by regressing current levels of public spending on the one-period lagged level. This 'de-trended' time series suffers even less from non-stationarity. Model 3 in Table 3 is a model using differenced data to show that most determinants remain statistically significant, albeit at lower levels.

Interpretation and discussion

Socio-economic variables

Variables of the socio-economic environment have a high explanatory power. The level of economic development, measured via GDP per capita, is positively associated with public education spending, but its influence stems mainly from the cross-sectional dimension (see models 4 and 5 which include country fixed-effects). Therefore, it could be argued that the pure version of Wagner's law, which stipulates increasing spending with increasing economic development *over time*, is not validated. However, the fact that different levels of economic development in different countries can be linked to the variation in education spending shows that economic well-being has an impact. The lack of a robust positive association over time could be explained by the existence of a

'post-expansionist' effect, which has been found in a cross-sectional comparison of 50 US states (Busemeyer 2006), where differences in economic well-being are also highly pronounced. According to this thesis, the expansion of educational opportunities converges to an inherent limit, which is lower than in the case of social policies. Social policies can, in theory, be expanded up to a state of full decommodification. In contrast, the expansion of educational services has inherent limits because these services are mainly provided in kind (teaching) and not in cash. Primary and secondary education are nearly universal in modern industrial nations and constitute a more or less constant demand on public funding. Because our dependent variable is not measured in absolute terms but relative to the GDP, a constant demand for resources actually results in a decrease in the percentage spent on education when the economy grows. In other words, economic well-being and growth provide enough fiscal leeway in some countries to fund the existing education system with a decreasing share of the GDP. In Sweden, for example, the percentage of GDP spent on public education has fallen since the 1970s, although tertiary enrolment has increased continually. Strong economic development created such a great degree of fiscal leeway that education opportunities could be expanded while the overall cost of education decreased as a percentage of the country's GDP.⁸

In the pooled sample, however, the cross-sectional effect dominates the over-time effect, and therefore we observe a robust positive association between economic well-being and public education spending. According to the estimates, a difference in GDP per capita of 10,000 dollars (about the difference between the US and Germany) accounts for 0.15 percentage points in the difference in public education spending *per year* (!).⁹ Therefore, if the GDP per capita of country A is 10,000 dollars higher than that of country B for ten consecutive years, this accounts for a 1.5 percentage point difference in public education spending (which is almost a third of the OECD average in public education spending in 2002, cf. OECD 2005: 184).

The negative coefficient estimate of GDP growth indicates that public education spending behaves anti-cyclically. This thesis is confirmed by the weak correlation between economic growth and public education spending (0.08). The anti-cyclical behaviour of education spending is related to its high degree of constancy over time. In the case of social spending, changes in the socio-economic environment (e.g. rising unemployment levels) have a direct impact on spending. Many social policy programmes are entitlement programmes, and an increase in the number of entitled recipients has a direct impact on the amount of money to be spent. In the case of education spending, however, the connection between changes in the socio-economic environment and spending is mediated by the political system. Over the long run, sluggish growth might lead to lower spending, but the number of teachers and school buildings cannot be adjusted to short-term fluctuations in the business cycle because long-term personal and investment decisions are involved.

Demographic demand for education spending is measured by the variable 'population share of those aged 5 to 29'. As I have argued above, this variable

better captures the demographic demand for education services than Castles' 'tertiary enrolment' variable. Nevertheless, the finding is remarkable in that the population share of the young has a positive impact on education spending, while the share of the elderly population¹⁰ has no discernible influence. A significant body of scholarship (Poterba 1997; Heclo 1988; Lynch 2001; Pecchenino and Utendorf 1999) discusses the rising conflict between generations. Given that younger generations have less political clout than older generations, this expectation is reasonable. The results of Table 3 show, however, that in the case of education spending, a higher share of the young population results in higher spending. This finding can be attributed to the fact that spending on primary and secondary education constitutes the largest part of education spending in OECD countries (about 75 per cent). In addition, the provision of educational services in these sectors is largely demand-driven because it is nearly universal. In contrast to investments in higher education, spending on primary and secondary education is less dependent on political and institutional factors and is governed to a greater extent by long-established political routines. Therefore, we also find a strong positive association between total spending and the share of the young population.

Institutional variables

To test for the impact of the constitutional veto structure of a country, an updated version of the Huber *et al.* (1993) index was included in the regressions.¹¹ In the model specifications with the long time period and without country fixed-effects, the coefficient estimate of the veto index has the expected negative sign and is statistically significant.¹² What is more, there is a robust and positive association between public education and public social spending.¹³ Taken together, these two findings imply that a strong constitutional veto structure, which has slowed down welfare state expansion, has limited the growth of the public education state as well. An extensive public education system can be seen as an integral part of a universal welfare state. This question is also related to the overall division of labour between statist institutions and market mechanisms in the provision of (quasi-)public goods.

This conclusion is obvious in the case of the Scandinavian, social-democratic welfare states, which exhibit high levels of public education and social spending. In Anglo-Saxon countries like the United States, Australia, and also Canada, the division of labour is geared more toward market solutions. What is more, the strong federalism of these same three countries has protracted the centralization of fiscal policy authority on the federal level. Rising demand for educational services often contributed to the establishment and maintenance of private institutions, since public solutions were not readily available. Therefore, we observe higher private education spending in these countries, especially in the post-secondary sector. 'Caught in the middle' are Germany and other Continental countries that lack both a universal welfare state of Scandinavian proportions and a division of labour geared toward markets as unequivocally as it is in the Anglo-Saxon family of nations. Here, public as well as private

education spending are below average. In the case of Germany, the decentralization of education policy competencies to lower levels of government and the existence of autonomous social insurance institutions (in other words: a strong veto structure) limit the degree of the possible redistribution of fiscal resources from other policy areas to education.

The third institutional variable of interest is the degree of decentralization of tax revenue authority. Controlling for the fact that decentralization of tax authority is higher in federalist countries,¹⁴ I find a positive and statistically significant impact of fiscal decentralization on public education spending. Because primary and secondary education spending constitutes a large part of total education spending and because these services are mainly provided at the local or regional level, this finding indicates that in fiscally decentralized countries, lower levels of government are engaging in a 'race to the top' in order to attract residents to their localities. This finding is surprising, given that most economic theories of fiscal federalism expect a decline in public spending in decentralized countries caused by inter-regional tax competition (Kirchgässner 2001).

Partisan factors

The replication of Castles' analysis in the pooled time-series framework has shown (section 3) that government participation of rightist parties has a negative impact on public education spending. In the more encompassing model specifications of Table 3, this negative effect loses statistical significance (model 6), even though the sign of the coefficient estimate remains negative.¹⁵ Remarkably, government participation of social democratic parties does not have an impact on public education spending (z-value of 0.34 respectively in a modified version of model 6).

Splitting the sample into sub-periods (models 7 and 8) is indicative in two points. First, partisan effects are discernible only for the sub-period of the 1980s. This confirms the findings of Kittel and Obinger (2003), who notice the disappearance of partisan effects on spending in the 1990s. This fact is complemented by the finding that the coefficient estimate of the veto index loses statistical significance in the model for the sub-period of the 1990s as well.¹⁶ Several factors can contribute to the weakening of partisan and institutional influences: the intensification of globalization and the maturation of welfare states beyond the electorate's willingness to finance them diminish the leeway for spending increases. Powerful welfare state clientele groups limit the scope for downward retrenchment. Over the long run, however, partisan forces have had an impact on the size of the welfare state and also on the level of public spending. Figure 2 shows a positive association between the long-term average of the share of social democrats in government and current education spending levels.¹⁷ Taken together, these findings suggest that social democratic participation in government in the immediate post-war decades had a larger impact on the formation of the public education state than in the period since the 1980s. Furthermore, further research is needed to

Figure 2 Public education spending and government participation of social democrats, $R^2 = 0.34$

Note: Public education spending is taken from OECD (2005: 184–5); average government participation of social democrats is calculated using Schmidt (2003b).

determine whether partisan effects impact on educational sectors differently (see Busemeyer (2006) for initial studies of public higher education spending).

Secondly, model 7 shows that the negative impact of rightist parties on public education spending is largely attributable to government participation of secular conservative parties and not Christian democrats. In contrast to model 6, model 7 does not use Castles' definition of rightist parties, but instead adopts the perspective of Schmidt (1996, 2003b) and others by focusing on party families. The coefficient estimate of conservative government participation for the period of the 1980s remains negative, but the estimate for Christian democratic government participation is positive and statistically significant.¹⁸ This could be further evidence that levels of public spending tend to increase when Christian democrats are in power, although the evidence remains inconclusive at this point.

5. CONCLUSION

The starting point of this article was Castles' (1989, 1998) analysis of the determinants of public education spending in OECD countries. While a replication

of Castles' cross-sectional regressions yielded similar results, I found that most of Castles' explanatory variables do not hold up in a pooled time-series analysis. Consequently, an alternative model was proposed that includes socio-economic, institutional, and partisan variables. It was shown that the level of economic development, the share of the young population, the constitutional veto structure, the level of public social spending, and the degree of tax-revenue decentralization are the core determinants of public education spending in OECD democracies. Government participation of conservative parties had an impact on public education spending in the sub-period of the 1980s only.

Further research is needed to explore the relationship between fiscal decentralization and education spending. My initial findings indicate that, in fiscally decentralized countries, a 'race to the top' in the provision of locally provided public goods might emerge. Another route for further research is the analysis of sectoral education spending. Because primary and secondary education has by now become an integral part of the public goods bundle of most industrialized countries, an analysis of the determinants of higher education spending seems promising. So far, work in this field has been done mainly by economists (for example, Morgan *et al.* 2001) and therefore underestimates the impact of political and institutional variables.

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APPENDIX: DATA SOURCES AND DEFINITIONS

<i>Public education spending as percentage of GDP</i>	Real public educational expenditure as a percentage of real GDP. Source: OECD: Public Educational Expenditure, Costs and Financing: An Analysis of Trends 1970–1988, Paris, 1992, p. 84; OECD: Education at a Glance, Paris, diverse years.
<i>Tertiary enrolment</i>	Source for Castles' replication: Castles (1998). For pooled time-series analysis: gross enrolment ratios, tertiary level. Source: UNESCO Statistical Yearbook, several years.
<i>Public social spending</i>	Social expenditures: total public social expenditures in percentage of GDP. Source: OECD Health Data 2004.
<i>GDP per capita</i>	GDP per capita in G-K dollars. Source: A. Madison, <i>The World Economy: Historical Statistics</i> , OECD Development Centre Studies, 2003.
<i>Population share of those aged between 5 and 29</i>	Share of those aged 5 to 29 relative to total population. Source: OECD: Education at a Glance, Paris, diverse years. After 1996, own calculations based on UNESCO Statistical Yearbook.
<i>Population share of those aged 65 and above</i>	Share of those aged 65 and over relative to total population. Source: OECD Health Data 2004.
<i>GDP growth</i>	Year to year percentage change of real GDP. Source: OECD Historical Statistics; figures after 2000 from OECD Economic Outlook 73.
<i>Cabinet share of social democrats</i>	Cabinet share of social democratic parties. Source: Schmidt (2003b).
<i>Cabinet share of Christian democrats</i>	Cabinet share of Christian democratic parties. Source: Schmidt (2003b).
<i>Cabinet share of conservatives</i>	Cabinet share of conservative parties. Source: Schmidt (2003b).
<i>Veto index</i>	1 Updated version of the index of state structure (Huber <i>et al.</i> 1993). 2 Schmidt's index of veto players NIR. Source: Schmidt (2000: 352).
<i>Federal country</i>	Federalism dummy. Federal = 1, Unitary = 0. Source: Kobert (2005).
<i>Fiscal decentralization</i>	Degree of tax revenue decentralization. Source: Stegarescu (2004).

NOTES

- 1 The research for this article was supported by funding from the German Research Foundation (DFG) and conducted as part of the research project 'Education Spending in International Comparison' under the direction of Professor Manfred G. Schmidt of the University of Heidelberg, Germany. I am very grateful for comments and support from Professor Schmidt and from my colleagues Rita Nikolai and Frieder Wolf. I would also like to thank Uwe Wagschal, Herbert Obinger, Nico Siegel, Gunther Hega, Bernhard Kittel, Jens Hainmüller and Frank Castles and the participants of the research workshop at the Institute for Political Science in Heidelberg, and the participants and audience of the panel on 'Determinants of Human Capital Investment' at the MPSA Conference, Chicago, 2006 for helpful comments and suggestions.
- 2 The (cross-sectional) variation coefficient of education spending is only slightly lower (0.17) than the coefficient for social spending (0.2).
- 3 Of course, the relationship between education spending and economic development is reciprocal. As studies have shown, investment in education is beneficial for economic development (Nijkamp and Poot 2004).
- 4 In this regard, I support Castles' approach of using cross-sectional regressions with long-term average values for partisan government participation.
- 5 (The following is based on Fox 1997: ch.16.1.) The idea of the bootstrap is to treat the sample as if it were the whole population. For n number of times (in our case: 1,000), re-samples are drawn *with* replacement from the original sample. This means that a given country can appear more than once in these new samples. The statistical procedure in question, in our case simple linear regression, is performed on each of the new samples and the estimates obtained are saved in a matrix. The final bootstrapped estimates are average values of all the saved estimates in the matrix.
- 6 Austria, Australia, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Italy, Ireland, Japan, New Zealand, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, the UK, the USA.
- 7 The inclusion of country fixed-effects in model specifications with a lagged dependent variable introduces a further bias on the coefficient estimates via the LDV (Kittel and Winner 2002: 18).
- 8 Of course, this is not true for public spending on higher education in Sweden, which has increased since the 1990s.
- 9 Predictions are based on models using levels of public spending instead of predicted change and cannot be derived from the results in Table 3 directly. More detailed regression results on request and in Bussemeyer (2006).
- 10 Regression results can be provided on demand.
- 11 Alternatively, regressions were run with the Schmidt veto index (Schmidt 2000: 353). In the end, I preferred the Huber, Ragin and Stephens index because it focuses on the institutional context, while Schmidt's index also includes indicators of political or societal veto power (for example, coalition government or consociationalism).
- 12 When country fixed-effects are included, the veto index loses statistical significance because it does not change much over time and the country fixed-effects dominate its impact. In the sub-period models (models 7 and 8), the cross-sectional variation of the veto index is not large enough to achieve statistical significance at conventional levels because of the shorter time frame.
- 13 Owing to non-stationarity problems, I included change in public social spending as an independent variable instead of levels of spending. Furthermore, the association between education and social spending suffers from problems of endogeneity, therefore social spending is not included in the base model (model 1).

- 14 This is done by including the veto index in the regression model.
- 15 When using moving average values for government participation of rightist parties, the z-value of the coefficient estimate remains essentially the same (-1.18).
- 16 However, we might be observing a statistical artefact: the veto index changes little over time and the brief time period of the 1990s does not contain enough cross-sectional variation to yield statistically significant estimates.
- 17 A similar graph, with reversed signs, can be drawn for the conservative party family.
- 18 The results are similar when I use an interactive term between Christian democratic government participation and a dummy variable for Germany, Italy, and Austria instead of the general government participation variable.

REFERENCES

- Allmendinger, J. and Aisenbrey, S. (2002) 'Soziologische Bildungsforschung', in R. Tippelt (ed.), *Handbuch Bildungsforschung*, Opladen: Leske + Budrich, pp. 41–60.
- Beck, N. and Katz, J.N. (1995) 'What to do (and not to do) with time-series cross-section data', *American Political Science Review* 89(3): 634–47.
- Beck, N. and Katz, J.N. (1996) 'Nuisance vs. substance: specifying and estimating time-series cross-section models', *Political Analysis* 6: 1–36.
- Boix, C. (1997) 'Political parties and the supply side of the economy: the provision of physical and human capital in advanced economies, 1960–1990', *American Journal of Political Science* 41(3): 814–45.
- Boix, C. (1998) *Political Parties, Growth and Equality: Conservative and Social Democratic Economic Strategies in the World Economy*, Cambridge: Cambridge University Press.
- Busemeyer, M.R. (2006) *Die Bildungsausgaben der USA im internationalen Vergleich: Politische Geschichte, Debatten und Erklärungsansätze*, Wiesbaden: Deutscher Universitäts-Verlag.
- Cameron, D.R. and Hofferbert, R.I. (1974) 'The impact of federalism on education finance: a comparative analysis', *European Journal of Political Research* 2: 225–58.
- Castles, F.G. (1982) 'The impact of parties on public expenditure', in F.G. Castles (ed.), *The Impact of Parties: Politics and Policies in Democratic Capitalist States*, London: Sage, pp. 21–96.
- Castles, F.G. (1989) 'Explaining public education expenditure in OECD nations', *European Journal of Political Research* 17: 431–48.
- Castles, F.G. (1994) 'On religion and public policy: does Catholicism make a difference?', *European Journal of Political Research* 25: 19–40.
- Castles, F.G. (1998) *Comparative Public Policy: Patterns of Post-War Transformation*, Cheltenham: Edward Elgar.
- Darby, J., Li, C.-W. and Muscatelli, V.A. (2004) 'Political uncertainty, public expenditure and growth', *European Journal of Political Economy* 20: 153–79.
- Dawson, R.E. and Robinson, J.A. (1963) 'Inter-party competition, economic variables, and welfare policies in the American states', *Journal of Politics* 2: 265–89.
- Esping-Andersen, G. (1985) 'Power and distributional regimes', *Politics & Society* 14(2): 223–56.
- Färber, G. (2000) 'Bildungsreform durch Reform der Bildungsfinanzierung?', in R. Weizsäcker (ed.), *Schul- und Hochschulorganisation*, Berlin: Duncker & Humblot, pp. 165–220.
- Fernández, R. and Rogerson, R. (1997) 'The determinants of public education expenditures: evidence from the States, 1950–1990', *NBER Working Paper* 5995, Cambridge, MA.

- Fox, J. (1997) *Applied Regression Analysis, Linear Models, and Related Methods*, London: Sage.
- Garrett, G. (1998) *Partisan Politics in the Global Economy*, Cambridge: Cambridge University Press.
- Garrett, G. and Lange, P. (1991) 'Political responses to interdependence: what's "left" for the Left?', *International Organization* 45(4): 539–64.
- Glennester, H. (2001) 'United Kingdom education 1997–2001', *CASEpaper* 50, Centre for Analysis of Social Exclusion, London School of Economics and Political Science.
- Gray, V. (1976) 'Models of comparative state politics: a comparison of cross-sectional and time series analysis', *American Journal of Political Science* 20(2): 235–56.
- Hanushek, E.A. and Rivkin, S.G. (1996) 'Understanding the 20th century growth in US school spending', *NBER Working Paper* 5547, Cambridge, MA.
- Heclo, H. (1988) 'Generational politics', in J.L. Palmer, T. Smeeding and B.B. Torrey (ed.), *The Vulnerable*, Washington, DC: The Urban Institute Press, pp. 381–411.
- Hega, G.M. and Hokenmaier, K.G. (2002) 'The welfare state and education: a comparison of social and educational policy in advanced industrial societies', *German Policy Studies* 2(1): 143–73.
- Hetmeier, H.-W. and Weiß, M. (2001) 'Bildungsausgaben', in W. Böttcher, K. Klemm and T. Rauschenbach (eds), *Bildung und Soziales in Zahlen*, Weinheim, München: Juventa, pp. 39–55.
- Hibbs, D.A. (1977) 'Political parties and macroeconomic policy', *American Political Science Review* 71: 1467–87.
- Hicks, A.M. and Swank, D.H. (1984) 'On the political economy of welfare expansion: a comparative analysis of 18 advanced capitalist democracies, 1960–1971', *Comparative Political Studies* 17(1): 81–119.
- Hicks, A.M. and Swank, D.H. (1992) 'Politics, institutions, and welfare spending in industrialized democracies, 1960–1982', *American Political Science Review* 86(3): 658–74.
- Hokenmaier, K.G. (2002) *Education, Social Security, and the Welfare State: Alternative Policy Choices in the United States and Germany*, dissertation, Western Michigan University, Kalamazoo.
- Huber, E. and Stephens, J.D. (2001) *Development and Crisis of the Welfare State: Parties and Policies in Global Markets*, Chicago: University of Chicago Press.
- Huber, E., Ragin, C. and Stephens, J.D. (1993) 'Social democracy, Christian democracy, constitutional structure, and the welfare state', *American Journal of Sociology* 99(3): 711–40.
- Iversen, T. and Cusack, T.R. (2000) 'The causes of welfare state expansion: deindustrialization or globalization?', *World Politics* 52: 313–49.
- Jorgenson, L.P. (1987) *The State and the Non-Public School, 1825–1925*, Columbia: University of Missouri Press.
- Kaufman, R.R. and Segura-Ubiergo, A. (2001) 'Globalization, domestic politics, and social spending in Latin America: a time-series cross-section analysis, 1973–97', *World Politics* 2001/July: 553–87.
- Kirchgässner, G. (2001) 'The effects of fiscal institutions on public finance: a survey of the empirical evidence', *CESifo Working Paper Series* No. 617, *University of St Gallen Discussion Paper* No. 2001–15, St Gallen.
- Kittel, B. (2006) 'Statistical narratives and the properties of macro-level variables: labor market institutions and employment performance in macrocomparative research'. Paper presented at the Conference on Method and Substance in Macrocomparative Analysis, April 2006, Amsterdam Institute for Advanced Labor Studies.

- Kittel, B. and Obinger, H. (2003) 'Political parties, institutions, and the dynamics of social expenditure in times of austerity', *Journal of European Public Policy* 10(1): 20–45.
- Kittel, B. and Winner, H. (2002) 'How reliable is pooled analysis in political economy? The globalization–welfare state nexus revisited', *MPIfG Discussion Paper* 02/3, Köln.
- Klass, G.M. (1979) 'The determination of policy and politics in the American states, 1948–1974', *Policy Studies Journal* 7(4): 745–52.
- Klemm, K. (2003) 'Bildungsausgaben: Woher sie kommen, wohin sie fließen', in K.S. Cortina (ed.), *Das Bildungswesen in der Bundesrepublik Deutschland*, Reinbeck: Rowohlt, pp. 214–51.
- Kobert, H. (Red.) (2005) *Der Fischer Weltalmanach*, Frankfurt am Main: Fischer.
- Kohl, J. (1981) 'Trends and problems in postwar public expenditure development in Western Europe and North America', in P. Flora and A.J. Heidenheimer (eds), *The Development of Welfare States in Europe and America*, New Brunswick and London: Transaction Books, pp. 307–44.
- Lepenies, W. (2003) 'Das Ende der Bildungsrepublik', *Süddeutsche Zeitung* 6–7 December, p. 4.
- Lynch, J. (2001) 'The age-orientation of social policy regimes in OECD countries', *Journal of Social Policy* 30(3): 411–36.
- Manow, P. (2004) "'The good, the bad, and the ugly" – Esping-Andersen's regime typology and the religious roots of the western welfare state', *MPIfG Working Paper* 04/3, Köln.
- Meltzer, A.H. and Richard, S.F. (1981) 'A rational theory of the size of government', *Journal of Political Economy* 89: 914–27.
- Morgan, D.R., Kickham, K. and LaPlant, J.T. (2001) 'State support for higher education: a political economy approach', *Policy Studies Journal* 29(3): 359–71.
- Nelson, F.H. (1992) 'The myth of high public spending on American education', American Federation of Teachers, Washington, DC.
- Nelson, F.H. (1996) 'How and how much the US spends on K-12 education: an international comparison', American Federation of Teachers, Washington, DC.
- Nijkamp, P. and Poot, J. (2004) 'Meta-analysis of the effect of fiscal policies on long-run growth', *European Journal of Political Economy* 20: 91–124.
- Nikolai, R. (2006) *Die Bildungsausgaben der Schweiz im intranationalen und internationalen Vergleich*, dissertation, Heidelberg: University of Heidelberg.
- Obinger, H. (2004) *Politik und Wirtschaftswachstum: Ein internationaler Vergleich*, Wiesbaden: Verlag für Sozialwissenschaften.
- Obinger, H. and Wagschal, U. (2000) 'Ökonomie, Institutionen und Politik: Determinanten der gebremsten Sozialstaatlichkeit im Überblick', in H. Obinger and U. Wagschal (eds), *Der gezügelte Wohlfahrtsstaat: Sozialpolitik in reichen Industrienationen*, Frankfurt a. M: Campus.
- OECD (2005) *Education at a Glance: OECD Indicators*, Paris: OECD.
- Pecchenino, R.A. and Utendorf, K.R. (1999) 'Social security, social welfare and the aging population', *Journal of Population Economics* 12: 607–23.
- Pierson, P. (2001) 'Coping with permanent austerity: welfare state restructuring in affluent democracies', in P. Pierson (ed.), *The New Politics of the Welfare State*, Oxford: Oxford University Press, pp. 410–56.
- Pierson, P. (2004) *Politics in Time: History, Institutions, and Social Analysis*, Princeton, NJ: Princeton University Press.
- Poterba, J.M. (1997) 'Demographic structure and the political economy of public education', *Journal of Policy Analysis and Management* 16(1): 48–66.
- Ram, R. (1995) 'Public educational expenditures in the United States: an analytical comparison with other industrialized countries', *Economics of Education Review* 14(1): 53–61.

- Schmidt, M.G. (1996) 'When parties matter: a review of the possibilities and limits of partisan influence on public policy', *European Journal of Political Research* 30: 155–83.
- Schmidt, M.G. (2000) *Demokratietheorien*, Opladen: Leske + Budrich.
- Schmidt, M.G. (2002) 'Warum Mittelmaß? Deutschlands Bildungsausgaben im internationalen Vergleich', *Politische Vierteljahresschrift* 43: 3–19.
- Schmidt, M.G. (2003a) 'Ausgaben für Bildung im internationalen Vergleich', *Aus Politik und Zeitgeschichte* B21–22: 6–11.
- Schmidt, M.G. (2003b) 'Die parteipolitische Zusammensetzung von Regierungen der OECD-Demokratien', Institute for Political Science, University of Heidelberg.
- Schmidt, M.G. (2004) 'Die öffentlichen und privaten Bildungsausgaben Deutschlands im internationalen Vergleich', *ZSE* 1/2004: 7–31.
- Schmidt, M.G. (2006) 'Testing the retrenchment hypothesis: the case of public and private expenditure on education in 21 OECD countries (1960–2002)'. Paper prepared for the Hanse Wissenschaftskolleg Conference on the Disappearing State, March 2006.
- Schmidt, M.G., Busemeyer, M.R., Nikolai, R. and Wolf, F. (2006) *Bildungsausgaben im inter- und intranationalen Vergleich: Bestimmungsfaktoren öffentlicher Bildungsausgaben in OECD-Staaten* (unpublished research report). Heidelberg: University of Heidelberg, Institute for Political Science.
- Siegel, N.A. (2002) *Baustelle Sozialpolitik: Konsolidierung und Rückbau im internationalen Vergleich*, Frankfurt a. M.: Campus.
- Stegarescu, D. (2004) 'Public sector decentralization: measurement concepts and recent international trends', *ZEW Discussion Paper* 04–74, Mannheim.
- Timmermann, D. (2002) 'Bildungsökonomie', in R. Tippelt (ed.), *Handbuch Bildungsforschung*, Opladen: Leske + Budrich, pp. 81–122.
- Van Kersbergen, K. (1995) *Social Capitalism: A Study of Christian Democracy and the Welfare State*, London and New York: Routledge.
- Verner, J.G. (1979) 'Socioeconomic environment, political system, and educational policy outcomes: a comparative analysis of 102 countries', *Comparative Politics* 11(2): 165–87.
- Wilensky, H.L. (1975) *The Welfare State and Equality: Structural and Ideological Roots of Public Expenditures*, Berkeley, CA: University of California Press.
- Wilensky, H.L. (1981) 'Leftism, Catholicism, and democratic corporatism: the role of political parties in recent welfare state development', in P. Flora and A.J. Heidenheimer (eds), *The Development of Welfare States in Europe and America*, New Brunswick and London: Transaction Books, pp. 345–82.
- Wilensky, H.L. (2002) *Rich Democracies: Political Economy, Public Policy, and Performance*, Berkeley, CA: University of California Press.
- Wilensky, H.L., Luebbert, G.M., Hahn, S.R. and Jamieson, A.M. (1987) 'Comparative social policy: theories, methods, findings', in M. Dierkes, H.N. Weiler and A.B. Antal (eds), *Comparative Policy Research: Learning from Experience*, Aldershot: Gower, pp. 381–457.
- Wolf, F. (2006) *Die Bildungsausgaben der Bundesländer im Vergleich: Welche Faktoren erklären ihre beträchtliche Variation?*, Münster: LIT.
- Zöllner, D. (1963) *Öffentliche Sozialleistungen und wirtschaftliche Entwicklung*, Berlin: Duncker & Humblot.