The Electoral Politics and Evolution of Complex Healthcare Systems

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Abstract

OECD countries have used a variety of mechanisms for subsidizing healthcare for more than a century. This paper suggests that the complexity of healthcare systems and reform tend to advance rational voter interests. It demonstrates that electoral models can explain why various combinations of healthcare programs have been adopted and why they are modified through time. The analytical and empirical results suggest that income, health risks, ideology, technology, and political institutions systematically affect the composition of national healthcare systems. Expenditures rise with income, technological advance, and leftward shifts in ideology, and fall somewhat with morbidity. The same variables affect composition of expenditures, although not uniformly.

Key Words: Rational Voter Model, Political Economy, Healthcare, Complex Healthcare Systems, Politics of Healthcare

JEL: H11, H51, I11, I18

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1 Introduction

The complexity of contemporary healthcare systems is a consequence of public policy decisions made over many decades. In 1883, Germany adopted a national healthcare insurance program under which employers and employees contributed to health treatment and income security funds. Similar systems were adopted by many other OECD countries during the next half century. These insurance-based programs were revised many times in the decades that followed. Because of this, each nation's system exhibits some path dependence and inertia, although the systems are sufficiently malleable that in the long run each nation's healthcare system can take virtually any form that is fiscally sustainable. This paper explores the extent to which electoral pressures can account for the path of reform in the late 20th century.

To say that policies in a democracy are generated by electoral pressures is not, of course, to claim very much. The nature of those pressures depends on assumptions about voters and both elected and unelected officials. We use the standard rational choice approach to characterizing all three groups of political actors. Under that approach voters are forward looking and reasonably well-informed about the public policy of interest. Elected officials (and organized groups of elected officials referred to as political parties), in turn, enjoy the fruits of office and so behave in a manner that attempts to please a sufficient number of voters to be returned to their positions of influence after the next election. They therefore propose and enact policies that advance voter interests and monitor and incentivize the national bureaucracy to implement policies in a manner voters are likely to approve of. [1]

To the extent that a democratic political system operates reasonably well, only minor agency costs will be observed, and moderate voters will get the services that they demand at a tax price they are willing to pay.

It bears noting, however, that what voters want from their health care systems is not

[1] See Mueller (2003) or Congleton, Grofman, and Voight (2017) for overviews of the public choice literature. See Congleton, Hillman, and Conrad (2008) or Congleton and Hillman (2015) for overviews of non-electoral models of policy formation.

necessarily any more homogeneous than the shopping baskets of goods that shoppers accumulate in grocery or department stores. Voters tend to disagree about the best combinations of public goods and services, because of differences in income and tastes (or ideologies). This is likely to be true of healthcare and risk-pooling systems as well. Previous work by Navarro (1989), Breyer (1995) and Jacob et al. (2005) demonstrates that systems that include both public and private healthcare services can advance voter interests. This paper suggests that more complex systems may also do so.

The models developed in this paper characterize voter interests in a more fine-grained manner than previous studies have, which allows the properties of both unified and complex healthcare systems to be analyzed. Two models of voter interests are developed in the next section of the paper. The first focuses on a voter's narrow economic and health interests, the second analyzes cases in which voters have broad (normative) as well as narrow (economic) interests. In both cases, there are economic reasons for voters to prefer complex healthcare delivery and finance systems to pure systems. The third section of the paper subjects the policy implications of the electoral models to a series of statistical tests. The results suggest that electoral models can account for most of the complexity and reform of OECD healthcare systems in recent decades.

This paper is not the first rational voter based analysis of healthcare systems, but it is the first to analyze complex healthcare systems, rather than systems based on one or two modes of finance and delivery. By analyzing the politics of complex healthcare systems, the paper fills a significant gap in the public choice and political science literatures on healthcare systems. The results imply that there are good reasons to adopt healthcare systems that simultaneously rely on a variety of "pure" systems for pooling risks and delivering healthcare.

2 Economic Interests and Healthcare System Choice

Most personal choices concerning healthcare can be regarded as choices regarding risk and insurance. What risks do individuals and families wish to bear themselves? Which risks do they

wish to share with others and at what cost? These are the core questions in private healthcare decisions, system design, and implementation. They are also the core questions faced by voters when casting votes that affect healthcare policies. The relevant tradeoffs are not trivial, because of the life-threatening nature of many health risks and the complexity of alternative risk and cost-sharing systems, but such tradeoffs also exist for other insurance and consumer products.

A household's marginal cost of risk-pooling under a given technology is largely determined by the manner in which healthcare costs are distributed among subscribers. In private insurance systems, a subscriber's cost reflects differences in health risks and the manner in which risks are pooled and priced. In public systems, personal risks are only indirectly priced and subscriber costs are largely determined by tax schedules and income. Thus, high-risk and high income persons pay different prices for health care insurance than low risk and low income persons according to the financing and risk-pooling systems in place.[2]

We use a demand-for-insurance model to characterize a typical rational voter's assessment of the relative merits of alternative healthcare systems. Part 2.1 of the theory section demonstrates that voter support for pure systems tends to be common at the level of specific treatments. Parts 2.2 and 2.3 argue that the specific pure system favored tends to vary among treatments in a manner that can generate complex healthcare systems. Part 2.4 develops an extended model of voter healthcare demand that includes noneconomic interests, which for purposes of discussion are regarded to be ideological or ethical in nature. Part 2.5 uses the model to characterize reduced form expenditure models.

The use of healthcare systems is sufficiently widespread that most voters have direct experience with their national systems and so can make reasonably informed decisions about which system would serve them best. Although understanding the full costs and benefits of

[2] The marginal costs of both private and public health insurance are also affected by a variety of state and national public policies. Government regulations often reduce the ability of insurers to discriminate among patients according to risk. Other regulations may limit the services that can be offered and the prices that providers can charge for the services permitted (or mandated). Private insurers may also benefit from tax preferences and direct subsidies. The costs to be shared are also affected by monopsony and monopoly power, the robustness of reserves among the insurance and healthcare providers, and differences in administrative costs. For the purposes of this paper, such market power, regulations and tax preferences are regarded to be part of a national system's cost structure.

alternative systems is often difficult, we assume that voters have unbiased estimates of their own costs and benefits with respect to private insurance and tax-financed systems. [3]

2.1 An Economic Model of Voter Preferences for Financing and Delivery of Healthcare Services

As a point of departure, we analyze voter decisions with respect to a specific health problem or class of treatments. Insights obtained by analyzing particular treatments are then used to characterize a vector of such choices, which in turn characterizes the voter's preferred healthcare system. The typical rational voter-consumer is assumed to maximizes a Von Neumann-Morgenstern utility function defined over personal consumption (X) and wellness (W).

To make the model tractable and reduce notational complexity, we assume that there are just two states of the world, one in which the individual is well (W) and another in which he or she is not well (W') because of a specific health problem. In the cases of interest, ill health in the not-well state can be improved via healthcare services. An individual's expected utility can be represented as:

$$U_i = (1-P_i)\, u(X_i, W_i) + P_i\, u[(X_i', e(H+O_i)W_i'] \qquad (1)$$

with X_i denoting individual i's private consumption and P_i the probability he or she contracts the illness of interest (the individual's morbidity). Treatments for the illness of interest are paid for with a combination of out-of-pocket expenses (O_i) and other healthcare provided by private insurance or government programs (H). Function *e* characterizes the efficacy of healthcare treatments. Its values will be greater than one for effective treatments, but not larger than W_i/W_i'. The "primes" denote values for the state in which the health problem occurs.

[3] Rational voters will not be perfectly informed about healthcare systems because of what Downs (1957) refers to as rational ignorance and what Simons (1984) refers to as bounded rationality. Limited information, time and attention can generate biased estimates of both the costs and benefits of alternative policies (Congleton 2001). Such biases can be overcome to some extent through informational aggregating aspects of democratic elections (Owen et al., 1989, Congleton, 2007). The jury-theorem effect of majoritarian elections is used here to justify our assumption that voters have unbiased expectations.

Nonetheless, uncertainty associated with imperfect information about future policies tends to generate a status quo bias (Congleton, 1986, Eichenberger and Serna,1996). Hessami (2016) provides evidence that suggests that complexity below some level has little effect on voters, but beyond some point additional complexity tends to generate a status quo bias (negative votes in referenda). This status quo bias provides one explanation for the fact that healthcare reforms tend to be relatively modest and whole cloth reforms are rare.

A voter's cost for coverage varies with the level of benefits (H) associated with the system in place (Sj), personal income (Yi), and morbidity (P_i). The individual's risk-pooling cost is characterized with cost function $C_{ij} = c(H, S_j, P_i, Y_i)$, which can be easily generalized to any countable number of health problems by treating H and S as vectors. This representation of the voter's cost function implies that economic (pragmatic) voters are indifferent between tax-financed and privately financed systems because they deliver the same services (H). They are not, however, indifferent about their associated costs, because this affects the funds available for non-health consumption.

We represent individual i's non-health consumption in the healthy state, X_i, as his or her income in that state, Y_i, less his or her premiums or tax cost, C_{ij}, for the risk-pooling system of interest, $X_i = Y_i - c(H, S_j, P_i, Y_i)$. The individual's consumption in the unwell or unhealthy state, X'_i, is his or her income (Y'_i) in the unwell state, less the cost of the insurance system and any out-of-pocket expenditures by the voter, $X'_i = Y'_i - c(H, S_j, P_i, Y'_i) - O_i$. The effect of income on cost of a particular treatment is determined by the healthcare and tax systems in the country of interest. Unsubscripted variables denote average values for the country of interest.

Substituting for consumption and differentiating with respect to H and O_i allows the voters' demand for health insurance to be characterized with two first order conditions:

$$(1 - P_i)[U_X(-C_H)] + P_i\,[U_X(-C_H) + U_W E_H W'] = 0 \qquad (2a)$$

$$[U_X(-1) + U_W E_H W'] = 0 \qquad (2b)$$

Solutions characterize the voter's ideal combination of risk pooling and out-of-pocket expenditures for a specific health service under a particular healthcare system. Although both equations must hold simultaneously, equation 2a can be said to characterize the portion of healthcare expenditures that is socialized—shared through risk pooling system of one kind or another. Equation 2b can be said to characterize that which remains entirely private.

The implicit function theorem allows the demand for insurance coverage and out-of-pocket expenditures characterized by the first order conditions to be written as functions of

parameters of the individual's choice problem.

$$H_i^* = h_i(P_i, W', Y_i, S_j) \quad (3a)$$

$$O_i^* = \phi_i(P_i, W', Y_i, S_j) \quad (3b)$$

A voter's demand for risk pooling, H_i^*, varies with morbidity, health risk (severity of the condition treated), personal income, and the system in place. The slopes and curvature of the demand functions are affected by risk aversion, treatment efficacy, treatment costs, and cost-sharing system.

Extremes in treatment are preferred when there are corner solutions to equations 2a or 2b. Voters prefer "complete" coverage (H such that e(H)W' = W and O=0) when the expected marginal benefit of coverage, $P_i [U_W E_H W']$, exceeds its marginal cost, $(1 - P_i)[U_X(-C_H)] + P_i [U_X(-C_H)]$, over the entire range of effective treatments. If no effective treatments for a condition exist, $E_H = 0$, neither socialized nor private expenditures are supported. The latter implies that innovations that greatly increase the effectiveness of treatments or which create new treatments for formally "untreatable" conditions tend to increase total healthcare expenditures.

2.2 Choosing among Risk Pooling Systems

Whenever healthcare expenditures are supported, non-ideological voters prefer the risk-pooling system that minimizes their cost of coverage. For example, if system Sj generates cost $C_{ji} = c(H, S_j, Y_i)$ and system S_k generates cost $C_{ki} = c(H, S_k, Y_i)$ with $C_{ki} > C_{ji}$ for the procedure of interest, voter i will prefer S_j to S_k for this particular potential health problem.

Pragmatic voters disagree about the optimal healthcare system, whenever their personal costs differ among alternative financing and risk-pooling systems. For example, suppose that government health insurance or services are financed with a proportional tax *t* on income. In that case, $\sum tY_i = PNH(1+d_s)$, where N is the number of persons covered and d_s is the overhead cost of the system of interest (unsubscripted values are again average ones for the community or country of interest). The tax rate is $t = [H/Y](1+d_s)$, and the cost of the government-sponsored service for individual *i* is $C_i = tY_i$. The cost of healthcare under a discriminatory private insurance

plan providing the same coverage is equal to its expected cost (given personal risk P_i) plus the system's administrative overhead, $C_i = P_iH(1+d_0)$, where d_0 is the overhead cost of a private insurance system. A private plan with risk-based pricing is preferred to tax-financed plans whenever $P_iH(1+d_0) < tY_i$.

Under an income tax–financed system, the cost of coverage for high-income persons tends to be higher than that for low-income persons. Similarly, the cost for low-risk persons of average income tends to be higher under tax-financed systems than under private insurance—assuming that health risks and income are not strongly and positively correlated. For persons of average risk and income, only the administrative costs differ.[4]

A national referendum on whether to privately or publically finance insurance for a specific health problem is effectively a contest between a private system and the most cost-effective tax-financed system (smallest d_s) in the country of interest (for the health problem of interest). The healthcare system voted into place is the one that minimizes the expected costs for a majority of voters. This may be either public or private, according to the tax system in place, and differences in administrative costs among the systems under consideration. [5]

Note that the pragmatic voter's preferred risk-pooling system is not based on overall economic efficiency, but his or her private costs. These are partly the result differences in efficiency (overhead costs) and partly of the manner in which costs are shared.

2.3 On the Electoral Support for Complex Systems

Each health problem has an ideal financing and delivery system for the median voter, namely

[4] A negative correlation would strengthen this conclusion. Such correlations are not included in the model, because the individualized morbidity implicitly account for a variety of personal factors that affect risks. These including behavioral ones (moral hazard) and links between income, stress, age, gender, etc.. Angel (2016) notes that self-reported assessments of health are also correlated with economic and institutional factors such as indebtedness and methods of debt collection. Such national factors would affect the shape of the cost function through effects on average morbidity, which are explicitly included in the model through W'. Similarly, individualized cost shares implicitly account for differences in tax burdens associated with income, age, and personal expectations regarding healthcare innovations.

[5] Subscriber costs under both private insurance and public insurance systems are also affected by the monopsony power of insurers and the monopoly power of service providers and their associated input providers. If cost function c is taken to be cost of health care services in a competitive environment, overhead or administrative cost, d, can be used to account for such differences in a given country. In the empirical sections of the paper, such national market effects are accounted for by the national fixed effects variable.

that which minimizes the median voter's costs. When a typical voter's least cost method of risk pooling varies among health problems, the ideal system for financing or providing specific services is not likely to be uniform. Composite systems are thus entirely compatible with the usual economic assumptions about consumer preferences and production technologies. Each voter's ideal system is the vector of risk-pooling and service delivering systems that minimizes his or her costs for each of the possible health conditions that are treatable.

For example, private out-of-pocket solutions may be the most cost-effective system for minor ailments when self-diagnosis is less costly and essentially as accurate as professional diagnosis. Similarly, one can imagine other problems for which government-sponsored medical clinics provide "low-tech" services for which professional diagnosis is straightforward and superior to self-diagnosis. For somewhat more difficult to diagnose and treat problems, socialized insurance systems may provide well-understood services with greater effectiveness and lower delivery costs, by encouraging competition among providing doctors and hospitals and using government's monopsony power to reduce healthcare costs. Private insurance or out of pocket–based systems may provide better "state-of-the-art" or experimental treatments than available under other systems. Such assessments of treatment costs and system effectiveness can generate quite complex healthcare systems.

2.4 Extended Model of Voter Preferences for Healthcare Systems

We next extend the economic model of voter interests to account for non-economic interests in healthcare services such as fairness and/or ideology. For example, socialists may prefer uniform tax-financed systems, even if they are more expensive than complex systems or private insurance systems, because the activity is undertaken collectively and uniform services are provided. Conservatives and classical-liberals may favor private care systems even if they are more costly than tax-financed systems, because they are more grounded in voluntary transactions. The delivery system itself is a "good" for many ideologically or normatively motivated voters, although it is not usually the only "good."

Personal ideals can be incorporated into the model in a variety of ways (Congleton, 1991; Alesina and Angeletos, 2005; Congleton and Bose, 2010). The simplest is to assume that a person's ethical or ideological beliefs imply that a particular system or combination of systems (S_i^{**}) is inherently desirable and that the closer the actual system is to that ideal the better, other things being equal. To simplify the narrative, we use the term "ideology" to refer to a voter's normative assessment of alternative healthcare systems. Deviation from an individual's ideal system creates an ideological cost ($I_i = |S - S_i^{**}|$) that diminishes a voter's subjective wellbeing. Expected utility for idealistic or ideological voters can be represented as:

$$U_i = (1\text{-}P_i)\, u(X_i, W_i, |S - S_i^{**}|) + P_i\, u(X_i', e[H+O_i]W'_i, |S - S_i^{**}|) \quad (5)$$

The ideal vector of health services and delivery system can be characterized by differentiating equation 5 with respect to S, H, and O and setting the results equal to zero.

$$(1 - P_i)[U_X(-C_S) + U_I] + (1 - P_i)[U'_X(-C_S) + U'_I] = 0 \quad (6a)$$

$$(1 - P_i)[U_X(-C_H)] + P_i[U_X(-C_H) + U_W E_H W'] = 0 \quad (6b)$$

$$[U_X(-1) + U_W E_H W'] = 0 \quad (6c)$$

To simplify the narrative and notation, we again begin by analyzing how such ideals affect choices with respect to a single health care problem or service.

If ideology or social norms matter, $U_I \neq 0$, and personal norms influence both electoral and policy outcomes. Moderately idealistic or ideological voters will prefer systems between the pragmatist's optimal system characterized above and their ideologically ideal system (S_i^{**}) whenever the marginal ideological utility generated by ideological goals is larger than the marginal subjective burden associated with additional healthcare costs.

The implicit function theorem allows an idealistic voter i's preferred level of health services (H_i) and risk-pooling system (S_i) for a particular health risk (W') to be characterized as function of parameters of his or her choice problem.

$$S_i^* = s_i(P_i, W', Y_i, S_i^{**}) \quad (7a)$$

$$H_i^* = h_i(P_i, W', Y_i, S_i^{**}) \quad (7b)$$

The healthcare system preferred by ideological voters is again obtained by choosing the best risk-

pooling system for each healthcare problem that can be treated, which now is influenced by both cost and ideological considerations.

2.5 Implications of the Voter Models for the Composition of System Expenditures

Several models of elections are possible. We adopt the most widely used model, the median voter model, for several reasons. First, it is grounded in rational voter models. Second, insofar as contested areas of the issue space can be summarized with a single dimension, it emerges as a Nash equilibrium of choices made by rational candidates and voters.[6] Third, most other characterization of electoral equilibria yield similar predictions, namely that moderate, relatively well-informed, voters largely determine electoral outcomes.[7] Fourth, the model's predictions are easiest to explain and estimate, because the median voter model implies that the interests of a single rational voter motivates both policy adoptions and reforms. The strong form of the median voter theorem implies that national healthcare systems tend to maximize the welfare of each nation's median voter(s). [8]

The healthcare system chosen by a majority of voters—whether ideological, non-ideological, or some mix of the two—tends to be very stable, whenever the median voter is not "nearly" indifferent among systems. In such cases, only relatively large changes in median voter income, overhead costs, health risks, or ideology would induce reforms. In cases in which the median voter is nearly indifferent among systems, even small changes in income, risk, or ideology induce changes in his or her ideal system. In the latter case, the rational voter model implies that there will be nearly constant pressures for reforms of existing healthcare systems

[6] There is a good deal of evidence that contested multi-dimensional policies can be mapped into a single dimension, without significant loss. See, for example, Poole and Rosenthal (2000) for evidence that single-dimensioned spatial voting models can be used to characterize the votes cast by elected representatives of the U. S. Congress.

[7] See for example, Mueller (2003) or Grofman (2017, forthcoming) for overviews of other election-based models and equilibria. It also bears noting that coalitions of high-income and low-risk taxpayers and low-income and high-risk taxpayers could opt for parallel systems for a single service as a consequence of coalitional politics, as in Epple and Romano (1996). This paper neglects such possibilities in order to develop a tractable model that can be subjected to statistical tests.

[8] The assumed seperability of health problems allows systems to be constructed one treatment at a time, which generates a multi-dimensional median voter outcome under somewhat weaker assumptions about the distribution of voter ideal points. Very similar results can also be generated from a stochastic voting model. Such models require fewer assumptions about voter preferences, but yield somewhat less sharp predictions about which voter interests drive policies.

because of changes in the pivotal voter's interests.

Together the median voter theorem and the rational voter models developed above allow reduced form models of the composition of healthcare expenditures to be developed. Let H_O^*, H_P^*, H_S^*, and H_G^* denote the sum of the ideal expenditure levels on treatments that the median voter believes should be provided by out-of-pocket, private insurance, social insurance, and direct government provision, respectively, as characterized by the median voter's ideal vectors from equations 7a and 7b. Together with the associate cost functions, these determine the level and distribution of national healthcare expenditures. Substituting the median voter's system and expenditure demands into the relevant cost functions and applying the implicit function theorem produces a system of reduced form equations that describe the pattern of healthcare system expenditures.

$$F_{Oi}^* = f_{Oi}(P_i, W', Y_i, S_i^{**}) \quad (8a)$$

$$F_{Pi}^* = f_{Pi}(P_i, W', Y_i, S_i^{**}) \quad (8b)$$

$$F_{Si}^* = f_{Si}(P_i, W', Y_i, S_i^{**}) \quad (8c)$$

$$F_{Gi}^* = f_{Gi}(P_i, W', Y_i, S_i^{**}) \quad (8d)$$

The total cost of the median voter's ideal composite healthcare system is T*, where

$$T^* = H_O^* + H_P^* + H_S^* + H_G^*. \quad (9)$$

3 Statistical Analysis of the Electoral Models of Healthcare System Choices

3.1 Data and Sources We use log linear forms of equations 8a, 8b, 8c, 8d, and 9 to undertake statistical analysis of the two rational voter models. The narrow rational voter model implies that median voter preferences over healthcare systems and coverage at a given time are ultimately driven by his or her income, morbidity, and technology. According to the extended model, his or her internalized norms (ideology) matter as well.

We begin by showing that composite healthcare systems are the norm, rather than the exception. The OECD divides risk-pooling systems into several categories according to delivery and funding method: (1) total government expenditures on healthcare (gg), (2) government

expenditures financed from general revenues, which excludes mandated public insurance schemes (gg_nosocx), (3) expenditure through social security programs (compulsory social health insurance programs, socx), (4) private health insurance (privins), (5) private out-of-pocket payments (privoop), (6) non-profit organizations such as charities and aid agencies providing goods and services to households free or at noneconomically significant prices, (nonprofit), and (7) health expenditures by corporations producing services other than health insurance, as for example employee clinics (corporate_noins). Table 1 reports average values for each OECD country and category of expenditure in the 2000–14 period.

The largest outlay (bolded) varies from country to country. In some cases, the largest program is government provided healthcare, as in Britain and Canada. In others, the largest program is compulsory health insurance, as in France and Germany. In Switzerland, Chile, and the United States, private insurance is an important method of pooling risks. What is most important for the purposes of this paper is that in no case is the largest program the only source of healthcare expenditures. In most cases, at least three of the categories still account for significant expenditures.

Table 1. Expenditures Composition, by Shares (Average 2000–14)

Country	gg	gg_nosocx	socx	privins	privoop	nonprofit	corporate_noins
Australia	68.53	**68.53**	0	8.38	19.62	0.60	3.23
Austria	75.61	30.54	**45.33**	4.86	17.89	1.21	0.17
Belgium	76.22	11.07	**65.59**	4.66	18.46	0.16	0.06
Canada	70.00	**68.62**	1.47	13.14	15.06	1.25	0.76
Chile	44.31	37.43	4.41	20.12	**38.04**	0	0
Czech Republic	86.12	5.67	**79.46**	0.20	13.54	1.01	0.33
Denmark	84.03	**84.03**	0	1.63	14.28	0.07	0
Estonia	77.30	10.40	**66.90**	0.22	20.99	0.02	1.26
Finland	73.68	**58.60**	15.08	2.29	20.71	1.09	2.22
France	78.56	3.73	**74.71**	13.46	7.41	0.01	0.68
Germany	76.41	7.10	**69.32**	9.14	13.62	0.39	0.43
Greece	64.13	27.47	**39.21**	2.60	30.39	0.16	0.02
Hungary	67.16	8.90	**57.72**	2.04	26.75	1.69	2.90
Iceland	81.28	**53.34**	28.07	0	17.19	1.43	0
Ireland	74.03	0	0	0	0	0	0
Israel	62.10	16.73	**45.66**	9.96	24.75	0.66	1.17
Italy	76.62	**76.46**	0.16	0.95	22.42	0	0
Japan	81.42	8.98	**72.44**	2.47	15.52	0	0.89
Korea	55.83	11.43	**44.40**	4.98	38.38	0.67	0.14
Luxembourg	83.77	8.68	75.09	3.01	12.11	1.10	0.00
Mexico	45.24	18.82	26.79	3.65	**50.74**	0	0
Netherlands	78.75	7.34	**74.09**	9.67	6.18	0.79	1.85
New Zealand	79.62	**73.18**	6.53	5.18	13.74	1.36	0.00

Norway	83.75	**71.16**	12.91	0.00	15.63	0	0.29
Poland	70.13	6.88	**63.25**	0.95	25.68	1.09	2.13
Portugal	69.71	69.04	0.93	4.63	25.11	0.08	0.41
Slovak Republic	77.07	6.74	**65.07**	0	24.84	0.95	2.40
Slovenia	72.83	3.24	**69.41**	13.73	12.64	0.06	0.92
Spain	72.44	**67.81**	4.98	5.03	21.65	0.52	0
Sweden	82.77	**82.56**	0.00	0.39	16.34	0.18	0.53
Switzerland	61.35	17.56	**43.46**	8.93	28.94	0.96	0
Turkey	72.50	26.27	47.54	0	19.10	0	6.86
United Kingdom	86.28	86.28	0	3.62	10.50	4.51	0
United States	46.37	0	0	**35.88**	13.21	3.86	0.21

Notes: all values are percentages in terms of total expenditures. gg = general government; gg_bosocx = general government excluding social security; socx: social security; privins = private insurance; privoop = private out of pocket expenditures; nonprofit = non-profit organizations; corporate_noins = non insurance expenditures from corporate.

We next attempt to determine whether the composition of national healthcare systems in a given year are generated by voter interests at that time. Reasonably good proxies for most of the variables used in the rational voter models are available from the OECD database. Relatively complete economic, health, and political data are available for most OECD countries for the period 1980 through 2014. Tables 2a and 2b provide the definitions and sources of the variables (a), and the summary statistics (b). All expenditure levels are in PPP constant dollars. [9]

Table 2a: Variables Definitions and Sources

Total	Total health per capita spending – log of ppp, constant prices – OECD Health Data
Gen Gov	Total General Government health care per capita spending – log of ppp, constant prices – OECD Health Data
Gen Gov (No SI)	General Government without Social Insurance Component of health per capita spending – log of ppp, constant prices – OECD Health Data
Gen Gov (Only SI)	General Government only Social Insurance Component of health per capita spending – log of ppp, constant prices – OECD Health Data
Priv	Total private health per capita spending – log of ppp, constant prices – OECD Health Data
Priv (Ins)	Private health per capita spending, insurance – log of ppp, constant prices – OECD Health Data
Priv (OOP)	Private health per capita spending, out of pocket – log of ppp, constant prices – OECD Health Data
MV (RL Ideology)	Kim Fording Median Voter Right (-100) to Left (100) Index. (i) Interpolated series between election years. (ii) residual component of the regression on per capita GDP. Measure derived from the Manifesto data.
RGDP PC	Real GDP per capita. Log transformation in constant prices ppp. – OECD Health Data
Mortality	Log of Mortality rate for cardiovascular disease – OECD Health Data
RGov HealthR&D (Lag 5 yrs)	Log of 5 years lag of the total government R&D spending on Health – OECD GBAORD Data, (in constant ppp dollars)
Proportional	Categorical Variable Measuring the Proportionality of the electoral system. Electoral system: single member districts or proportional representation.

[9] Note, for example, that the data for the US do not distinguish among its public health care programs. Medicare, Medicaid, and Veteran's Administration expenditures are included in general government expenditures, but Medicare is not counted as a mandated social insurance program.

	0 = single-member, simple plurality systems; 1 = modified proportional representation (parallel plurality PR systems, majority-plurality/alternative vote); 2 = proportional representation (PR). Source: Comparative Political Dataset
Presidential	Categorical Variable measuring the Presidential System Executive-legislative relations. 0 = parliamentary system; 1 = semi-presidential dominated by parliament; 2 = hybrid system; 3 = semi-presidential dominated by president; 4 = presidential system. Source: Comparative Political Dataset
Federalism	Categorical variable measuring the federal system Federalism. Coded: 0 = no; 1 = weak; 2 = strong. Following Huber et al. (2004); national sources and constitutions.[10] Source Comparative Political Dataset
% >65yrs	% of population above 65 years old

We approximate median income with real per capita gross domestic product (RGDP PC) measured using the purchasing power parity method.[11] Three indicators of health risks (morbidity) were collected, cardiovascular mortality rates, cancer mortality rates, and population over age 65. Insofar as a voter in mid-life has no special knowledge of his or her specific risks, average risks serve as useful approximation of his or her assessment of morbidity. Table 2 provides summary statistics for the variables used in the estimates (in logs). Data on the implicit sample weighting induced by data availability is provided in the appendix.

Table 2b: Summary Statistics (1980–2013)

Variable	N	Mean	SD	Min	Max
Total	997	7.430	0.670	4.620	8.920
Gen Gov	969	7.080	0.800	2.840	8.260
Gen Gov (No SI)	460	6.090	1.400	2.470	8.130
Gen Gov (Only SI)	375	6.020	1.790	0.240	8.140
Priv	958	6.070	0.750	2.950	8.270
Priv (Ins)	426	4.200	1.600	-1.300	7.870
Priv (OOP)	476	5.940	0.550	4.060	7.150
MV (RL Ideology)*	952	1.480	10.76	-31.15	43.52
RGDP PC	1064	10.20	0.450	8.530	11.41
Mortality	1040	6.080	0.420	5.060	7.750
RGov HealthR&D (Lag 5 yrs)	952	9.930	0.470	9.210	10.64
Proportional	916	1.620	0.700	0	2
Presidential	916	0.570	0.960	0	4
Federalism	916	0.490	0.820	0	2

[10] Huber, Evelyne, Charles Ragin, John D. Stephens, David Brady and Jason Beckfield. 2004. Comparative Welfare States Data Set. Northwestern University, University of North Carolina, Duke University and Indiana University.

[11] Average income is normally greater than median income, but highly correlated with it. Thus, it serves as a good proxy for median income. If turnout rises with income, as it does in most countries, the use of an income variable somewhat greater than median national income provides a better proxy for the median voter income. The Stadelmann et al. (2015) estimates for Switzerland imply that elected officials vote in a manner that is consistent with voters with relatively high income, which also implies that an income variable that is somewhat greater than median income will better characterize the voting behavior of elected representatives.

% >65yrs	916	14.41	2.530	9.100	25.10

*the MV measure used in the regressions is the log transform of this variable, once rescaled to positive values

In the extended interest model, we use the Kim-Ford right-left ideological index to represent the median voter's ideology. The Kim-Fording (KF) index places national party platforms on a single international left-right scale. Rational-voter models imply that voter interests and therefore party platforms are systematically affected by income trends and fluctuations. To distinguish ideological from income effects on median policy preferences, we estimate ideology as a linear function of per capita income and used the residual as our measure of ideology. We then rescale the index and apply a log transformation. The effects of economic growth and business cycles on the pivotal voter's healthcare policy preferences are thus fully captured by the income variable.

We use ordinary least squares with country fixed effects as our estimator because it has proven to be a relatively robust estimation method and is appropriate for reduced-form panel estimation.[12] We use robust standard errors to compute relevant t-statistics. The results using cardiovascular mortality rates are reported. The others are available on request. As usual, neither the data nor estimation strategy are perfect, but are sufficient for the purposes of this study, which is to determine the extent to which an electoral model of healthcare policy grounded in rational choice models can account for differences in the composition of national healthcare systems through time and among countries. The log transformation of the expenditure, income, and ideology variables allows the all the estimated coefficients to be interpreted as elasticities.

[12] Every model abstracts from the complexity of human society to focus on what are believed to be key relationships. Thus, there is always some risk that relevant factors are neglected by a model, most of which are of the "other things being equal variety." Leaving relevant variables can generate various kinds of estimation bias, although the kind of bias varies with the characteristics of the independent variables. For example, in a regression based on exogenous variables, suppose that $Z = a + bX + cY + u$, with $X \sim N(m,s)$, $Y \sim N(n,t)$, and $u \sim N(0,e)$. If only X is used in the estimation, estimates of intercept term "a" will be biased, because it will include the mean of the Y distribution. The estimated standard error of the residual, u, is also biased, and affected by the variance of Y. As a consequence, the estimated value of standard error "e" tends to be higher than it truly is in most (although not all) cases. Estimates of coefficient "b," however, will be unbiased, given the distributional assumptions, although it's estimated standard error will be higher than it would have been if variable Y had been taken into account. The latter reduces the probability that statistical significance is found, which is an unavoidable cost of the estimation methods used here. In cases in which the neglected variables are country specific, inclusion of fixed-country effects (binary variables) tends to reduce both biases, by capturing the means of the neglected country specific variables.

We focus on the 1980-2013 period, because extending the sample to before 1980 would make the panel severely unbalanced. This is a sufficiently long period that technological advances are likely to have had significant effects on the cost and range of possible treatments and thereby on voter demands for healthcare services. The estimates include a nation's tax-financed healthcare R&D expenditures (in PPP constant dollars), with a 5-year lag to account for the effects of technology on desired healthcare expenditures. We use national healthcare R&D expenditures, rather than country trends, because trends tend to misestimate the technological effect.

3.2 Estimates of Electoral Models of Health Care Expenditures

Table 3 provides panel regression estimates of the median voter's demand for the expenditure categories reported in table 2, when his or her demand is based on economic and personal health considerations alone. Estimates of total real per capita healthcare spending are reported in column 1, total per capita government expenditures, direct expenditures, and mandated insurance outlays are reported in columns 2, 3, and 4. Estimates of total per capita private expenditures, private insurance, and out of pocket expenditures are reported in columns 5, 6, and 7. Corporate non-insurance spending and non-profit spending are not included in the regressions because of a lack of data.

As predicted by the rational voter model, the effects of income and risk are evident in the estimated expenditure equations for each type of program, and are significant in most of the estimates. The country fixed effect variables are also important (although not reported), which suggests that some elements of national healthcare systems are idiosyncratic, reflecting local market conditions, national culture, and institutional differences (Brady et al 2016). The elasticities of income for the various categories of health spending are above 1 in all regressions except the one in column 7. Coefficients for average income are statistically significant at the 1% level in all regressions. Differences among those coefficients suggest that the income elasticity of the alternative risk-pooling methods vary. The variation in elasticities implies that the

composition of healthcare programs changes with income, with private insurance increasing most rapidly, followed by the two major governmental systems.[13] The positive signs imply that the income effect on demand exceeds its tax-price effect. In general, relatively greater growth of healthcare expenditures occurred in countries that made relatively greater use of private insurance systems than those using mandated social insurance or tax-funded single payer systems.

Table 3: Healthcare Expenditure by Category - OECD country panel 1980-2013
Narrow Economic Voter Model

VARIABLES	(1) Total	(2) Gen Gov	(3) Gen Gov (No SI)	(4) Gen Gov (SI)	(5) Private	(6) Priv(Ins)	(7) Priv(OOP)
RGDPPC	1.009***	1.101***	1.553***	1.493***	1.181***	2.460***	0.934***
	(25.052)	(12.62)	(18.38)	(11.47)	(13.30)	(17.24)	(9.187)
Morbidity (Cardiovascular)	-0.081*	-0.236***	-0.107	-0.778***	0.481***	-0.143	0.182
	(-1.748)	(-3.097)	(-0.556)	(-6.115)	(4.237)	(-0.657)	(0.960)
RGov HealthR&D (Lag 5 yrs)	0.215***	0.124**	0.194	-0.162**	0.515***	0.118	0.270***
	(7.325)	(2.398)	(1.604)	(-2.122)	(7.439)	(0.898)	(2.803)
Country Fixed Effects	yes	yes	yes	yes	yes	yes	yes
Observations	791	784	409	334	777	385	418
R-squared	0.985	0.973	0.987	0.993	0.906	0.974	0.936

Robust t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

The negative effect found for morbidity suggests that there is implicit risk pricing for the average voter and others near the average under both public and private risk pooling. As health risks increase, average costs and expenditures tend to rise. This higher price reduces the desired per capita expenditure in most categories. The lagged variable of total government R&D health spending is generally positive and statistically significant, except in the case of government social insurance alone (column 4), where the association is negative. The positive effect of tax-financed R&D expenditures is consistent with the postulated demand increasing effects of introducing new services and more expensive treatments to the healthcare menu. Innovations in healthcare,

[13] This may reflect the period studied. Most OECD countries had greatly expanded the extent of risk pooling undertaken in tax-financed and mandatory contribution programs in the previous two decades. Given full-scale programs in place with limits on health services, it would be natural for voters to attempt to expand existing programs by casting votes and in their private lives to "top up" tax-financed services with private insurance.

as true of other consumer goods, are not all concerned with reducing the production costs of existing services.

Table 4 presents estimates of the extended model of voter interests. Residuals from a linear estimate of the Kim-Fording right-left index as a function of national per capita GDP are used as an instrument for the median voter's ideology. The coefficient values of the economic variables are similar in magnitude to those reported in Table 3. Coefficients for the adjusted Kim-Fording ideological measure are generally negative in these regressions, although not always statistically significant. Larger values indicate that the median voter's ideology has shifted to the left. In the period studied, the results suggest that other forms of redistribution had a higher salience than healthcare after the effects of technological advance, morbidity, and income were taken into account. Given the somewhat different sample sizes and additional explanatory variable, these results also provide evidence of robustness for the electoral model of healthcare system choice. (Data availability for the ideology variable caused our sample sizes to fall somewhat for each category.)

Table 4: Health Expenditures by Category - OECD country panel 1980-2013
Extended Voter Model

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	Total	Gen Gov	Gen Gov (No SI)	Gen Gov (SI)	Priv	Priv(Ins)	Priv(OOP)
MV (RL Ideology)	-0.019	-0.0393**	-0.133***	-0.0933**	0.0101	-0.116**	0.0274
	(-1.488)	(-2.222)	(-3.316)	(-2.215)	(0.418)	(-2.397)	(0.881)
RGDPPC	0.956***	0.880***	1.612***	1.023***	1.379***	1.663***	1.340***
	(22.631)	(14.62)	(9.230)	(4.248)	(11.66)	(6.172)	(5.916)
Morbidity (Cardiovascular)	-0.133**	-0.341***	-0.0944	-1.007***	0.595***	-0.228	0.277
	(-2.545)	(-3.805)	(-0.396)	(-6.480)	(4.502)	(-0.834)	(1.113)
Gov HealthR&D (Lag 5 yrs)	0.196***	0.128**	0.138	-0.210**	0.519***	0.211	0.238**
	(6.344)	(2.322)	(1.014)	(-2.335)	(6.813)	(1.324)	(2.215)
Country Fixed Effects	yes	yes	yes	yes	yes	yes	yes
Observations	714	708	348	280	701	331	357
R-squared	0.983	0.971	0.987	0.993	0.907	0.977	0.933

Robust t-statistics in parentheses; *** p<0.01, ** p<0.05, * p<0.1

3.3 Political Institutions and Voter Determination of Health Care Expenditures

A possible weakness of pure electoral models is that, with the exception of Switzerland, voters rarely vote directly on policies. Instead, policy decisions are made by various combinations of elected officials that are elected and adopt policies in somewhat different ways. These differences can affect policy decisions as indicated by the models developed by Buchanan and Tullock (1962), Frey (1994), and Persson and Tabelini (2000), among many others. To account for institutional effects, we augment the extended electoral model by including institutional variables found to be important in previous studies of government expenditures (Persson and Tabellini 2000, Congleton and Bose 2010). We include categorical measures of the executive branch and electoral process: presidential (1) or parliamentary (0), and proportional representation (1) or majoritarian (0). We also include a measure of federalism. The institutional variables are also interacted with median ideology (adjusted for income effects) to determine whether institutions affect the manner in which voter ideology affect policies. Another demographic variable is also included, which for the purposes of this paper can be regarded as another risk or cost indicator.

The coefficient values of the economic variables are similar to those reported in Table 3 for the economic model of voter demand for healthcare expenditures. We again find a positive income elasticity, although somewhat lower ones than in the previous estimates. Healthcare spending increases with income, as found above and in most previous studies (Parkin et. al. 1987, Hall and Jones, 2007, Acemoglu et. al. 2013). We again find evidence of a risk-pricing effect. As cardiovascular mortality risks increase there is a reduction in total healthcare spending (column 1) and of general government spending (column 2). The effect remains negative though it is a bit less significant when we exclude social insurance from public spending (column 3). The effect is largest (-.607 and significant at the 5% level) for mandated social insurance programs (column 4).

Morbidity has a positive and significant association with total private spending (column

5). A positive effect is found for private insurance and out of pocket expenditures (columns 6 and 7), although the coefficients are not statistically significant. This effect most likely reflects a small shift in demand from the public sector to the private sector caused by reductions in tax-financed programs, other things being equal. The five-years lag of total government health R&D again has a positive association with health spending, and is significant at 1% level in specifications 1, 2, 5, 6, and 7. This finding is consistent with several case-study based papers showing that technological progress increases health care expenditures (Weisbrod, 1991, Newhouse 1992; Deaton, 2002).

The effect of ideology is decomposed into direct and institution-driven effects. The direct ideological effects are stronger and have a more plausible sign than in the first series of estimates. Statistically significant direct ideological effects are found in columns 1, 2, and 5. These indicate that a pivotal voter whose ideology shifts towards the left prefers more health spending overall, more general government spending on healthcare, and more overall private spending. Institutions can indirectly moderate or reinforce the direct effect. Proportional representation diminishes the effect of ideology, and presidential systems reinforce the ideological effects.

We also find evidence that constitutional features of governance bias policies away from the median voter. A proportional representation system is positively associated with per capita healthcare spending, while a presidential system is negatively correlated with per capita spending, general government spending, and private insurance spending. We find a positive association between presidential systems and direct healthcare spending.

A federal form of government also affects the composition of healthcare systems. We find different effects among individual subsystems (not all of which are statistically significant). Federalism does not affect the main aggregates (total per capita spending and total per capita government spending), but does affect the composition of national systems. The negative correlation is sharp and significant for social insurance (in column 4). The effect on private spending and private insurance are positive (0.581 and 2.379 respectively). The sign for private

out-of-pocket expenditures is negative (-3.246, 1% significance level). These effects imply that federalism is not simply another proxy for ideology. Yard-stick competition and bargaining between regional and national governments evidently have direct effects on the composition of national health care systems.

Table 5: Health Expenditure Shares-Total - OECD country panel 1980-2013
Extended Economic Voter Model with Institutional Controls and Interactions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	Total	Gen Gov	Gen Gov (No SI)	Gen Gov (SI)	Priv	Priv(Ins)	Priv(OOP)
MV (RL Ideology)	0.095***	0.102***	-0.104*	-0.111	0.242***	0.0256	0.0885
	(3.530)	(3.298)	(-1.661)	(-0.840)	(3.344)	(0.0944)	(0.635)
RGDPPC	0.876***	0.727***	0.664***	0.619**	1.335***	0.332	1.211***
	(22.714)	(15.55)	(4.158)	(2.386)	(11.25)	(1.161)	(6.406)
Morbidity (Cardiovascular)	-0.114**	-0.261***	-0.360*	-0.607**	0.592***	0.178	0.0927
	(-2.102)	(-3.493)	(-1.728)	(-2.148)	(3.971)	(0.542)	(0.422)
RGov HealthR&D (Lag 5 yrs)	0.213***	0.185***	0.135	-0.0240	0.567***	0.542***	0.0260
	(6.656)	(4.102)	(1.208)	(-0.157)	(6.035)	(2.631)	(0.206)
Proportional	0.243***	0.273***	-0.0985	0.595	0.518***	0.583	0.207
	(4.510)	(4.089)	(-0.760)	(1.526)	(3.300)	(1.091)	(0.749)
Presidential	-0.132***	-0.177***	0.719**	-0.312	-0.0991	-0.940***	0.423
	(-3.642)	(-3.054)	(1.980)	(-1.310)	(-1.122)	(-4.073)	(0.983)
Federalism	-0.005	0.00244	-0.393***	-1.495***	0.581***	2.379***	-3.246***
	(-0.873)	(0.365)	(-4.349)	(-17.97)	(2.605)	(5.049)	(-2.655)
%Pop >65yrs	0.003	0.00837*	-0.0421**	0.0102	-0.0242**	-0.0155	0.0477***
	(1.063)	(1.801)	(-2.396)	(0.660)	(-2.073)	(-1.102)	(4.167)
MV (RL Ideology) x Proportional	-0.065***	-0.0755***	0.0369	-0.0187	-0.143***	-0.0995	-0.0414
	(-4.221)	(-3.826)	(0.962)	(-0.240)	(-3.593)	(-0.667)	(-0.533)
MV (RL Ideology) x Presidential	0.041***	0.0502***	0.00269	0.0853	0.0524*	0.241***	0.119**
	(3.542)	(2.732)	(0.0686)	(1.213)	(1.833)	(3.300)	(2.253)
Observations	658	652	306	238	646	291	314
R-squared	0.982	0.964	0.992	0.996	0.916	0.983	0.955

Robust t-statistics in parentheses; *** p<0.01, ** p<0.05, * p<0.1

The last regressor before the interaction terms is the percentage of population above 65 years old. This can be regarded as another risk factor that tends to generally increase the cost of tax-financed systems relative to private ones for the median voter, who is younger and so less at risk than older persons. Consistent with this interpretation, the association, when significant, is negative for governmental and private outlays, but positive and significant at the 1% level for private out of pocket per capita expenditures. As public expenditures and private expenditures contract, because of cost considerations, out of pocket expenditures for those at risk tend to

expand.

Overall the estimates reported in table 5 imply that voter interests continue to substantially determine the composition and extent of a nation's healthcare system, although the various institutions of representative democracy also affect both the allocation of expenditures among healthcare subsystems and the extent of overall spending.

4 Conclusions

This paper has developed and tested an electoral model of healthcare system choice grounded on rational voter interests. The rational voter model was used to characterize key parameters of the voter's choice problem, which can be used as exogenous or proximate cause variables for the purposes of estimation. This is not to say that other less proximate links in the causal chain are without interest. For example, morbidity is one of the parameters taken into account by rational consumer-voters when determining their demand for public and private health insurance. Morbidity may in turn be correlated with other factors, such as age, lifestyle, stress, and so forth. These factors may be used to predict future morbidity and voter demand for healthcare services and could be targeted with public policies to reduce them. However, it is not age, lifestyle, or stress that generate a demand for health insurance, but rather indirect effects that those factors have on health risks. Personal income is also a parameter of the consumer-voter's choice problem. In this model, it has both the usual demand effects and also effects on a voter's cost for alternative methods of healthcare risk pooling and delivery. Our results suggest that the demand effects dominate the cost effects for the average OECD voter. Personal income may be affected by education, age, regulatory environment and so forth, which may be used to predict future income and future demands for healthcare. However, the usual rational voter models imply that income is the proximate cause, rather than those other variables. We do not directly test these widely-used propositions from microeconomics. Instead we test whether the proximate cause variables that a rational voter model directs attention to are correlated with the various forms of the risk pooling and healthcare delivery systems in place. We find considerable

evidence that they are. That evidence suggests that electoral pressures account for most of the trajectory and variation in the composition of healthcare systems in OECD countries during the past three decades.

Economic growth increases average income, which increases the general demand for healthcare, although the (net) income effects vary among methods of risk pooling and service delivery. We also find evidence of relative price effects. Risks tend to increase costs for voters with median or average characteristics, which tends to induce reductions in per capita public expenditures, other things being equal. We also find evidence of demand effects generated by innovations in healthcare treatments. Technological advance increases voter demand for healthcare services, most likely by expanding the menu of treatments available.

Income, relative prices, and technology are core drivers of healthcare expenditures in both idealistic and non-idealistic rational voter models, and all three were found to affect the trajectory and composition of healthcare expenditures. We also found evidence of what might regarded as idealistic, ideological, or expressive voting. Median voter ideology affected both the level and composition of healthcare expenditures, although the effects of ideology varied with political institutions. That institutions matter is not a surprise of course, but the estimated effects of institutions on both the level and composition of healthcare expenditures are striking and evidently not entirely captured with country fixed effects.

Most OECD healthcare systems share the property that their risk-pooling systems are relatively complex and are adjusted at a variety of margins through time. This paper has begun the process of understanding that complexity and the trajectory of reform. The results suggest that voter interests and political institutions differ enough among OECD countries to account for the observed variation in the extent and compositions of national healthcare systems. This is not to say that other factors are not important. For example, interest groups and agency costs may also influence the extent and composition of healthcare expenditures. Our results simply suggest that shifts in a rational voter's interests can account for most the recent history and complexity of healthcare expenditure in OECD countries.

The results also suggest that unified healthcare systems are not necessarily the best for individual voters or electorates as a whole. The best risk-pooling and delivery system takes account of economic and health interests, including a typical voter's personal cost and health risks. Insofar as voters have ideological or ethical interests, these too should be accounted for, as they tend to through electoral pressures. Complex systems may well deliver healthcare at a lower cost or with greater overall effectiveness than less complex systems.

References

Acemoglu, D., Finkelstein, A., & Notowidigdo, M. J. (2013). "Income and Health Spending: Evidence from Oil Price Shocks," *Review of Economics and Statistics*,*95*(4): 1079-1095.

Alesina, Alberto and George-Marios Angeletos (2005). "Fairness and Redistribution," *American Economic Review* 95(4): 960–80.

Anderberg, Dan (1999). "Determining the Mix of Public and Private Provision of Insurance by Majority Rule," *European Journal of Political Economy* 15(3): 417–40.

Angel, Stefan (2016). "The Effect of Over-Indebtedness on Health: Comparative Analysis of Europe," *Kyklos* 69 (2): 208–27.

Baltagi, Badi H. and Francesco Moscone (2010). "Expenditure and Income in the OECD Reconsidered: Evidence from Panel Data," *Economic Modelling* 27: 804–11.

Brady, D., Marquardt, S., Gauchat, G. and Reynolds, M. M. (2016). "Path Dependency and the Politics of Socialized Health Care," Journal of Health Politics, Policy, and Law 41: 393–421.

Breyer, Friedrich (1995). "The Political Economy of Rationing in Social Health Insurance," *Journal of Population Economics* 8(2), 137–48.

Buchanan, James M. and Tullock, Gordon (1962). *The Calculus of Consent: Logical Foundations of Constitutional Democracy*. Ann Arbor MI: University of Michigan Press.

Congleton, Roger D. (2007). "Informational Limits to Democratic Public Policy: The Jury Theorem, Yardstick Competition, and Ignorance," *Public Choice* 132(3): 333–52.

Congleton, Roger D. (2001). "Rational Ignorance, Rational Voter Expectations, and Public Policy: A Discrete Informational Foundation for Fiscal Illusion," *Public Choice* 107(1):35–64.

Congleton, Roger D. (1991). "Ideological Conviction and Persuasion in the Rent-Seeking Society," *Journal of Public Economics* 44: 65-86.

Congleton, Roger D. (1986). "Rent-Seeking Aspects of Political Advertising," *Public Choice* 49(3): 249-63.

Congleton, Roger D., Grofman, Bernard, and Voight Stefan (2017, forthcoming). *The Oxford Handbook of Public Choice*. Oxford: Oxford University Press.

Congleton, Roger D. and Feler Bose (2010). "The Rise of the Modern Welfare State, Ideology, Institutions and Income Security: Analysis and Evidence," *Public Choice* 144(3–4): 535–55.

Congleton, Roger D., Hillman, Arye L., and Konrad, Kai A. (2008) *40 Years of Research on Rent Seeking*. Heidelberg: Springer Verlag.

Cutler, David M. (1995). "The Cost and Financing of ," *American Economic Review* 85(2): 32–37.

Cutler, David M. (2000). "Walking the Tightrope on Medicare Reform*," Journal of Economic Perspectives* 14(2): 45–56.

Cutler, David M., Mark McClellan, and Joseph P. Newhouse (2000). "How Does Managed Care Do It?" *RAND Journal of Economics* 31(3): 526–48.

Deaton, A. (2002). "Policy Implications of the Gradient of Health and Wealth." *Health Affairs*, *21*(2): 13-30.

Downs, Anthony (1957) *An Economic Theory of Democracy*. New York: Harper and Row.

Epple, Dennis and Richard Romano (1996). "Ends against the Middle: Determining Public Service Provision When There Are Private Alternatives*," Journal of Public Economics* 62(3): 297–325.

Feldstein, Martin (1995). "The Economics of Health and : What Have We Learned? What Have I Learned?" *American Economic Review* 85(2): 28–31.

Feldstein, Martin (2006). "Balancing the Goals of Provision*," NBER Working Paper* 12279.

Freeman, Richard (2000). *The Politics of Health in Europe*. Manchester, UK: Manchester University Press.

Frey, Bruno S. (1994) "Direct Democracy: Political Economic Lessons from Swiss Experience," American Economic Review 84(2): 338–42.

Glied, Sherry (2003). " Costs: On the Rise Again*," The Journal of Economic Perspectives* 17(2): 125–48.

Grofman, Benard (2017, forthcoming). "Politics in One Dimension," In Congleton, Roger D., Grofman, Bernard, and Voigt, Stefan (Eds.) *Oxford Handbook of Public Choice.* Oxford: Oxford University Press.

Hall, R. E. and C. I. Jones (2007). "The Value of Life and the Rise in Health Spending," *Quarterly Journal of Economics* 122: 39–72.

Hessami, Zohal (2016) "How Do Voters React to Complex Choices in a Direct Democracy? Evidence from Switzerland, *Kyklos* 69 (2): 263–93.

Jacob, Johanna and Douglas Lundin (2005). "A Median Voter Model of Health Insurance with Ex Post Moral Hazard," *Journal of Health Economics* 24(2): 407–26.

Jacobs, Lawrence R. (1993). "Health Reform Impasse: The Politics of American Ambivalence toward Government*," Journal of Health Politics, Policy and Law* 18(3): 629–55.

Jottier, Dimi, Ashworth, John, and Heyndels, Bruno (2012). "Understanding Voters' Preferences: How the electorate's Complexity Affects Prediction Accuracy and Wishful Thinking among Politicians with Respect to Election Outcomes," Kyklos 65 (3): 340–70.

Kifmann, Mathias (2005). "Health Insurance in a Democracy: Why Is It Public and Why Are Premiums Income Related?" *Public Choice* 124: 283–308.

McCoskey, Suzanne K. and Thomas M. Selden (1998). " Expenditure and GDP: Panel Data Unit Root Test Results," *Journal of Health Economics* 17: 369–76.

Milne, R. and H. Molana (1991). "On the Effect of Income and Relative Price on the Demand for : EC Evidence," *Applied Economics* 23(7): 1221–26.

Mueller, Dennis C. (2003). *Public Choice III*. Cambridge: Cambridge University Press.

Navarro, Vicente (1989). "Why Some Countries Have National Health Insurance, Others Have National Health Services, and the U.S. Has Neither," *Social Science & Medicine* 28(9): 887–98.

Newhouse, Joseph P. (1977). "Medical-Care Expenditure: A Cross-National Survey," *The Journal of Human Resources* 12(1): 115–25.

Newhouse, Joseph P. (1992). "Medical Care Costs: How Much Welfare Loss," *Journal of Economic Perspectives* 6: 3–21.

Okunade, Albert A., Mustafa C. Karakus, and Charles Okeke (2004). "Determinants of Health Expenditure Growth of the OECD Countries: Jackknife Resampling Plan Estimates," *Management Science* 7(3): 173–83.

Owen, Guillermo, Grofman, Bernard, and Feld, Scott L. (1989) "Proving a Distribution-Free Generalization of the Condorcet Jury Theorem," *Mathematical Social Sciences* 17(1): 1-16.

Poole, Keith, and Rosenthal, Howard (2000) *Congress: A Political-Economic History of Roll Call Voting*. Oxford: Oxford University Press.

Parkin, David, Alistair McGuire, and Brian Yule (1987). "Aggregate Expenditures and National Income: Is a Luxury Good?" *Journal of Health Economics* 6(2): 109–27.

Pauly, Mark P. (1974). "Overinsurance and Public Provision of Insurance: The Roles of Moral Hazard and Adverse Selection," *Quarterly Journal of Economics* 88(1): 44–62.

Persson, Torsten and Guido Tabellini (2000). *Political Economics*. Cambridge, MA: MIT Press.

Plott, C. R. (1967). "A Notion of Equilibrium and Its Possibility under Majority Rule," *American Economic Review* 57: 787–806.

Ruger, Jennifer P. (2007). "Health, Health Care, and Incompletely Theorized Agreements: A Normative Theory of Health Policy Decision Making," *Journal of Health Politics, Policy and Law* 32(1): 51–87.

Sanz, Ismael and Francisco J. Velázquez (2007). "The Role of Ageing in the Growth of Government and Social Welfare Spending in the OECD," *European Journal of Political Economy* 23: 917–31.

Simon, Herbert A. (1984) *Models of Bounded Rationality: Economic Analysis and Public Policy*. Cambridge MA: MIT Press.

Stadelmann, David, Portmann, Marco, and Eichenberger, Reiner (2015) "Income and Policy Choices: Evidence from Parliamentary Decisions and Referenda," *Economics Letters* 135: 117–20.

Weisbrod, B. A. (1991). "The health care quadrilemma: an essay on technological change, insurance, quality of care, and cost containment," *Journal of Economic Literature*, *29*(2): 523-552.

Appendix: Unbalanced Panel Statistics

(A) By Country and Dependent Variables

Country	Gen Gov	Gen Gov (No SI)	Gen Gov (SI)	Private	Private (Ins)	Private (OOP)	Overall
AUS	33	15	0	33	15	15	33
AUT	34	10	10	34	10	10	34
BEL	22	11	11	19	11	11	34
CAN	34	11	11	34	11	11	34
CHE	29	19	19	29	19	19	34
CHL	19	11	11	19	11	11	19
CZE	24	11	11	24	11	11	24
DEU	33	22	22	33	22	22	33
DNK	34	17	0	34	17	17	34
ESP	34	11	11	34	11	11	34
EST	15	11	11	15	10	11	15
FIN	34	19	19	34	19	19	34
FRA	26	11	11	26	11	11	26
GBR	34	17	0	34	17	17	34
GRC	26	6	6	26	6	6	26
HUN	23	11	11	23	11	11	23
IRL	33	0	0	33	0	0	33
ISL	34	11	11	34	0	11	34
ISR	19	6	6	19	6	8	34
ITA	26	19	19	34	19	19	26
JPN	34	19	19	34	18	18	34
KOR	34	34	34	34	34	34	34
LUX	14	13	13	14	13	13	14
MEX	24	20	20	24	20	20	24
NLD	34	11	11	34	11	11	34
NOR	34	11	11	34	0	11	34
NZL	34	33	10	34	31	31	34
POL	23	11	11	15	11	11	24
PRT	34	14	14	34	14	14	34
SVK	17	11	11	17	0	11	17
SVN	19	11	11	19	11	11	19
SWE	34	13	0	29	13	13	29
TUR	34	10	10	31	2	16	34
USA	34	0	0	34	11	11	34
Total	969	460	375	958	426	476	997

(B) By Year and Dependent Variables

year	Gen Gov	Gen Gov (No SI)	Gen Gov (SI)	Gen Gov	Private (Ins)	Private (OOP)	Overall
1980	20	2	1	20	2	2	22
1981	19	2	1	18	1	1	21
1982	19	2	1	18	2	2	21
1983	19	2	1	18	1	1	21
1984	19	2	1	19	2	2	21
1985	21	2	1	22	2	2	23
1986	20	2	1	21	2	2	22
1987	20	2	1	21	2	2	22
1988	22	2	1	22	2	2	24
1989	22	2	1	22	2	2	24
1990	25	3	2	25	3	3	28
1991	26	3	2	25	4	3	28
1992	28	4	3	26	4	5	29
1993	28	4	3	26	4	5	29
1994	28	4	3	26	5	5	29
1995	31	8	7	30	8	9	31
1996	31	8	7	30	8	9	31
1997	32	11	8	31	10	11	32
1998	32	12	8	31	11	12	32
1999	34	10	6	34	10	10	34
2000	34	12	8	34	12	12	34
2001	34	13	8	34	13	13	34
2002	34	13	8	34	13	13	34
2003	34	27	23	34	24	28	34
2004	34	29	25	34	27	30	34
2005	34	30	26	34	27	31	34
2006	34	31	27	34	28	32	34
2007	34	31	27	34	28	32	34
2008	34	32	28	34	29	33	34
2009	34	32	28	34	29	33	34
2010	34	31	27	34	29	33	34
2011	34	32	28	34	29	33	34
2012	34	31	27	34	28	33	34
2013	31	29	26	31	25	30	31
Total	969	460	375	958	426	476	997

(C) By Country and Independent Variables

Country	MV, KF Index (interpolated)	GDP PC	Mortality (Circulatory)	Gov Health R&D (Lag 5 yrs)	Proportional	Presidential	Federalism	% >65yrs
AUS	34	34	31	28	34	34	34	34
AUT	29	34	34	28	34	34	34	34
BEL	31	34	33	28	34	34	34	34
CAN	32	34	32	28	34	34	34	34
CHE	32	34	33	28	34	34	34	33
CHL	0	28	32	28	0	0	0	0
CZE	24	24	28	28	21	21	21	24
DEU	34	34	24	28	34	34	34	34
DNK	32	34	33	28	34	34	34	33
ESP	32	34	34	28	34	34	34	34
EST	19	21	30	28	22	22	22	22
FIN	32	34	34	28	34	34	34	34
FRA	33	34	32	28	34	34	34	33
GBR	31	34	33	28	34	34	34	34
GRC	33	34	33	28	34	34	34	33
HUN	23	23	34	28	24	24	24	24
IRL	32	34	31	28	34	34	34	34
ISL	34	34	30	28	34	34	34	34
ISR	5	19	33	28	0	0	0	0
ITA	34	34	31	28	34	34	34	34
JPN	26	34	34	28	34	34	34	34
KOR	21	34	28	28	0	0	0	0
LUX	34	34	34	28	34	34	34	34
MEX	33	34	31	28	0	0	0	0
NLD	33	34	34	28	34	34	34	33
NOR	30	34	34	28	34	34	34	34
NZL	32	34	32	28	34	34	34	34
POL	21	24	32	28	22	22	22	23
PRT	32	34	31	28	34	34	34	34
SVK	21	22	19	28	22	22	22	24
SVN	17	19	26	28	23	23	23	23
SWE	31	34	34	28	34	34	34	33
TUR	32	34	5	28	0	0	0	0
USA	33	34	31	28	34	34	34	34
Total	952	1064	1040	952	916	916	916	916

(D) By Year and Independent Variable

year	MV, KF Index (interpolated)	GDP PC	Mortality (Circulatory)	Gov Health R&D (Lag 5 yrs)	Proportional	Presidential	Federalism	% >65yrs
1980	25	26	26	0	23	23	23	23
1981	25	26	28	0	23	23	23	23
1982	25	26	28	0	23	23	23	23
1983	25	26	26	0	23	23	23	23
1984	25	26	26	0	23	23	23	23
1985	25	26	30	0	23	23	23	23
1986	25	27	31	34	23	23	23	23
1987	25	27	31	34	23	23	23	23
1988	25	27	31	34	23	23	23	23
1989	25	27	31	34	23	23	23	23
1990	26	29	32	34	24	24	24	27
1991	28	30	32	34	25	25	25	28
1992	30	31	33	34	28	28	28	29
1993	31	32	33	34	29	29	29	29
1994	31	32	33	34	29	29	29	29
1995	33	34	33	34	29	29	29	29
1996	33	34	33	34	29	29	29	29
1997	33	34	32	34	29	29	29	29
1998	33	34	32	34	29	29	29	29
1999	33	34	33	34	29	29	29	29
2000	32	34	32	34	29	29	29	29
2001	32	34	33	34	29	29	29	29
2002	32	34	33	34	29	29	29	29
2003	32	34	33	34	29	29	29	29
2004	32	34	31	34	29	29	29	29
2005	32	34	30	34	29	29	29	29
2006	31	34	32	34	29	29	29	29
2007	31	34	33	34	29	29	29	29
2008	31	34	33	34	29	29	29	29
2009	30	34	34	34	29	29	29	29
2010	29	34	33	34	29	29	29	29
2011	26	34	29	34	29	29	29	29
2012	14	34	25	34	29	29	29	29
2013	7	34	15	34	29	29	29	22
Total	952	1064	1040	952	916	916	916	916