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Is post-communist health spending unusual?

A comparison with established market economies[1]

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Abstract

What factors determine a country's spending on health? And what factors determine the share of spending financed by the public sector? Taking these factors into account, is post-communist health spending unusual? For the OECD economies, we find that *per capita* health spending is strongly related to *per capita* income, with an elasticity of about 1.5. The elasticity for developing economies is close to one. Spending is also positively related to the elderly dependency rate, but the relationship is weaker than a static comparison of spending by the elderly and non-elderly would suggest. Even though health spending as a share of GDP in the post-communist countries of eastern and central Europe is below the OECD average, there is evidence of above normal health spending in most countries when we control for income and demographics. For Hungary, the 'excess' spending reached over three percentage points of GDP in 1994. For the OECD sample, four development indicators account for half the variation in the public sector share of total health spending. Political variables help explain the remainder. If the post-communist countries converge to the market economy pattern, the share of public financing will fall, yet still remain well above half.

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1. Introduction

For most sectors of the economies making the transition from communism to capitalism, the established market economies provide a clear road map for required reforms. For a successful transition, prices must be market determined, enterprise entry and exit allowed, and enterprises predominantly privately owned. Accordingly, the freeing of most prices, allowing competition, ending subsidies to loss-making enterprises, and (more slowly) the transfer of state property to private owners, have been pursued to varying degrees by countries embarking on transition.

For the health sector, the model provided by established market economies is more ambiguous, so that it is less obvious how the transformation of this sector should proceed, or even if radical transformation is required at all. At the most basic level, market economies differ greatly in the fraction of resources they devote to health care. Even comparing the United Kingdom with the United States, two countries that are generally thought to practice an especially market driven form of capitalism, there are sharp differences in the resource allocations to health. The United States devotes more than 14 per cent of GDP to health, compared to just half that share in the United Kingdom. In the United Kingdom, the public sector accounts for more than 80 per cent of total health spending, almost twice the share in the United States. For all the OECD countries, the (unweighted) average share of GDP devoted to health in the early 1990s was around 7.5 per cent. Given the considerable variation in OECD spending, the more advanced transition economies had expenditure shares that were within one standard deviation of this benchmark.[2] Moreover, the average public share of total spending was about three-quarters, meaning that the public sector-dominated systems of the transition economies were not too out of line, especially when compared with the high public shares of the Western European countries. Since post-communist health spending was not grossly atypical, health system reform was initially low on the list of transition priorities. Over time, however, fiscal pressures and deteriorating health outcomes have pushed health system reform into the spotlight.

There is an on-going debate among health economists and politicians in transition economies, as well as among the international institutions involved with transition, about the right size of the health sector for this region. Is it overblown or too small? Does the public sector spend too much or not enough? Our approach in this paper is to stand back from the details of specific country reforms, and to look more closely than heretofore at the patterns that exist in market economy health spending. With this 'normal' pattern in hand, we then compare the spending patterns of the post-communist economies over the course of the transition. In establishing the normal pattern, we are interested in a number of questions, the answers to which we hope will also interest health specialists not directly concerned with post-communist transition. How does health spending

[2] In the early 1990s, the standard deviation was approximately 2 percentage points of GDP.

vary with income and the demographic structure of the population? Controlling for income and demographics, has there been a tendency for health spending to increase over time as a result of developments in health care technologies and innovations in systems of delivery and financing? Does the extent of public involvement tend to affect the overall level of spending on health? Are the determinants of health care spending different in developed and developing countries? Are there development-related patterns in the extent of reliance on the public sector, or are differences between countries largely attributable to politics? Given the answers to these questions, how do the spending patterns of the post-communist countries compare with those of the market economies?

The paper is organized as follows. In the next section, we outline a simple framework for estimating the determinants of health spending across countries and time, and apply that framework to a pooled OECD dataset. We also apply the framework to a cross-section of developed (OECD) and developing countries to see if the estimated relationships apply to poorer countries as well. In Section 3, we tentatively compare post-communist health spending with the market economy relationships estimated in Section 2, with special focus on the Hungarian case (both because we know it best and are surer about the quality of the data). In Section 4, we attempt to account for differences in the public sector share using both economic and political variables. We again pay particular attention to Hungary, comparing the evolution of its public share of total health spending with the predicted share based on our estimate of the normal market economy pattern. Section 5 contains some concluding comments.

2. What determines how much a country spends on health? International evidence

2.1 A simple framework

In this section, we attempt to distil from international evidence the main determinants of *per capita* health spending in market economies. We first examine a pooled sample of 25 OECD economies over the 25-year period from 1970 to 1994; this sample provides our main comparison group. We also examine a larger 1990 cross-section of 81 developed and developing countries, to see if our estimated relationship holds up in a broader sample of countries.

The dependent variable for both datasets is *per capita* health spending adjusted for GDP purchasing power parities and measured in constant (1990) US dollars.[3] Our measure of health spending is thus the *per capita* opportunity cost (in terms of foregone GDP per person) of the resources devoted to health. With this definition,

[3] The pooled sample uses OECD purchasing power parity calculations with *per capita* spending measured in 1990 US dollars. The cross-section uses the purchasing power parity calculations from the Penn World Tables (see Summers and Heston, 1991, with updated data taken from the NBER website, http://www.nber.org/pwt56.html) measured in 1985 US dollars.

per capita health spending is equal to the product of share of health spending in GDP and *per capita* GDP. Tables 1 and 2 show the share of GDP and *per capita* health spending for selected years in the OECD sample.

Table 1. Health spending as a percentage of GDP (25 OECD countries; selected years, 1970 to 1994)

	1970	1974	1978	1982	1986	1990	1994
Australia	5.7	6.5	7.6	7.7	8.0	8.3	8.5
Austria	5.3	5.6	7.7	6.7	6.9	7.2	8.0
Belgium	4.1	4.7	6.8	7.2	7.4	7.5	8.0
Canada	7.1	6.8	7.2	8.3	8.7	9.2	9.9
Denmark	6.1	7.1	6.6	8.9	7.9	8.2	8.2
Finland	5.7	5.8	6.8	6.8	7.4	8.0	7.9
France	5.8	6.3	7.3	8.0	8.5	8.9	9.7
Germany	6.3	8.0	8.7	9.1	9.2	8.7	10.0
Greece	3.3	3.3	3.4	3.6	4.4	4.2	5.4
Iceland	5.0	5.4	6.0	6.7	7.7	7.9	8.1
Ireland	5.3	7.1	7.7	8.1	7.7	6.7	7.2
Italy	5.2	5.9	5.9	7.0	7.0	8.1	8.4
Japan	4.4	5.0	5.9	6.7	6.6	6.0	7.0
Korea	2.1	2.6	2.5	3.4	3.8	3.9	3.8
Luxembourg	3.7	3.8	6.0	6.3	6.0	6.6	6.5
Netherlands	5.9	7.0	7.6	8.3	8.0	8.3	8.8
New Zealand	5.2	6.1	7.1	6.1	5.3	7.0	7.3
Norway	4.5	5.5	6.8	6.9	7.2	7.8	7.8
Portugal	2.8	4.1	5.1	6.1	6.9	6.5	7.8
Spain	3.7	4.6	5.6	5.9	5.6	6.9	7.4
Sweden	7.1	7.6	9.1	9.6	8.7	8.8	8.7
Switzerland	4.9	5.9	6.8	7.2	8.0	8.3	9.5
Turkey	2.4	2.4	3.4	2.9	2.7	3.6	3.6
United Kingdom	4.5	5.3	5.3	5.8	5.9	6.0	6.9
United States	7.3	7.8	8.6	10.2	10.8	12.6	14.1
Mean	4.9	5.6	6.5	6.9	7.1	7.4	7.9
Standard deviation	1.4	1.5	1.6	1.8	1.8	1.9	2.1
Coefficient of variation	0.29	0.27	0.25	0.26	0.25	0.25	0.26

Source: OECD Health Data 1998.

Table 2. Health spending per person, in 1990 US dollars (adjusted for GDP PPPs)

				Average annual compound growth			
				Health spending per person (%)		*GDP per person (PPP) (%)*	
	1970	**1982**	**1994**	**1970–82**	**1982–94**	**1970–82**	**1982–94**
Australia	672	1077	1453	4.0	2.5	1.4	1.7
Austria	512	926	1432	5.1	3.7	3.0	2.2
Belgium	425	1009	1471	7.5	3.2	2.5	2.3
Canada	813	1267	1791	3.8	2.9	2.4	1.4
Denmark	690	1237	1496	5.0	1.6	1.7	2.3
Finland	531	894	1153	4.4	2.1	2.9	0.9
France	662	1198	1671	5.1	2.8	2.3	1.2
Germany	566	1059	1765	5.4	4.3	2.2	3.5
Greece	189	294	565	3.8	5.6	3.0	2.1
Iceland	445	1027	1408	7.2	2.7	4.6	1.1
Ireland	316	688	1011	6.7	3.3	3.0	4.3
Italy	502	924	1402	5.2	3.5	2.6	2.0
Japan	419	904	1330	6.6	3.3	3.0	2.9
Korea	45	141	386	10.0	8.7	5.7	7.7
Luxembourg	475	976	1753	6.2	5.0	1.6	4.7
Netherlands	653	1098	1481	4.4	2.5	1.5	2.0
New Zealand	568	777	1068	2.6	2.7	1.3	1.2
Norway	428	994	1529	7.3	3.7	3.5	2.6
Portugal	141	445	839	10.1	5.4	3.2	3.3
Spain	263	542	909	6.2	4.4	2.2	2.4
Sweden	869	1390	1364	4.0	–0.2	1.4	0.7
Switzerland	814	1313	2052	4.1	3.8	0.8	1.4
Turkey	72	107	170	3.4	3.9	1.8	2.1
United Kingdom	464	733	1083	3.9	3.3	1.7	1.8
United States	1159	1880	3246	4.1	4.7	1.3	1.9
Mean	508	916	1353	5.4	3.6	2.4	2.4
Standard deviation	260	400	596	1.9	1.6	1.1	1.5
Coefficient of variation	0.51	0.44	0.44	0.35	0.46	0.46	0.63

Source: OECD Health Data 1998.

In estimating the normal health-spending pattern we draw on a framework developed in a companion paper, Kornai and McHale (1999). The interested reader is referred to that paper for an elaboration of our approach.[4] The framework integrates the strong log-linear relationship observed in most health spending studies, with a systematic method allowing for shifts in this relationship due to changes in demographics, technology, etc.

More specifically, we assume that in any given year there is a constant elasticity relationship between *per capita* health spending on *non*-elderly individuals (h_{it}^n) and *per capita* GDP (y_{it}) given by,

$$h_{it}^n = A_t y_{it}^{\beta} e^{u_{it}} , \tag{1}$$

where i indexes the country and t indexes the year (1 to T), β is the income elasticity of health spending, and u_{it} is i.i.d with zero mean and constant variance. The value of the time-specific constant, A_t , is A_1 in the first year and A_1 multiplied by some time-specific factor, e^{α_t} , in subsequent years. Technical change that increases *per capita* health spending for a given *per capita* GDP shows up as an increase in α , and this will shift the income-health relationship upwards.

Average health spending on the elderly (h_{it}^e) is assumed to be a constant multiple, $1+\gamma$, of spending on the non-elderly. Letting d_{it} represent the dependency rate (defined as the ratio of the elderly population to the total population) for country i in year t, *per capita* health spending can be written as a population-weighted average of *per capita* spending on the elderly and non-elderly,

$$\begin{aligned} h_{it} &= (1-d_{it})h_{it}^n + d_{it}h_{it}^e \\ &= (1-d_{it})h_{it}^n + d_{it}(1+\gamma)h_{it}^n \\ &= h_{it}^n (1+\gamma d_{it}) \\ &= A_t y_{it}^{\beta} (1+\gamma d_{it}) e^{u_{it}} \end{aligned} \tag{2}$$

Taking logs, and introducing separate dummy variables ($D_2 \ldots D_T$) to allow for time-specific intercepts for each year after the first, yields the following convenient regression for econometric estimation.

[4] The literature on the determinants of cross-country differences in *per capita* health spending has been very active in recent years and remains quite unsettled. For an excellent recent survey of the field see Gerdtham and Jonsson (1999).

$$\ln h_{it} = \ln A_1 + \sum_{t=2}^{T} \alpha_t D_t + \beta \ln y_{it} + \ln(1+\gamma d_{it}) + u_{it}$$

$$\approx \ln A_1 + \sum_{t=2}^{T} \alpha_t D_t + \beta \ln y_{it} + \gamma d_{it} + u_{it}. \qquad (3)$$

With the above approximation, the coefficient on the dependency rate variable provides an estimate of the 'premium' health spending on the elderly. The approximation will be more accurate the lower the elderly dependency ratio and the lower the true premium.[5] Other demographic variables can be added and interpreted using a similar technique. Turning to the time dummies, a significantly positive coefficient on the dummy for the tenth time period, say, is consistent with a technologically-induced increase in *per capita* health spending by the tenth year of the sample.[6] Of course, any observed shifting of the regression line might be due to factors other than technology and demographics. One alternative shift factor is organizational innovation. For example, a better understanding of the relative advantages of financing arrangements based on fee for service and capitation, or the ability to control costs using global budgets, could lead a number of countries to pursue reforms that shift the estimated income-health spending relationship. How can shifts due to such organizational innovation be distinguished from shifts due to new technology? We might be able to get some clues by looking at the pattern of time dummy coefficients. If new technical knowledge is causing the income-health spending relationship to shift upwards over time, it is likely that the process is relatively smooth from year to year. Thus if there is a secular upward drift in the estimated relationship, this is suggestive of a technology-driven process. Another possibility is that there is a secular drift upwards, but the relationship jumps up or down during periods of organizational innovation. In this case, if we can isolate the periods of organizational reform, we might be able to identify the underlying impact of technology.

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[5] For example, if the elderly dependency ratio is 0.13 (about the OECD average in 1990) and the elderly spend twice as much as the non-elderly on health care (so that γ equals 1), then $\ln(1+\gamma d)$ equals 0.122. The approximation is less good if γ is as high as 3. In this case γd equals 0.39 while $\ln(1+\gamma d)$ equals 0.329. However, our econometric estimates for the pooled OECD sample put γ at around 1, so the approximation seems reasonable.

[6] Note that if the time specific technology factor is growing at a constant rate, *g*, the intercept in year *t* is $\ln A_1 + gt$; i.e., the intercept in the log regression grows linearly with time.

2.2 Pooled sample regression results

The pooled sample regression results are reported in Table 3. A robust finding is that the income elasticity of health spending is significantly greater than one. Although the estimates of this elasticity in the literature have typically found it to be greater than one, our estimate – which does not seem to be sensitive to adding demographic controls and time fixed effects to the regression – is high at around 1.5.[7]

Table 3. Regression results for the pooled time series/cross-section OECD sample
Dependent variable: log *per capita* health spending

Explanatory variables	(1)	(2)	(3)	(4)
Log *per capita* GDP	1.598*	1.659*	1.525*	1.537*
	(0.0190)	(0.023)	(0.025)	(0.026)
Elderly dependency rate			0.758**	0.997*
(share of population 65 and over)			(0.321)	(0.364)
Female to male labour force ratio			0.399*	0.353*
			(0.065)	(0.066)
Public share of total health spending				–0.090
				(–0.061)
Time fixed effects	Yes		Yes	Yes
Country fixed effects		Yes		
Constant	–8.493	–8.810	–8.101	–8.144
Adjusted R^2	0.932	0.978	0.937	0.935
Observations	625	625	625	614

Notes: Standard errors are in parentheses. *Significance at the 1 per cent level; **Significance at the 5 per cent level.

The results also indicate that demographic composition affects health spending. Not surprisingly, we find that controlling for income, older populations have higher health spending, although the size of the coefficient is not large. A percentage point increase in the elderly dependency rate is associated with about a 0.75 per cent increase in *per capita* spending. To put this estimate in perspective, it implies that the roughly 10 percentage point increase in the elderly dependency rate for OECD countries that is projected to take place between 2000 and 2030 (from 13 per cent to 23 per cent) would, all else equal, increase *per capita* health

[7] The literature on the relationship between income and health spending includes important contributions from Culyer (1992); Gerdtham *et al.* (1992); Hitiris and Posnett (1992); Kleiman (1974); Newhouse (1977); Newhouse (1987); and Parkin *et al.* (1987).

spending by 7.5 per cent. Given our formulation, this coefficient is consistent with an elderly person spending, on average, about 1.75 times what a non-elderly person spends, a multiple that is lower than direct OECD estimates of this ration (see OECD 1997b).[8] One interpretation of the small estimated effect of ageing is that health systems respond to an older population, and the increased spending pressures it gives rise to, by reducing spending on the non-elderly population. On this interpretation, the coefficient can be viewed as an estimate of the 'general equilibrium' effect of population ageing. If this attenuation of the effect of ageing were to continue, the rapid population ageing that is set to occur over the next three decades will lead to smaller increases in *per capita* health spending than the direct comparisons (or partial equilibrium estimates) would indicate.

There is also evidence that a greater prevalence of two-earner families leads to a significant increase in health spending, which is especially relevant to the post communist economies given their inheritance of high female participation rates (Kornai, 1992), and the tendency for those rates to fall in the early transition years. The importance of two-earner families is proxied by the ratio of female to male members in the labour force, where the male labour force is taken as an estimate of the potential female labour force. One implication of greater female participation is that there are fewer possibilities for the provision of care directly through the household, leading to a greater reliance on market-provided care. (Greater female participation is also likely to be associated with better household education about the benefits of medical care, which should also cause *per capita* spending to increase.) Controlling for income and the elderly dependency rate, we find that an increase of one percentage point in the female / male labour force ratio leads to a 0.4 per cent increase in health spending.[9]

The only variable that we include that might capture some of the differences in the organization of health care across time and countries is the share of public spending in total health spending. The conventional wisdom is that more centralized, government-dominated health care systems (such as the National Health Service in the United Kingdom) are better at controlling costs than more decentralized, private-sector dominated systems (such as exists in the United States).[10] Although this variable does enter with a negative sign, it is not significant by a conventional t-test at the 10 per cent significance level (with or without demographic controls).

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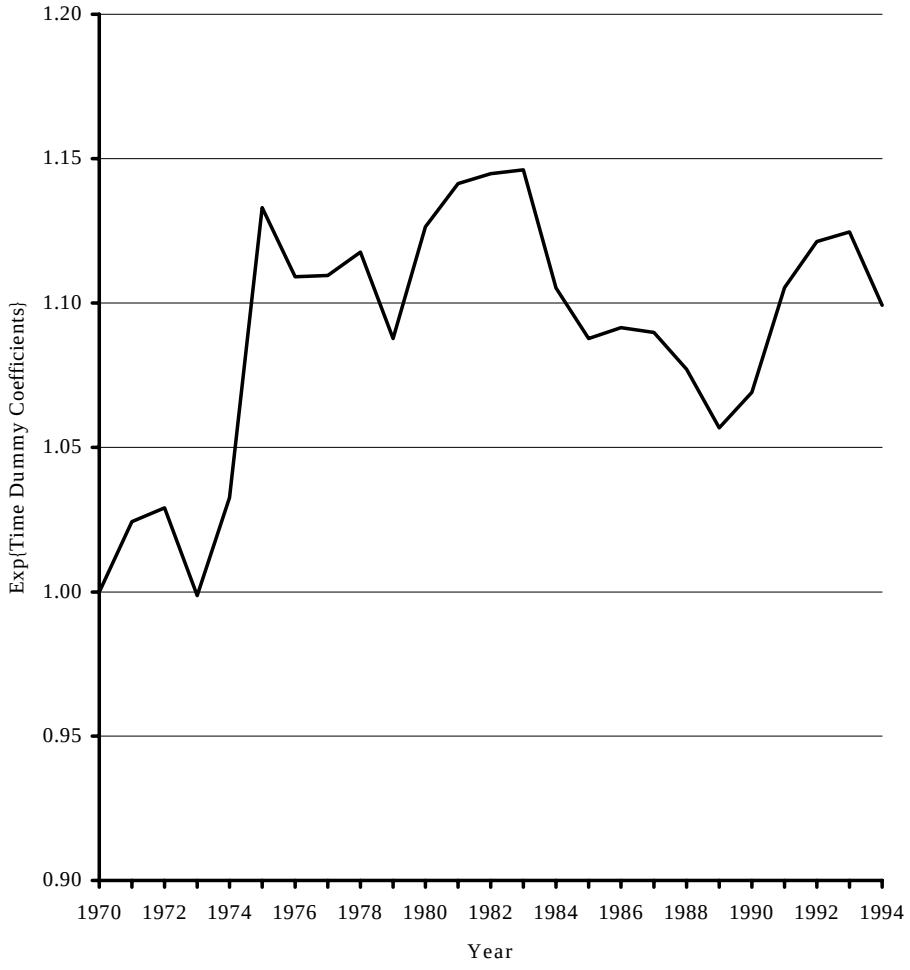
[8] The OECD estimates of this multiple differ quite a lot between countries. Thus this estimate, which is an average across countries, might be a considerable underestimate of the impact of ageing on health spending for some countries.

[9] We also hypothesized that increased urbanization would lead to greater health spending, since the average distance from health care providers tends to be lower the more urban the population and urban living can increase the strains on public health. The estimated coefficient on the urbanization rate was negative, albeit insignificant, when included as the sole demographic control and when included with the other controls.

[10] The inefficiencies associated with public provision are usually thought to increase costs rather than to lower them (see Shleifer, 1998 for a general discussion of state *versus* private ownership).

Figure 1. Time effects on *per capita* health spending calculations based on log-linear regression with time fixed effects specification (3), Table 3



The inclusion of time fixed effects allowed us to look for evidence of upward shifts of the regression line over time due to common improvements in health-related technologies. Figure 1 shows the time effects for regression (3). A similar time pattern of fixed effects is also present for the other regressions. The excluded time dummy variable is for 1970, the first year of the sample. For ease of interpretation, we have graphed exponents of the time dummy coefficients rather than the coefficients themselves. A value of 1.1, for example, indicates that for given values of the explanatory variables *per capita* health spending is 10 per cent higher than it would be if these values had been observed in 1970.

From 1975 to 1983, the time dummy coefficients are significantly different from zero by a t-test; that is, given that the regression intercept is allowed to vary over time, the intercepts for this time period are significantly different from the intercept in 1970. Thus there is some evidence that the basic relationship between income and health spending shifted up during the first half of the sample period. The reasonably steady upward shifting of the estimated cross-sectional relationship over the first half of the sample is consistent with the hypothesis of increased health spending driven by new technical possibilities for health care. However, the pattern of time effects shows that the relationship actually shifted downwards during the 1980s, although there are indications that the relationship began shifting up again in the 1990s. This time pattern is consistent with evidence of delivery and financing reforms in the health care systems of a number of countries during the 1980s – innovations designed in large measure to control costs (see OECD, 1994 for an overview of reforms in seventeen countries). The upward shifts in the cross-sectional relationship in the early 1990s are consistent, however, with the view that organizational innovations had a one-off impact on spending, but that they leave the underlying tendency for spending to grow because of new technologies unaltered.[11] If this is the case, our failure, after controlling for income, to find evidence of a large and sustained impact of time on *per capita* health spending need not imply that health spending will not be driven inexorably upwards by new technologies in the future. Having said that, the pooled cross-country evidence from the recent quarter century shows that such an inexorable rise is not inevitable.

2.3 Health spending across 81 developed and developing countries

Do these OECD countries provide a good reference for comparing the post-communist economies? Since the OECD is a club of relatively high-income economies,[12] there is a concern that their resource allocations to health might not be all that relevant for the poorer post-communist economies, particularly the newly independent countries (NICs) of the former Soviet Union. For this reason we also examine a sample of 81 developed and developing countries for the single year of 1990. This sample includes our 25 OECD countries plus 56 additional countries. This set of 56 includes Mexico, which is now an OECD member but is excluded from the OECD sample because of limited time series data on health spending.[13] The additional countries also include Hong Kong, Singapore and Israel, which have *per capita* GDP levels in 1990 that would put them above some of the 25 OECD economies. Notwithstanding that the division between the

[11] The possibility that an organizational change reduces the level of spending but not the growth rate is consistent with US evidence that shows that HMOs lower health spending relative to fee-for-service plans, but the growth rate of spending under the two types of spending are similar (see Newhouse, 1992).

[12] The sample does have observations on relatively low-income countries, most notably Turkey and Korea in the 1970s.

[13] Mexico was not an OECD member in 1990, however.

original 25 and the additional 56 is not a clear-cut division between the better off and the less well off, we are interested to see if the previously estimated relationships are robust to adding additional (predominantly poorer) countries.

Table 4. Regression results for 1990 country cross-section sample (81 countries) Dependent variable: log *per capita* health spending

Explanatory variables	(1)	(2)	(3)	(4)	(5)	(6)
Log *per capita* GDP	1.215*	1.009*	1.055*	0.962*	1.211*	1.083*
	(0.035)	(0.048)	(0.066)	(0.078)	(0.066)	(0.079)
OECD dummy*log *per capita* GDP		0.622*		0.576**		0.414***
		(0.178)		(0.252)		(0.237)
Elderly dependency rate			4.894*	4.954	1.922	3.208
(share of population 65 and over)			(1.587)	(2.979)	(1.771)	(2.773)
OECD dummy*elderly dependency rate				–4.712		–1.596
				(3.966)		(3.891)
Female to male labour force ratio			0.369***	0.112	0.446**	0.339
			(0.198)	(0.224)	(0.189)	(0.214)
OECD dummy*female to male labour force ratio				0.340		0.112
				(0.622)		(0.574)
Public share of total health spending					0.706*	0.993*
					(0.223)	(0.261)
OECD dummy*public share of total health spending						–1.52*
						(0.562)
OECD dummy		–5.376*		–4.933**		–2.791
		(1.688)		(2.101)		(2.055)
Constant	–4.840	–3.316	–4.070	–3.210	–4.896	–4.733
Adjusted R^2	0.94	0.94	0.95	0.96	0.96	0.96
Observations	81	81	81	81	81	81

Notes: Standard errors are in parentheses. *Significance at the 1 per cent level; **Significance at the 5 per cent level; ***Significance at the 10 per cent level.

The cross-section estimates are shown in Table 4. Our strategy is to look at pairs of regressions: one regression forces the coefficients on the included variables and the intercept to be equal across sub-samples and the other regression allows the coefficients (including the intercept) to differ across sub-samples. The first regression in Table 4 shows the results of the bivariate regression of health spending on income. The income elasticity is greater than one, but it is less than the pooled estimate and also less than the 1990 cross-section estimate for the OECD sample. Not surprisingly, a graph (not shown) of the

regression line and the data points shows that there are large positive errors for most of the higher income countries. In other words, an elasticity value of 1.22 does poorly in capturing the extent to which health spending increases with a country's income. We thus allow for different income elasticities (as well as different intercepts) for the 25-country OECD sample. We do this by adding an OECD dummy variable and an OECD/*per capita* GDP interaction variable to the regression in the second regression. The significant positive coefficient on the interaction variable is evidence that the elasticity for the OECD countries is significantly higher than for the non-OECD countries. Indeed, for the non-OECD counties, the income elasticity seems to be about one. This implies that there is no relationship between the *share* of GDP spent on health and *per capita* income. The phenomenon of a rising share of the economy being devoted to health as the economy gets richer appears to depend on a certain threshold of richness being attained first.

The third regression includes the elderly dependency rate and female/male labour force ratio as additional correlates, but does not allow for different coefficients between the two sub-samples. These differences are allowed in the fourth regression. The magnitude of the coefficient on the elderly dependency variable is much larger in the non-OECD sub-sample. A single percentage point increase in the elderly dependency rate would lead to an estimated 5 per cent increase in *per capita* health spending. In contrast, for the OECD sample the ageing of the population has almost no effect on *per capita* health spending. This suggests that the impact of population ageing is more pronounced when countries are developing. Despite the large difference in the sizes of the coefficients in the two sub-samples, however, the large standard error on the dependency rate-OECD interaction variable means that the hypothesis that the coefficients are equal cannot be rejected at conventional significance levels. Similarly, the hypothesis that the coefficient on the labour force participation variable is equal across sub-samples cannot be rejected. Nonetheless, the magnitude of the coefficient is greater for the OECD countries (0.452 *versus* 0.112), which weakly suggests that the impact on health spending of the shift to two-earner households is more pronounced when countries are more developed.

The final pair of regressions (5 and 6) add the public share of total health spending as an explanatory variable; a variable that we found to be insignificantly related to total health spending in the pooled OECD sample. For this extended sample of developed and developing countries, the coefficient on the public share variable is positive and significant. Allowing again for different coefficients between the sub-samples, we find that the coefficient is significantly larger for the non-OECD countries. Public financing of health care does raise total *per capita* health spending, but only, it seems, for poorer countries.[14]

[14] We also experimented with other potential explanatory variables. We added two other development indicator variables – urbanization and the share of the labour force in agriculture. Only the latter had a significant (negative) effect. We also added a latitude variable given the evidence of the link between

To sum up, there is evidence that the forces driving health spending are different in the developed and developing countries. Compared to the OECD sample of countries that we use for our pooled regressions, developing country health spending tends to grow less strongly with *per capita* income and female labour force participation, and more strongly with population ageing and the public role in health care provision. Thus the estimated normal pattern will be sensitive to the countries we include in the reference group.

3. A comparison of post-communist health spending with market economy patterns

Taking into account their levels of development and the elderliness of their populations, do the post-communist countries spend a lot on health? To help answer this question, in this section we take the health spending regression equations estimated in Section 2 to represent the normal international pattern (in a descriptive rather than an evaluative sense), and then see how post-communist spending compares.[15]

A major practical difficulty is properly specifying the income levels of the post-communist countries. In the last section, we found that there is a strong relationship between real, purchasing power adjusted *per capita* income and health spending measured in the same units. Different attempts to make purchasing power parity corrections for post-communist countries have produced different estimates of relative incomes. The comparisons are thus sensitive to the chosen measures, and need to be treated with some caution. We have chosen to use OECD estimates of the purchasing power adjusted *per capita* GDP, measured as a fraction of the US level. We then multiply this fraction by the US *per capita* GDP from the OECD dataset used in Section 2 to get comparable average income estimates for ten post-communist countries.

nearness to the equator and the incidence of disease (especially tropical diseases), but this variable does not seem to be a predictor of health spending. Finally, we investigated the effect of an index of political rights, reasoning that where political rights are respected people would be more likely to have access to health care. The political rights index is on a scale from 1 to 7, with lower numbers indicating greater rights. This variable does have the expected negative sign, but again is insignificant on the basis of a t-test at conventional significance levels.

[15] Although definitions of health spending for the post-communist countries match those for the OECD countries, in practice there are several problems with how the data are compiled. Most worrisome are the treatments of investment and private expenses in public and private medical sectors. Wherever possible we include estimates for private health spending (see the data appendix). Since private sector estimates are not always available, the errors in the data tend to be biased in the direction of underestimating total spending, and the share of private spending in the total.

Table 5. Actual and predicted post-communist health spending, predictions based on pooled sample regression estimates [Table 3, Specification (3)]

	GDP *per capita*, US$1990 (PPP)					Elderly dependency rate					Female/male labour force ratio				
	1990	1991	1992	1993	1994	1990	1991	1992	1993	1994	1990	1991	1992	1993	1994
Bulgaria	5296	4157	3764	3812	3914	13.0	13.4	14.0	14.4	14.7	97.9	98.2	98.4	98.7	98.9
Czech Republic	9754	8363	7970	7623	8058	12.5	12.7	12.8	12.9	13.1	89.3	89.4	89.5	89.6	89.8
Estonia	. . .	. . .	3764	3363	3454	11.6	11.8	12.2	12.6	12.9	98.1	98.8	99.5	100.2	100.9
Hungary	6514	5657	5535	5605	5756	13.4	13.5	13.7	13.8	14.0	78.8	78.7	78.7	78.6	78.6
Latvia	. . .	3263	3321	2915	2763	12.0	12.2	12.5	12.9	13.2	98.3	99.1	99.8	100.6	101.3
Lithuania	. . .	4786	3321	3363	3454	10.9	11.0	11.1	11.4	11.7	91.5	91.6	91.7	91.8	91.9
Poland	4504	4234	4206	4260	4605	10.1	10.2	10.4	10.6	10.8	83.5	83.7	83.9	84.1	84.3
Romania	4433	3706	3321	3363	3454	10.4	10.7	11.2	11.4	11.7	79.5	79.6	79.7	79.8	79.9
Slovak Republic	7315	6273	5977	5829	5986	10.3	10.4	11.2	11.3	10.7	90.2	90.4	90.7	91.0	91.3
Slovenia	. . .	8920	8191	8520	8979	10.8	11.1	11.4	11.7	12.1	79.6	80.0	80.3	80.7	81.1

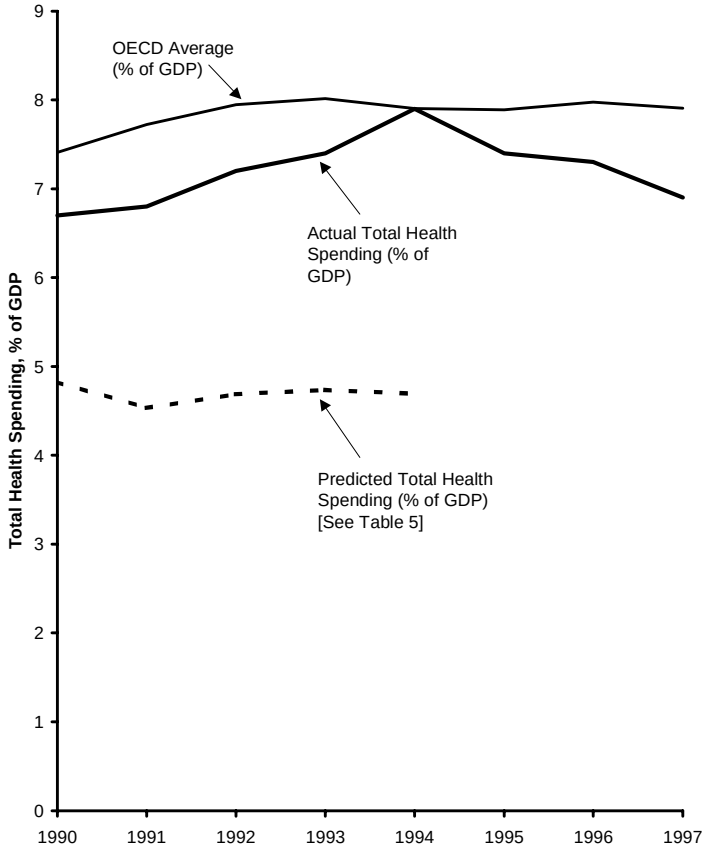
	Actual *per capita* health spending, US$1990 (PPP)					Predicted *per capita* health spending, US$1990 (PPP)					Difference between actual and predicted				
	1990	1991	1992	1993	1994	1990	1991	1992	1993	1994	1990	1991	1992	1993	1994
Bulgaria	275	226	256	196	185	247	173	156	160	164	28	53	100	36	21
Czech Republic	527	443	430	556	612	603	483	470	441	469	–76	–39	–39	116	144
Estonia	. . .	. . .	169	212	214	. . .	. . .	155	132	134	. . .	. .	14	80	80
Hungary	436	385	398	415	455	314	256	260	266	270	122	128	139	149	185
Latvia	. . .	85	93	120	113	. . .	119	128	106	96	. . .	–34	–35	13	17
Lithuania	. . .	177	139	141	166	. . .	205	123	126	128	. . .	–28	16	15	37
Poland	230	246	265	. . .	309	178	164	170	174	192	52	82	95	. . .	116
Romania	124	122	116	101	114	171	132	117	120	122	–47	–10	–1	–19	–9
Slovak Republic	393	310	304	371	422	384	307	301	291	295	9	3	3	80	127
Slovenia	. . .	461	608	653	700	. . .	507	467	499	530	. . .	–45	141	154	170

Table 5 (cont). Actual and predicted post-communist health spending, predictions based on pooled sample regression estimates [Table 3, Specification (3)]

	Actual health spending, per cent of GDP					Predicted health spending, per cent of GDP					Difference between actual and predicted				
	1990	1991	1992	1993	1994	1990	1991	1992	1993	1994	1990	1991	1992	1993	1994
Bulgaria	5.2	5.4	6.8	5.2	4.7	4.7	4.2	4.2	4.2	4.2	0.5	1.3	2.7	0.9	0.5
Czech Republic	5.4	5.3	5.4	7.3	7.6	6.2	5.8	5.9	5.8	5.8	–0.8	–0.5	–0.5	1.5	1.8
Estonia	. . .	. . .	4.5	6.3	6.2	. . .	. . .	4.1	3.9	3.9	. . .	. . .	0.4	2.4	2.3
Hungary	6.7	6.8	7.2	7.4	7.9	4.8	4.5	4.7	4.7	4.7	1.9	2.3	2.5	2.7	3.2
Latvia	2.5	2.6	2.8	4.1	4.1	. . .	3.6	3.9	3.6	3.5	. . .	–1.0	–1.1	0.5	0.6
Lithuania	3.3	3.7	4.2	4.2	4.8	. . .	4.3	3.7	3.7	3.7	. . .	–0.6	0.5	0.5	1.1
Poland	5.1	5.8	6.3	. . .	6.7	4.0	3.9	4.0	4.1	4.2	1.1	1.9	2.3	. . .	2.5
Romania	2.8	3.3	3.5	3.0	3.3	3.9	3.6	3.5	3.6	3.5	–1.1	–0.3	0.0	–0.6	–0.2
Slovak Republic	5.4	5.0	5.1	6.4	7.1	5.2	4.9	5.0	5.0	4.9	0.1	0.1	0.1	1.4	2.1
Slovenia	5.6	5.2	7.4	7.7	7.8	. . .	5.7	5.7	5.9	5.9	. . .	–0.5	1.7	1.8	1.9

Our predictions are based on regression (3) of Table 3, which includes *per capita* GDP, the elderly dependency rate, and the female/male labour force ratio as explanatory variables. Post-communist data for these three variables are shown in the first block of Table 5. The second block contains actual *per capita* health spending, predicted *per capita* health spending, and the difference between the two. For convenience, the last block shows these three variables as a percentage of GDP.

Figure 2. Hungary: actual and predicted health spending during the transition



In 1994, the last year considered, nine of the ten countries have health spending that was greater than predicted based on the OECD regression. The exception is Romania, which has health spending that is just slightly below what is predicted. Hungary has the largest 'excess' spending level at 3.2 percentage points of GDP. In most countries there is a tendency for both the share of health

spending in GDP and the excess spending to rise over the course of the transition. Since the first half of the 1990s was a period of severe contraction for these economies, the evolution of the share of health spending in GDP indicates that the health sector was less prone to contract than the rest of the economy. Indeed, the real level of health spending measured in 1990 US dollars actually rose in a number of countries.

Figure 2 graphs the evolution of the actual and predicted shares of health care spending as a share of GDP for Hungary, which, to repeat, exhibits the largest discrepancy. As an additional reference point we include the unweighted average from the 25-country OECD sample. We also include data on the actual share and OECD average out to 1997. Since the predicted share of GDP is reasonably constant for the period from 1990 and 1994, it seems reasonable to extrapolate a share of between 4.5 and 5.0 per cent of GDP for the years immediately following.

The discrepancy between the actual and predicted share in Hungary has been large since the beginning of transition, probably reaching a peak in 1994. In that year, Hungary had a GDP share that was equal to the OECD average. After 1994 the GDP share has fallen back by about a percentage point of GDP. In 1997 Hungary was probably still spending about two percentage points of GDP more than predicted based on the estimated market economy pattern.

In the previous section, we observed that the causal connections between the three explanatory variables and health spending are different in developed and developing countries. *Per capita* health spending is relatively less sensitive to *per capita* income in developing countries and more sensitive to elderliness of the population. Since the post-communist economies are relatively poor and have relatively old populations for countries at their level of development, we also examine the predictions based on the 56 developing countries sub-sample for the single year of 1994. These predictions are shown in Table 6. To aid comparisons, we reproduce the estimates based on the pooled OECD sample for the single year of 1994, and also show the estimates based on the OECD sub-sample of the 1990 cross-section. The two sets of OECD sample based predictions are roughly similar. The predictions based on the developing country sample are quite different, however. For each of the ten countries, the predicted share of health spending in GDP is higher when we use the developing countries as the reference group. For the poorest post-communist economies in this group, the differences are quite large. For example, the predicted share for Bulgaria based on the OECD pattern is around 4 per cent compared with almost 7 per cent based on the developing country pattern. The elderliness of the post communist populations accounts for a significant part of the differences. For the developing country sub-sample, each extra percentage point on the elderly dependency rate is estimated to raise *per capita* health spending by almost 5 per cent. Most developing countries have elderly dependency rates in the low to mid single digits, whereas the elderly dependency rates in Eastern and Central Europe are close to rates observed in the OECD countries. The unweighted average elderly dependency rate was just 3.8 per cent in the developing country sub-sample in 1994, compared with 12.8 per

cent in the OECD sub-sample and 12.5 per cent in the ten post-communist countries included in Table 8. Bulgaria's elderly dependency rate in 1994 was 14.7 per cent. All else equal, the elderliness of the Bulgarian population raises projected health spending share by about 50 per cent compared to what it would be if Bulgaria had the average elderly dependency rate of the 56 developing countries. It should not be too surprising, then, that the projected health spending shares for the post-communist economies are high when we extrapolate the developing country pattern.

Table 6. Predicted health spending as a percentage of GDP for 1994, alternative samples

		OECD pooled regression (1994 specific intercept)		**1990 cross-section OECD sub-sample**		**1990 cross-section developing country sub-sample**	
	Actual	*Predicted*	*Difference*	*Predicted*	*Difference*	*Predicted*	*Difference*
Bulgaria	4.7	4.2	0.5	3.9	0.8	6.8	–2.1
Czech Republic	7.6	5.8	1.8	5.5	2.1	6.1	1.5
Estonia	6.2	3.9	2.3	3.7	2.5	6.3	–0.1
Hungary	7.9	4.7	3.2	4.4	3.5	6.3	1.6
Latvia	4.1	3.5	0.6	3.3	0.8	6.4	–2.3
Lithuania	4.8	3.7	1.1	3.5	1.3	5.9	–1.1
Poland	6.7	4.2	2.5	4.0	2.7	5.5	1.2
Romania	3.3	3.5	–0.2	3.3	0.0	5.8	–2.5
Slovak Republic	7.1	4.9	2.1	4.7	2.3	5.5	1.6
Slovenia	7.8	5.9	1.9	5.6	2.2	5.7	2.1

Notes: Difference = Actual – Predicted. Each set of predictions is based on a regression with log *per capita* GDP, the elderly dependency rate and the female/male labour force ratio as explanatory variables. The OECD pooled regression predictions are based on regression (3) of Table 3, and are the same as the predictions for 1994 in Table 5. The 1990 cross-section regression predictions are based on regression (4) of Table 4.

What conclusions do we draw? The foregoing comparisons demonstrate that predicted health spending is sensitive to the reference group used. We think that the more interesting reference group is provided by the OECD economies, since they provide the model that the leaders in many transition economies claim to be aspiring to. Moreover, given the lack of sensitivity of the projected GDP share to the level of *per capita* GDP when using the developing country reference group, the projected shares fall in a very narrow range. On the other hand, the actual shares cover a wide range, from 3.3 per cent in Romania to 7.9 per cent in Hungary in 1994. There is clearly a tendency for the better-off post-communist

countries – Hungary, the Czech and Slovak Republics, Poland and Slovenia – to spend relatively large shares of their GDP on health. Thus the OECD pattern of health shares rising with GDP is present among the post-communist countries.

If we take the OECD economies as the reference group, the post-communist economies have prematurely high shares of GDP devoted to health spending. In other words, these economies devote a fraction of their GDP to health spending that is typical of developed economies at higher income levels. For Hungary's, holding other factors constant, *per capita* GDP (in constant 1990 dollars) would have to be more than $15,000 in 1994 for the country's health GDP share of 7.9 per cent in 1994 to be considered normal on the basis of the OECD regression. This compares to an actual *per capita* GDP of less than $6,000. For some countries – including the Baltic countries and the Czech and Slovak Republics – the above normal health shares have emerged during the transition period, and thus might be temporary phenomenon related to the transformational recessions these countries have experienced. In Hungary's case, however, the health share was already two percentage points above the predicted level at the beginning of the decade, and has remained stubbornly well above normal through the rest of the decade.

4. What determines the public sector's role in funding health care? International evidence and comparisons

4.1 Determinants of the public share in OECD economies

The post-communist economies start off their transitions with practically all health spending done by the public sector (WHO, 1998). Of course, the public sector dominates most other parts of the economy as well. For countries aspiring to be market economies, such general public dominance is unusual, and a major privatization effort must be part of becoming a normal market economy. Table 7 shows that a large public role is not unusual in the health sectors of OECD economies, however. Even the United States, which is a major outlier in terms of its reliance on the public sector (more than two standard deviations below the mean), more than 40 per cent of health spending is funded by the public sector.[16]

Our goal in this section is to use simple regression analysis to see if there are patterns in the extent of reliance on the public sector in funding health care in the OECD countries over the period 1970 to 1994, and to draw lessons for the post-communist countries. In particular, we are interested to see if relationships exist between some standard correlates of development – *per capita* real GDP, the elderly dependency rate, the urbanization rate, and the female share of the labour force – and the public sector share of total health spending. We also probe the

[16] This share is projected to rise as population ages, since a large fraction of health care for the elderly is financed through the public Medicare and Medicaid programs.

data to determine if political indicators can help account for the residual differences.

Table 7. Public share of total health spending (%)
25 OECD countries; selected years, 1970 to 1994

	1970	1974	1978	1982	1986	1990	1994
Australia	56.7	63.9	62.5	60.9	70.6	67.3	66.8
Austria	63.0	65.2	69.8	75.4	76.5	73.5	74.1
Belgium	87.0	82.5	83.1	85.9	79.4	88.9	87.9
Canada	70.2	74.8	76.3	76.3	75.3	74.4	71.9
Denmark	86.3	81.2	84.8	88.8	89.0	86.1	86.6
Finland	73.8	77.4	77.9	80.0	79.3	80.9	74.8
France	74.7	76.0	77.5	79.0	76.3	74.5	78.4
Germany	72.8	78.2	78.8	78.3	77.7	76.2	77.6
Greece	53.4	60.2	76.1	91.3	80.7	82.3	76.2
Iceland	81.7	87.9	90.2	89.1	86.5	86.6	84.0
Ireland	81.7	80.0	78.7	80.5	75.4	72.9	75.2
Italy	86.9	88.5	88.8	78.7	76.0	78.1	70.6
Japan	69.8	74.1	76.0	71.0	72.4	77.1	77.8
Korea	8.3	7.4	18.9	28.8	28.1	43.6	45.7
Luxembourg	88.9	…	92.2	93.0	89.4	93.1	91.8
Netherlands	84.3	71.7	74.6	76.0	72.4	72.7	77.5
New Zealand	80.3	74.0	76.9	88.0	86.3	82.4	77.6
Norway	91.6	94.8	92.7	87.6	87.0	83.3	84.4
Portugal	59.0	62.7	67.1	56.2	52.6	65.5	63.4
Spain	65.4	72.5	78.5	79.4	79.9	78.7	78.7
Sweden	86.0	89.9	91.5	91.6	90.2	89.9	84.6
Switzerland	63.9	66.2	67.2	68.5	66.1	68.4	72.1
Turkey	37.3	…	18.6	…	41.8	60.9	68.9
United Kingdom	87.0	89.7	90.0	87.6	85.3	84.1	84.1
United States	37.8	40.8	41.7	41.7	41.2	40.7	44.8
Mean	69.9	…	73.2	…	73.4	75.3	75.0
Standard deviation	19.8	…	19.8	…	16.1	12.7	11.2
Coefficient of variation	0.28	…	0.27	…	0.22	0.17	0.15

Source: OECD Health Data 1998.

Table 8. Regression results for public share of total health spending. Pooled OECD sample. Dependent variable: public share of total health spending

Explanatory variables	(1)	(2)	(3)	(4)	(5)	(6)
(1) Development/Demographic						
Per capita GDP	–0.0007*	–0.0002	–0.0016*	–0.0007*	–0.0003*	–0.0002***
	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(–0.0001)	(0.0001)
Elderly dependency rate (Share of population 65 or over)	3.8059*	3.0918*	3.0448*	2.0991*	1.5219*	1.4966*
	(0.1762)	(0.1544)	(0.2000)	(0.1499)	(0.1257)	(0.1274)
Urbanization rate	0.4574*	0.3883*	0.2692*	0.2285*	0.2739*	0.2854*
	(0.0323)	(0.0275)	(0.0334)	(0.0244)	(0.0255)	(0.0205)
Female share of labour force	–0.4573*	–0.4699*	–0.2689*	–0.1699**	–0.5842*	–0.3656*
	(–0.0921)	(0.0773)	(0.0932)	(0.0668)	(0.0679)	(0.0562)
(2) Political						
Share of vote for left (Socialist) parties					0.2914*	0.0482***
					(0.0001)	(0.0254)
Share of vote for centre Christian parties					–0.1431*	–0.1799*
					(0.0476)	(0.0383)
Strength of bimcameralism					–6.7599*	–5.3992*
					(0.4036)	(0.3349)
US dummy		–32.7411*		–31.0976*		–24.3280*
		(2.0416)		(1.4678)		(1.15138)
Constant	21.91	25.81	52.12	51.12	58.67	56.80
Adjusted R^2	0.58	0.70	0.42	0.71	0.71	0.81
Observations	614	614	475	475	475	475

Notes: Standard errors are in parentheses * Significance at the 1 per cent level ** Significance at the 5 per cent level *** Significance at the 10 per cent level.

Table 8 records our main regression results. The first four regressions include only development / demographic variables. Of these, the first two regressions use the full 25-country sample. The only difference between (1) and (2) is that (2) includes a US dummy (which we include because the US is clearly a large outlier, as discussed above, in its reliance on private funding). The third and fourth regressions are parallel to the first and second except that the sample is limited to 19 countries.[17] The reason we limit the sample is because our political variables, which are from the Comparative Welfare States Dataset (Huber *et al*., 1997), are limited to these nineteen. This allows us to evaluate the effect of adding the political variables. The last two regressions include political variables, again with and without a US dummy.

Our findings confirm that both development and political variables are associated with the extent of reliance on public sector funding. Taken alone, the development variables explain about half of the variation in public shares. A robust finding is that there are significant negative relationships between the public share and the *per capita* income and female share variables. In other words, when countries are poor and women tend not to work outside the home, there is greater reliance on the public sector (for any given amount of total health spending). We also find evidence of significant positive relationships between the public share variable and both the elderly dependency rate and the urbanization rate. Older and more urban populations rely more heavily on public sector funding. The significance of the coefficients on all four variables is robust to including the US dummy, although the magnitudes of the coefficients fall in each case.[18] Not surprisingly, the coefficient on the US dummy variable is large and negative – indicating a US effect of almost 33 percentage points of total health spending.

There is evidence that political variables also matter. Although there are many political measures that could be included, we limit ourselves to the share of the vote for socialist parties, the share of the vote for Christian democratic parties, and the strength of bicameralism as measured by a three-category index. We expected that strong support for left parties would be associated with a large public share. Given the important role played by Christian democratic parties in the development of the post-war welfare state in some countries, we thought it possible that support for these parties might be associated with more public funding of health.[19] Finally, we include that bicameralism index on the hypothesis that more separated powers check the expansion of government. The bicameralsim index takes a value of 0 for no second chamber or a second chamber

[17] The excluded countries are Greece, Korea, Iceland, Portugal, Spain and Turkey.

[18] We also ran this regression for the 81 country cross-section sample. The income *per capita* and dependency rate variables are significant and have roughly the same coefficients as in the OECD sample. The female share and urbanization rate variables are not significant, however.

[19] In the Huber *et al.* codings, Christian democratic parties that combine Catholic and Protestant forces, such as the German Christian democrats and the post-merger Dutch Christian democrats, are classified as Christian.

with very weak powers, 1 for weak bicameralism, and 2 for strong bicameralism.[20]

The inclusion of these variables does improve the fit of the regressions as measured by the adjusted R squared. Without a US dummy, this measure of goodness-of-fit rises from 0.42 to 0.71. With a US dummy, the improvement in the measure of fit is more modest, rising from 0.71 to 0.81. The size of the left vote has a positive coefficient and is significant at the 1 per cent level without the US dummy and at the 10 per cent level with the US dummy. The size of the Christian democratic vote has a significantly negative coefficient (at the 1 per cent level) in both regressions.[21] Finally, the highly significant coefficient on the strength of bicameralism variable is evidence that having a second chamber with strong powers does reduce the public share.

Our broad interpretation of these findings is that development and demographic factors do significantly influence the extent of the public sector role in funding health spending. However, our four structural indicators leave about half the variation in the public share unexplained. The political variables we include – although admittedly rather crude attempts to capture the importance of politics – help in explaining part of the remaining variation.

4.2 Predicted public sector shares for post-communist economies

Controlling for development and demographics, do the post-communist economies rely to an unusual extent on public sector health care funding? In answering this question we face problems of data quality that appear to be even more severe than those with total health spending. The WHO Health For All database records the public share for many of the post-communist economies over most of the transition period as being one hundred per cent, although more private spending is recorded in later years. Owing to these data concerns, we limit ourselves to predicting what the public shares would be based on our previously estimated normal market economy pattern. Only for Hungary, a country for which we are reasonably comfortable with the public share estimates, do we compare the predictions with the actual evolution of the public share.

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[20] Under category 0, Huber *et al.* (1997) include Austria, Denmark, Finland, France, Luxembourg, New Zealand, Norway, Sweden and the United Kingdom. Under category 1, they include Belgium, Canada, Ireland, Italy, Japan and the Netherlands. Finally under category 3, they include Australia, Germany, Switzerland and the United States.

[21] We also investigated the importance of measures of *cumulative* post-war influence that are part of the Huber *et al.* dataset. This measure is the cumulative measure from 1946 to the year of observation of the seats of a particular type of party as a percentage of seats held by all government parties. Such a cumulative measure is interesting since the impact of a party on existing policies could be badly measured by their current levels of support. On the cumulative measure, both left and Christian democratic parties have a significant positive effect on the public share. This finding is robust to including the share of the vote variables in the regression.

Table 9. Predicted values for public share of total health spending predictions based on development/demographic variables only

(1) Predictions based on regression without dummy for US [Table 8, Specification (1)]					
	1990	**1991**	**1992**	**1993**	**1994**
Bulgaria	59.2	61.4	63.8	64.8	65.9
Czech Republic	54.5	56.2	57.0	57.7	57.9
Estonia	. . .	. . .	55.5	56.9	58.2
Hungary	59.9	60.8	61.4	61.4	61.8
Latvia	. . .	55.8	57.0	59.0	59.9
Lithuania	. . .	50.8	51.8	52.3	53.4
Poland	49.0	49.9	50.6	50.9	51.5
Romania	54.4	55.6	57.6	58.1	59.1
Slovak Republic	52.1	52.6	55.9	56.1	53.9
Slovenia	. . .	50.7	52.1	52.7	53.2

(2) Predictions based on regression with dummy for US [Table 11, Specification (2)]					
	1990	**1991**	**1992**	**1993**	**1994**
Bulgaria	84.9	86.3	88.0	88.7	89.7
Czech Republic	83.0	83.9	84.4	84.8	85.2
Estonia	. . .	. . .	81.0	81.9	83.0
Hungary	86.5	86.7	87.2	87.1	87.5
Latvia	. . .	81.0	82.1	83.5	84.1
Lithuania	. . .	77.8	77.9	78.3	79.2
Poland	76.8	77.4	78.0	78.1	78.8
Romania	82.1	82.7	84.2	84.5	85.4
Slovak Republic	81.0	81.0	83.5	83.5	81.8
Slovenia	. . .	80.1	80.8	81.3	81.8
OECD average	*75.3*	*75.3*	*75.3*	*75.0*	*75.0*
OECD average without US	*74.5*	. . .	*74.8*	*76.7*	*76.3*

The predictions are recorded in Table 9. Two sets of predictions are shown, each based on the full set of 25 OECD economies. Only the development and demographic variables are used in the projection regressions (regressions (1) and (2) in Table 8). The only difference between the two sets is that a US dummy is added to the second prediction regression. A casual glance at the two sets reveals that allowing for the US effect makes a big difference. Adding the US dummy effectively excludes the US from the reference group when establishing the normal pattern. With the US effect so controlled for, it would be 'normal' for the

post-communist economies to have public shares between 80 and 90 per cent. Not controlling for the US effect, the normal range falls to between one-half and two-thirds.

Figure 3. Hungary: Public share of total health spending during the transition

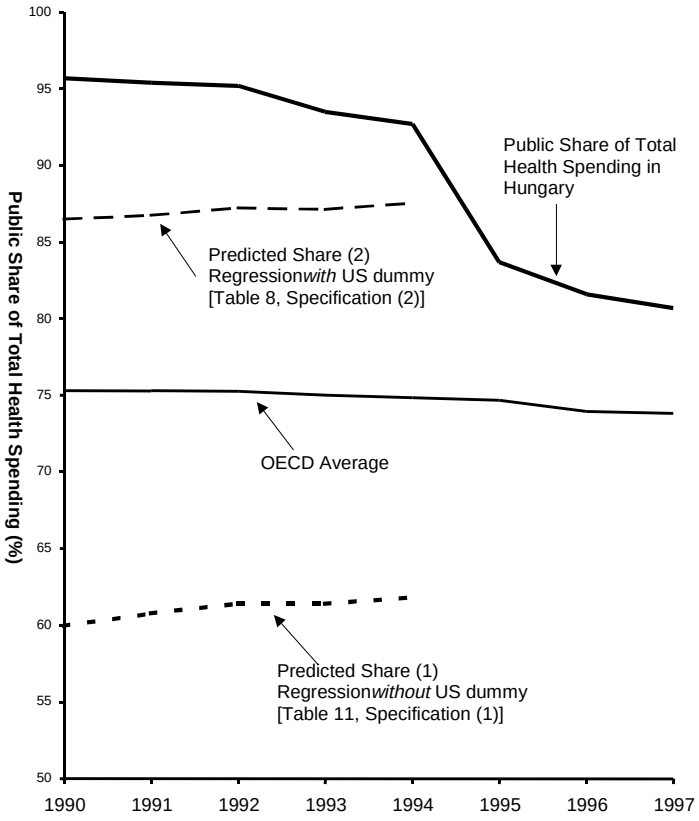

Figure 3 shows the evolution of the public share in Hungary between 1990 and 1997. This share remained above 90 per cent in the early transition years, but has fallen significantly in recent years. The figure also contains our two alternative predicted evolutions for Hungary, which are limited to the period from 1990 to 1994. However, the predicted share is relatively constant, so that a simple extrapolation for the 1995 to 1997 period based on the 1994 public share should not be misleading. We also include the evolution of (unweighted) OECD public share average in the figure. The Hungarian public share was still above the OECD average in 1997, although it appears to be converging to that average.

What we conclude about the normalcy or otherwise of the public role in Hungarian health spending evidently depends on which reference group we use. If we control for the US effect, the public share has already fallen below the normal OECD pattern. That is, taking into account *per capita* income and the various demographic controls, Hungary already has a smaller public share than is normal in the OECD. If the US is given equal weight with the rest, however, the public share is still high.

More generally, our results suggest that even at the relatively low *per capita* GDP levels of the post-communist countries, the large involvement of their public sectors in funding health spending is not unusual. Indeed, we find using the OECD data that the public role falls as countries become better off. We also find that countries with older populations tend to rely more on public sector funding. It is not unusual, then, for relatively poor and relatively old populations to have large public sector involvement in funding health spending. It is hard to predict what will happen to the public share in the years ahead. Our regressions suggest that (controlling for the US effect) an additional $1,000 of *per capita* GDP lowers the public share by about 2 percentage points. On the other hand, an additional percentage point on the elderly dependency rate raises the public share by 2 to 3 percentage points. Thus, if the post-communist countries follow the estimated OECD pattern, the public share will be subject to countervailing forces as these economies become richer and older.

5. Summary and concluding comments

The title of our paper asks if post-communist health spending is unusual. To provide a tentative answer to this question we examined the patterns present in the health spending data of developed and developing countries. For the developed countries we found that *per capita* health spending tends to grow at about one and a half times the growth rate of *per capita* income. *Per capita* health spending is higher in older populations, but not by as much as a simple comparison of the spending of the elderly and non-elderly would suggest. Controlling for income and demographics, there does not appear to be a secular technology-driven upward drift in health spending. The public share of total health spending is significantly negatively related to *per capita* income and women's labour force participation, and positively related to the elderly dependency rate and the urbanization rate. Together these variables explain about half the variation in observed public shares. Political variables help to explain a significant part of the remaining variation. For the developing countries, *per capita* health spending increases at about the same rate as *per capita* income. In contrast to the developed countries, however, they show a more pronounced tendency for health spending to increase with the elderliness of the population. Spending also appears to rise with the share of public spending, a relationship

that is not present in the developing country data.

Our comparisons of the health spending of post-communist countries with these international patterns is limited by the quality of the health spending data – especially the measurement of private spending. For the more developed of the post-communist economies, for which we have the most confidence in the data, health spending is unusually high. For Hungary the excess spending is more than three percentage points of GDP. When we control for a US effect in estimating the normal pattern for the public share of total health spending, we find that the predicted shares for post-communist countries are quite high. Indeed, the predicted shares are above the (high) OECD average.

We hope that future work will improve these estimates. Here we single out a few areas where future work could yield additional insights. First and foremost, we need better data on transition economy health spending. Second, we need to understand better how the factors that drive health spending change as countries become more developed. Third, although we experimented with various variables in estimating the normal patterns, there were some variables that we believe to be important but we were not able to get consistent data for. One such variable is the relative factor price of medical care services, particularly the relative salaries of medical care professionals. Fourth, we need to better understand the role of politics in driving the public role in health care.

These limitations not withstanding, we believe that cautious conclusions can be drawn from the present calculations – adjusted, of course, to country-specific situations. In spite of the many justified complaints about the health systems in the post-communist economies, governments must be careful in pushing for increased macro spending on their health sectors. Taking into account the current levels of development, spending levels are not abnormally low if the established market economies are taken as the benchmark – if anything, our calculations suggest that they are abnormally high. Furthermore, although reliance on the public sector is high in post-communist countries, our calculations do not indicate that this reliance is abnormally high. Of course, the market economy pattern is not inviolable as the target for post-communist resource allocation. Policy-makers in the established market economies are themselves wrestling with the problems of controlling the cost of health care to the public and private sectors. The comparisons provided here suggest, however, that a more urgent task may be to make better use of the (predominantly public) resources allocated to the health sector by improving the efficiency of health care provision and the incentives to seek and provide appropriate levels of care.

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Data appendix

OECD sample

The health care variables – Total Health Spending as a Share of GDP and the Public Share of Total Health Spending – are from the *OECD Health Data 1998: A Comparative Analysis of 29 Countries* CD ROM. The *Per capita* GDP data (adjusted for purchasing power parity and converted to 1990 US dollars) are also taken from this source, as is the Elderly Dependency Rate (defined as the share of the population that is 65 or over). *Per capita* Total Health Spending measured in units of GDP is calculated as the product of Total Health Care Spending as a Share of GDP and *Per capita* GDP. The Female Share of the Labour Force and Urbanization Rate data are from the *World Development Indicators* (World Bank, 1997) CD ROM. The political variables are from the *Comparative Welfare States Data Set*, as assembled by Evelyne Huber, Charles Ragin, and John Stephens (1997). This political dataset can be accessed from the Luxembourg Income Study's website at http://lissy.ceps.lu/access.htm.

The health spending data for the post-communist countries are mostly from the World Health Organization's, *Health For All Database* (1998), but are supplemented from other sources where we think better data are available. For Hungary total health spending is from the OECD *Economic Survey of Hungary* (1999). The OECD numbers underestimate total spending for the years 1995 to 1997, however, since they include only expenses for medicines and therapeutic equipment, and exclude privately purchased care in public institutions and private practices. Accordingly, the OECD numbers were supplemented by Hungarian Ministry of Finance estimates of private purchases of health services based on household survey data. For Poland, Chellaraj *et al.* (1996) is used as the source for 1990 to 1992, and Chawla *et al.* (1998) is used for 1994. For Romania, we use Cellaraj *et al.* (1996) and the OECD *Economic Survey of Romania* (1998). The Health For All Database is also used for the Elderly Dependency Rate numbers. *Per capita* real GDP measured as a fraction of the US level is taken from various editions of the *OECD Short-Term Economic Indicators: Transition Economies* for the years from 1991 to 1994. These fractions are combined with the *per capita* real GDP figures for the US from the OECD Health Data discussed above to produce

comparable *per capita* GDP numbers for the post-communist countries. Where possible a *per capita* GDP number is inferred for 1990. This inference is made using the growth rate of PPP *per capita* GDP between 1990 and 1991 from Maddison (1995). The Female Share of the Labour Force (used to calculate the Female to Male Labour Force Ratio variable) and Urbanization Rate variables are from the World Development Indicators (World Bank, 1997).

81-country cross-section sample

The health spending data for the 25 OECD countries are from *OECD Health Data* CD ROM for the single year of 1990. The health spending data for the additional 56 countries are from the *World Development Report: Investing in Health* (World Bank, 1993). For the 25 OECD countries, the *per capita* GDP data has the same source as the pooled sample for the single year of 1990. For all 56 developing counties, the *Per capita* GDP data is calculated as the fraction of US *per capita* GDP from the *Penn World Table* (1992) multiplied by *per capita* GDP for the US for 1990 from the OECD dataset. The Penn World Table data can be downloaded from http://www.nber.org/pwt56.html – the National Bureau of Economic Research (NBER) website. The Elderly Dependency Rate data for the OECD countries are from the same source as the pooled OECD data for the single year of 1990. For the 56 developing countries the Elderly Dependency Rate data are from *Averting the Old Age Crisis: Policies to Protect and Promote Growth* (World Bank 1994). The Female Share of the Labour Force, Urbanization Rate and Share of the Labour Force in Agriculture are from *World Development Indicators* (World Bank 1997). The Latitude index is from La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998). This variable, which they adapt from the CIA Factbook, is the absolute value of the latitude of the country, scaled to take values between zero and one. The Political Rights Index is provided by Istvan Majoros, and is calculated from data in the Freedom House publication *Freedom in the World: Political Rights and Political Liberties* (various editions).