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COMPARING NON-FATAL HEALTH ACROSS COUNTRIES: IS THE US MEDICAL SYSTEM BETTER?

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Abstract:

The primary focus of the paper is to assess whether the US, which spends significantly more than any other country in health care, has better health outcomes. It has long been clear that mortality as a whole is not better in the US than in other countries. We focus our analysis on the US performance for the treatment of non-fatal health outcomes and we compare the health of the United States to that of Canada, the United Kingdom and Spain. Our results indicate a discrepancy between high quality of life for some outcomes and low quality of life for others. Such discrepancy is not attributable to measurement issues in determining a person's quality of life, nor is it attributable to differing performance by income. Our results suggest that the discrepancy is due to the fact that the US does better for the treatment of conditions where high-tech medicine is a key to better health and worse in conditions requiring substantial chronic disease management.

Keywords: international comparison, healthcare systems, chronic diseases, technology, health.

COMPARING NON-FATAL HEALTH ACROSS COUNTRIES: IS THE US MEDICAL SYSTEM BETTER?

Comparing medical care systems across countries has become a preoccupation of policymakers. It is commonly asserted in the United States, for example, that the Canadian health care system is better than the US one since its per capita spending in US dollars PPP is lower, by about 45 percent, but longevity is just as high. The UK asserts its superiority over France for the same reason.

Implicit in such comparisons is the idea that mortality is a good summary for the output of the medical care system. But this is not necessarily the case. Many medical services are designed not to extend life but to improve the quality of it. Indeed, entire fields of medicine –care for mental illness, ophthalmology services, physical therapy, gastroenterology, to name a few– are devoted not to extending life but to increasing its quality. And even services that were developed to extend life, such as coronary bypass surgery, are often applied in situations where quality of life more than length of life is the goal.

Specialists in the field, of course, recognize the limitations of mortality for comparing health across countries. But traditionally there have been few good ways to compare morbidity across countries.[1] In this paper, we propose a methodology to compare non-fatal health outcomes across countries and present a preliminary comparison of health differences in the United States, Canada, the United Kingdom, and Spain.

To understand our methodology, suppose there were just one disease, say kidney failure. Imagine that we surveyed the population in each country, including people with and without kidney failure, asking people "How would you rate your health: excellent, very good, good, fair or poor?" People with kidney failure will generally report their health as worse than people without kidney failure (holding constant demographic and other factors), reflecting their true lower health state. The degree to which people with kidney failure report themselves in worse health in different countries is a measure of how well the medical care system –and society more generally– treats kidney failure. If the US has a better medical care system than other countries, people with kidney failure in this US should report themselves in relatively better health compared to people without kidney failure than people with kidney disease do in other countries.

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[1] Measuring disability adjusted life years is one approach that has been taken in the literature, but this is very controversial. See Murray and Lopez (1996).

Note: We are grateful to the National Institutes on Aging for research support.

Note that our methodology does not make a comparison of *absolute* levels of self-reported health for people with kidney disease in different countries. Rather, it compares the *relative* health of those with and without kidney failure. In this respect, it follows the approach of Cutler and Richardson (1997, 1998, 1999), who propose to measure quality of life disutility for different conditions by how people with and without those conditions self-report their health. Our analysis applies this logic to an international setting.

We implement this methodology in four countries: the United States, Canada, the United Kingdom, and Spain. We chose these countries because they have very different medical care systems, and because they have readily available data on medical conditions and self-reported health. But even for four countries, the data are somewhat limited. We feel comfortable making only eleven disease comparisons (and fewer than that in some cases): heart disease, strokes, asthma or bronchitis, diabetes, arthritis, hypertension, migraine, back problems, hearing impairments, cataracts and glaucoma.

Our primary focus is whether the United States, which spends significantly more than any of these other countries do on medical care, has better health outcomes. Somewhat to our surprise, this is not uniformly the case. The US does clearly better on some conditions. People suffering from heart problems, stroke or arthritis are found to be in better health in the US than people with these conditions in the other three countries. But the US does much worse on other conditions. The most important of these is diabetes, where US citizens report themselves in substantially worse health than citizens in any of the other three countries.

We consider a number of explanations for why this may be the case. The first explanation is that it may reflect a problem with our self-report variable; people in some countries may be less likely to report themselves in poor or excellent health than people in other countries even with the same 'true' quality of life. To some extent, we control for this by comparing health for people with and without particular conditions. As a further test, we repeat our analysis using a more objective measure of health: the number of impairments in basic Activities of Daily Living (ADLs) that the person has. Our results are virtually identical in considering ADL impairments as in looking at self-reported health, however, so we reject this explanation.

The second hypothesis we consider is that the US does better for richer, well insured people than for poorer, uninsured people, and these differences are reflected in the prevalence of particular conditions. However, we show that our results are the same when we divide each country into rich and poor, as when we consider them together. Thus, this explanation is not supported.

We finally propose, and provide limited evidence for, an alternative explanation: the US does much better in conditions where high-tech medicine is the key to better health, and worse in conditions where low-tech management of chronic disease is more important. This hypothesis matches the ranking of the diseases. Heart disease and strokes are the two conditions where high-tech medicine is most valuable, and they are the two where the US does best. Diabetes is a condition where chronic disease management is vital, and the US does worst. With the data at hand, we are unable to prove whether high-tech care and poor chronic disease management are the source of the differing results, but we suggest empirical tests that could be helpful.

The rest of the paper is organized as follows. Section 1 describes the methodology. Section 2 describes the data and the institutional environment of the four countries we consider. Section 3 presents our main results, and section 4 discusses possible interpretations. The last section concludes.

I. Methods

When comparing the effect of medical care on non-fatal health across countries, we have several options. One option is to look at the prevalence of particular diseases across countries. This is an important outcome, but it suffers from two problems. First, and most importantly, prevalence of disease will be influenced by many factors in addition to medical care. Thus, one would need to be cautious about such an interpretation. Second, prevalence alone does not account for the severity of the impairment – how much does the health system alleviate the adverse impact of diseases.

To focus particularly on what medical care can do to influence health, we consider the health of people who have particular conditions, ignoring the possible role of medical care in disease prevention. Even here, there are methodological choices about how to compare health. One strategy is to undertake physical observations of people with different diseases and have experts (or non-experts) rate those observations. This is a good strategy, and we pursue it to some extent below. But physical assessment of life with diseases is limited, and omits the enormous contribution that mental and other non-physical attributes (such as pain) play in health. Further, even experts in the field may not know what it is like to live with particular diseases.

We thus take an alternate approach to measuring the impact of the medical system. Following Cutler and Richardson (1997, 1998, and 1999), we compare the self-reported health of people who have a condition to the self-reported health of people who do not have that condition. These self-reports are the individuals' own assessment of their current health state. Self-assessed health of people with a condition is on average below that of people without the condition (as one would expect). The degree to which self-reports of those with a given condition fall below those without that condition is an indicator of the quality of life for people with the condition. We can compare these quality of-life differentials across countries.[2]

We formalize this idea with a little notation. We assume that people have a latent measure of health h^*, which depends on the diseases they have D, demographic characteristics X such as sex, income or education, and the country C. Countries treat diseases differently, and hence each disease may affect the health outcomes of people who live there differently. We express health of people i in country j as:

$$h_{i,j}^* = D_{i,j} \cdot C_j \cdot \beta + X_{i,j} \cdot C_j \cdot \gamma + \varepsilon_{i,j} \qquad (1)$$

where β, and λ are vectors of parameters to be estimated. The interaction of disease indicators with country dummies allows for the differential effect of having each condition in each country. We interact demographic variables with country dummies to allow for variation along this dimension as well.

In practice, we do not observe h^*, the underlying health measure. We do observe discrete approximations to it, denoted h. In our primary specification, the questions that we consider are about self-reported overall health status (SRHS), generally framed as: "How

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[2] There is another way to explain the comparison that may be helpful. We are implicitly comparing the health of people with each disease across countries, but scaling that by the health of people without that disease. The scaling accounts for country-specific reporting factors that would otherwise influence the results.

would you rate your health: excellent, very good, good, fair or poor?" Previous research shows that SRHS is a good predictor of mortality as well as of other health outcomes, with people who rate their health as poor being more likely to die or to have a bad health outcome (Long and Marshall, 1999; Mossey and Shapiro, 1982; Kaplan et al., 1988; Idler et al., 1990).

With a distributional assumption on ε, we can relate the underlying variable to its discrete approximation. In particular, if we assume that ε is normally distributed, we can estimate equation 1 using an ordered probit model. This model, in addition to the coefficients of the previous specification, will also give us estimates of c_1, c_2 and c_3, the break points between the four different health states (the four states are defined below).[3]

The β and γ coefficients in our model range from $+\infty$ to $-\infty$. To normalize the results, we divide our coefficients by the difference between the cut points of very good/excellent health and poor/very poor health, e.g., $\beta_i = \beta_i / (c_1 - c_3)$. If we interpret the difference between c_1 and c_3 as the difference between perfect health and death, this would correspond to the quality-adjusted life expectancy associated with each health state. We thus term these QALY measures. Even if one is not willing to make this assumption, however, the scaling provides a useful benchmark.

Self-reported health status is not necessarily a perfect measure of health. The very nature of the self-report raises some questions. For instance, it could be the case that diseases have the same effect on the health of the population in different countries, but that people perceive the impacts differently for cultural reasons. As noted above, we believe our within-country comparison controls for this. We can test this further, however, using physical measures of impairment in addition to self-reported. We thus estimate models using impairments in activities of daily living (ADLs, including the ability to perform certain daily habits such as bathing, dressing, walking or eating) as the dependent variable. As we show below, the results are similar with the two measures.

II. Selection of Countries and Data

We focus our analysis on the health of the elderly. In developed countries, the elderly are virtually the only group with significant health impairments, so it makes sense to focus on that group. We analyze the health of the elderly in four countries: the US, Canada, the UK, and Spain. The countries were chosen partly because they have available data, and partly because their health systems are so different. The main characteristics of the four systems are summarized below and spending trends are shown in Figure 1.[4]

The United States

The United States spends the most on medical care of the four countries in our sample – indeed, the most of any country. Spending was $3538 per person (PPP applied), or 13.2 percent of GDP, in 1994[5] (roughly the time of our data). The US health care system is a

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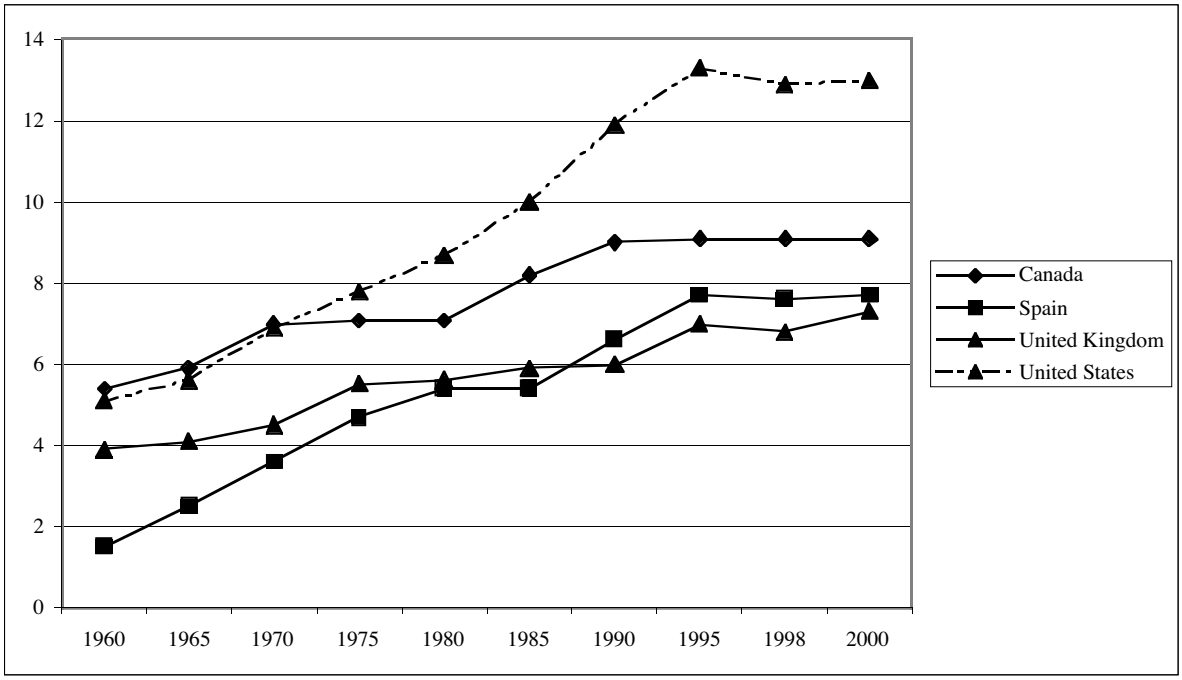
[3] In our basic model, we assume these cut points are the same across countries. We also have run the model allowing the cut points to differ across countries. The results are robust to this change.

[4] A comparison of the problems faced by medical care systems internationally is in Cutler (2002).

[5] All spending data are from the OECD Health Data (2002).

mix of public and private insurance. There is near universal coverage for the elderly under Medicare, but some health impairments of the elderly will have resulted from conditions occurring earlier in life, when private insurance is more common. The receipt and quality of private insurance is related to income. About 15 percent of the US population is without health insurance, most predominantly the near poor population.

Figure 1. Health Expenditure as % of GDP



Source: OECD Health Data, 2002.

Health insurance in the United States is frequently quite generous on the demand-side. Patients pay relatively little for using care, and traditionally faced few restrictions on which providers they can access. This is still true among the elderly, although there is a major exception: Medicare does not cover costs of outpatient prescription medications. In the non-elderly population, cost sharing is also low; most people with insurance can access medical care without a major financial barrier.

On the supply-side, the system is mixed. Much of private health insurance is 'managed', with explicit utilization restrictions placed on providers and financial incentives inducing them to use less care. But there are no overall constraints on technological availability, the way there are in other countries.

The National Health Interview Survey (NHIS) is the most common source of information on disease prevalence and health status for the US, and it has been conducted annually since 1957. Each year it includes a core set of questions on health-related variables, with periodic supplements that include more detailed information for certain populations or diseases. In 1994, the NHIS conducted the Second Supplement on Aging (the first was in 1984), containing detailed information about health conditions and physical functioning. We use the SOA data in our analysis. The sample is about 110,000 people.

Canada

Canada is the second most expensive system among our four countries, spending over 9 percent of GDP on medical care in the mid-1990s. Canada has a national insurance system (Medicare), which covers people from cradle to grave.[6] The Canadian system is administered separately in the provinces and territories, but for our purposes the similarities are more important than the differences.

Coverage in Canada is relatively complete; there are few restrictions on the providers that people can see. As in the US, however, pharmaceutical coverage is spotty. Some provinces cover prescription medications for particular groups such as the elderly, and others do not.

For services that are covered, cost sharing in Canada is very low; patients pay very little for the care that they receive. Access to care is rationed on the supply-side, however, particularly for high-tech services. Governments in Canada set limits on the availability of sophisticated services and put overall caps on hospital spending, which in turn limits how much technology can be used. Decisions on the availability of high-tech care are made at least in part on the basis of cost-effectiveness criteria. The Canadian Coordinating Office for Health Technology undertakes a technology assessment, and many provinces have their own technology assessment services. The same is true for the UK (the relevant body is the National Institute for Clinical Excellence) and Spain (The National Office of Technology Assessment). Use of high-tech care in Canada is far below similar use in the US (Kessler and McClellan, 1999), as we document below.

Data on health in Canada are available in the Canadian National Population Health Survey (NPHS). The first cycle of data collection was in 1994, and continued surveys have been conducted every second year thereafter. Our study includes data for 1994. The target population of the NPHS includes residents in all provinces, with the exclusion of people living on Indian Reserves. The sample is about 19,000 people. In each household, basic information is collected for all its members and one person, aged 12 or older, is randomly selected for a more in-depth interview.

The United Kingdom

The United Kingdom is a negative outlier in almost all medical spending comparisons. Spending on medical care is only about 7 percent of GDP. Given the fact that spending as a share of GDP typically rises with income, and that the UK is relatively wealthy, this makes spending particularly low.

The National Health Service (NHS) in the UK dates from 1948. All legal residents are eligible for health care coverage. In addition to the public coverage, people are allowed to purchase supplemental private insurance, or to pay physicians privately for services. About 10.5 percent of the UK population had private insurance in 1995[7].

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[6] Some of the current elderly were alive before Medicare was implemented, but they were very young, and their late life health is unlikely to reflect this to any great extent.

[7] Source: Laing and Buisson (1997).

Accessing health care in the UK generally costs a patient very little. Most health care is free of charge at the point of use, although there is some cost sharing for some services, including pharmaceuticals. This cost sharing is waived for the elderly (and children). As with Canada, spending in the UK is limited on the supply-side. The government restricts funding for hospitals and monitors technology acquisition. Both of these steps limit the availability of high-tech resources.

Service efficiency has been a chronic problem in the UK. The perception of the UK system is one of long lines and non-monetary restrictions on service use. Patients must have a referral from a general practitioner to access specialist care. Urgent cases may be seen soon, but non-urgent cases can have a substantial delay. To address these issues, the government in 1990 attempted to create an 'internal market' in medical services, where patients can choose their primary care 'fundholder', and primary care providers can shop among hospitals for the best care. The internal market was partially successful in improving the efficiency of the system (Propper and Soderlund, 1998), but not wholly.[8]

Our data for the UK are from the British Household Panel Survey (BHPS). The BHPS is not designed as a health survey, although it includes substantial information about health status. Questions are asked about the prevalence of certain health conditions as well as the ADLs for the elderly. The BHPS interviews more than 5,000 households (about 10,000 individuals) per year. Longitudinal information is collected in successive waves. The survey also includes information regarding household organization, labor market, income, housing and socio-economic values. We use data from 1995.

Spain

Spain spends about 7 percent of GDP on medical care, roughly the same percentage as the UK. The Spanish health system has changed enormously in the last 25 years since the re-establishment of democracy and the enactment of the new Constitution in 1978. Prior to 1978, Spain had a centralized, means-tested social security system, with only 20 percent of its population covered by public insurance in 1942 and 45 percent covered in 1960[9]. The Basic Social Security Act in 1967 led to an increase in public health insurance coverage to 81 percent of the population.

The 1978 Constitution established the universal right to health care and set out a new regionally based health care system where the 17 Spanish Autonomous Communities were responsible for the provision of health care in their territories. The process of devolution of health care competences to the regional governments started in 1981[10]. Each autonomous community is organized in health areas and basic health zones that are responsible for the management of the health facilities and services in their geographical area. Ninety-five percent of the Spanish population is covered by the Social Security system, with nearly all of the remainder (civil servants) covered through a special mutual fund system.

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[8] The Blair government has backed away from this reform somewhat, and in exchange proposes to spend much more on medical care.

[9] Data: European Observatory of Health Care Systems.

[10] Through 1994, authority had been transferred to 7 of the 17 Autonomous Communities, covering 62 percent of the Spanish population (Catalonia, Basque Country, Valencia, Galicia, Navarra, Canary Islands). Health care in the remaining 10 is still under the control of the central state's administration and is managed by INSALUD (National Institute of Health). However, the devolution process back to these 10 communities has been reactivated since 2001.

The Spanish medical system covers primary health care, specialized care (inpatient and outpatient), and pharmaceuticals. Primary and specialty care is free of charge, although there is a 40 percent copayment for pharmaceuticals, but this is waived for the elderly and those with permanent disabilities. Among common medical care items, only dental care is not covered.

Patients have free choice of their physician[11]. Two forms of organization of primary care coexist: the traditional form of organization that consisted in sole-practitioners working part time and paid on a capitated basis and the new model, where primary care physicians are part of a team of general practitioners working full time on a salaried basis and a small capitation fee. Now most physicians in Spain are salaried employees of the government. The same is true for hospitals and ambulatory clinics. In the Spanish health system, specialists from general hospitals rotate to cover for outpatient ambulatory services.

As with Canada and the UK, Spain also uses supply-side restrictions to control spending, although there are some differences across autonomous communities. Most communities use an annual budget for hospital payments but a few (i.e. Catalonia) use a mixed funding system where the annual budget is combined with a DRG (Diagnostic Related Group) system.

On many measures, the Spanish medical care system works very well. Accessibility is among the highest in Europe, with 92 percent of the patients having to wait one day or less for a consultation with a GP (Ortún and López-Casasnovas, 1999). Moreover, despite the fact that GPs serve as gatekeepers, patients do not need a referral to see some specialists. All health care areas have at least one main hospital and they are organized in such a way that nearly everyone lives within an hour of a general hospital. Because of the centralized nature of provision, Spain can make large-scale changes in medical care quickly. As we discuss below, Spain has emphasized strongly some measures of preventive care, such as treatment of diabetes.

To measure health in Spain, we use data from the Encuesta Nacional de Salud de España (ENSE). The ENSE collects information about health status as well as access to care, visits to specialists, and pharmaceutical consumption. The survey contains extra information for the elderly (ADLs) and for children 16 or younger (diet, vaccination, breast-feeding). The survey includes about 9,000 people and it started in 1993, continuing every two years thereafter. In our study we include data for 1993, 1995 and 1997.

Questions about Self-Reported Health

All four surveys ask about self-reported health, with relatively similar questions.[12] However, the possible responses vary slightly by countries. In the US and Canada, there are five responses: "poor", "fair", "good", "very good" and "excellent". In the UK and Spain, the five responses are slightly different: "very poor", "poor", "fair", "good" and "very good". Our within-country differencing methodology should adjust for these differences in possible responses, but it is important to understand what effect such a wording choice can have.

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11 However, if patients want to choose a physician that is in another health care area, first the GP has to accept the patient in her list.

12 For instance, the US NHIS asks "would you say that your health in general is excellent, very good, good, fair or poor?". The Canadian National Population Health Survey asks: "in general, how would you describe your health: excellent; very good; good; fair; poor". The British Household Panel Survey asks "please think back over the last 12 months about how your health has been. Compared to people of your own age, would you say that your health has on the whole been: excellent, good, fair, poor, very poor?". The Spanish ENSE asks "in the last 12 months, would you say that your health has been very good, good, fair, bad, or very bad?"

To examine this, we take advantage of the fact that the US added the "very good" choice in 1981. Prior to that year, there were only four possible responses. Table 1 presents the percentage of US population that reported each of the answers in 1980 and in 1982-83. The differences in the set of people reporting fair or poor health, and good or better health, between the two sets of answers are not statistically significant. In light of this, we redefine SRHS in all countries into four categories that are comparable across all four countries: poor or very poor; fair, good, and very good or excellent. We order the responses from 1 to four in that order.

Table 1. Self.Reported Health Status in 1980 versus 1982-1983

	Summary Measures					Tabulation Measures	
	Excellent	**Very Good**	**Good**	**Fair**	**Poor**	**Excellent-Good**	**Fair-Poor**
Age 18+							
. **1980**	49%	…	38%	9%	3%	*88%*	*12%*
1982-83	40%	25%	24%	8%	3%	*89%*	*11%*
Age 65+							
. **1980**	29%	…	41%	22%	9%	*69%*	*31%*
1982-83	16%	19%	31%	22%	12%	*66%*	*34%*

Source: Authors' Calculations based on the National Health Interview Survey

Selection of Conditions

The NHIS in the US contains information on a vast array of chronic conditions, as well as other measures of health such as ADL impairments. Unfortunately, this is not the case for all countries, where the prevalence questions are much more limited. This is particularly true in the UK, where the survey is not a dedicated health questionnaire. In light of this, and in order to be able to compare the US with as many countries as possible, we use several sets of comparison questions. In the first set of results, we compare only the US and Canada, since these are the countries for which the most conditions in common are asked about (14 total). The second set of results extends the analysis to include Spain, with fewer health conditions in common (9 conditions). The last set of results is for all four countries. These results have the least common conditions (8 conditions).

Table 2 shows conditions that are available in each country. The large set of 14 conditions includes: stroke, asthma or bronchitis, skin or allergy problems, arthritis, diabetes, hypertension, stomach problems (ulcer and other digestive conditions), migraine, back problems, cataracts and glaucoma, sight impairment, and hearing impairment.

In addition to choosing comparable conditions, we need to account for the fact that different countries might have different awareness of certain diseases, with some countries diagnosing certain conditions more frequently. If this is the case, we might find that a country does very well in the treatment of a certain disease simply because there is more awareness and more mild cases are being diagnosed.

To examine this, Table 2 presents the prevalence of these health conditions in the four countries. We present prevalence estimates for the overall population and for the elderly. In most of the cases there are no major differences in prevalence across countries. The exceptions to this are skin or allergy conditions and visual impairments. The US has almost double the share of people suffering from skin or allergy conditions, while it has a much

lower percentage of its population suffering from visual impairments.[13] Given this, when analyzing our results we downweight the results for these two conditions, and focus instead on the others.

Table 2. Chronic Condition Prevalence Rate per 1000 People

	US		CANADA		SPAIN		UK	
	All	65+	All	65+	All	65+	All	65+
Endocrine								
Diabetes	35.8	147.20	30.20	111.90	36.00	138.80	24.20	124.10
Circulatory								
Hypertension	125.10	339.20	106.90	286.50	119.10	303.60	…	…
Stroke	14.10	47.70	8.60	39.60	…	…	…	…
Heart Problems	60.80	257.20	38.00	175.10	48.10	238.30	…	…
Circulatory Probl.	138.80	409.80	110.00	380.80	109.00	387.30	123.30	388.60
Musculoskeletal								
Arthritis	134.77	581.95	126.90	504.40	81.90	533.50	147.50	535.80
Back Probl.	70.10	122.70	81.20	124.50	…	…	…	…
Respiratory								
Asthma/Bronchitis	116.34	106.80	85.30	97.50	119.10	107.60	113.50	188.20
Digestive								
Stomach/Ulcer Probl.	28.30	48.30	33.00	49.70	38.80	61.70	35.20	60.70
Impairments								
Cataracts	25.70	102.20	23.90	139.30	…	…	…	…
Glaucoma	10.80	35.30	9.90	46.30	…	…	…	…
Sight Probl.	50.10	86.35	79.80	126.70	88.50	123.10	…	128.50
Hearing Probl.	93.10	322.10	58.10	214.90	82.60	263.10	…	…
Other								
Skin/Allergy	152.30	194.70	125.20	114.20	80.00	72.20	115.20	87.40

SOURCES: US (National Health Interview Survey); Canada (National Population Health Survey); UK (British Household Panel Survey); Spain (Encuesta Nacional de Salud)

III. Main Results

We present our main results in three tables. Table 3 compares the US and Canada, the countries with the most data. Table 4 adds Spain to the comparison, and Table 5 adds the UK. Tables 4 and 5 have fewer conditions than Table 3, reflecting the smaller number of comparable conditions asked about in different countries. In each case, the dependent variable is the person's self-reported health status, reported on a 1 to 4 scale as previously defined, where a higher number is better health. Thus, a negative coefficient indicates that a particular condition adversely affects health. The first column of each table reports results for the entire elderly sample, and the second column normalizes the coefficients dividing them by the cut points 1 and 3. We term this the QALY estimate, although that particular interpretation is not central to our results. The third to sixth columns are discussed in the next section.

Consider first table Table 3. As expected, the diseases all have a negative impact on self-reported health. The ones with the largest impact are asthma or bronchitis, heart problems and strokes. The normalized coefficients in the second column imply that asthma or bronchitis would have a QALY weight for the US of 0.800 (1-0.200). The QALY weight for the US for heart disease is 0.841 and for stroke 0.710. The relative QALY rankings are consistent with our expectations.

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[13] In the case of visual impairment, there is an issue about how people respond if they use glasses or contact lenses and that corrects the problem.

Table 3. US and Canada

Dependent variable: Self-reported health

	All		Poor		Non-Poor	
	Coefficients	**ΔQaly**	**Coefficients**	**ΔQaly**	**Coefficients**	**ΔQaly**
Asthma or Bronchitis	-0.359**	-0.200	-0.310**	-0,175	-0.523**	-0,276
	[0.087]		[0.107]		[0.140]	
Asthma/Bronch*Canada	-0.317*	-0.177	-0,251	-0,142	-0.555**	-0,294
	[0.171]		[0.205]		[0.273]	
Skin/Allergy	-0,0004	0.000	-0,033	-0,019	0,084	0,044
	[0.058]		[0.068]		[0.116]	
Skin/Allergy*Canada	-0,092	-0.051	-0,038	-0,021	-0,219	-0,116
	[0.082]		[0.099]		[0.155]	
Arthritis	-0.039**	-0.022	-0.052**	-0,029	0,029	0,015
	[0.014]		[0.025]		[0.090]	
Arthritis*Canada	-0.288**	-0.161	-0.309**	-0,175	-0.291**	-0,154
	[0.060]		[0.071]		[0.115]	
Diabetes	-0.476**	-0,266	-0.636**	-0,360	-0.468**	-0,247
	[0.081]		[0.094]		[0.109]	
Diabetes*Canada	0.348**	0,194	0.369**	0,209	0.338*	0,178
	[0.103]		[0.121]		[0.200]	
Hypertension	-0.222**	-0,124	-0.221**	-0,125	-0.204**	-0,108
	[0.033]		[0.038]		[0.070]	
Hypertension*Canada	-0,020	-0,011	-0,019	-0,011	-0,123	-0,065
	[0.054]		[0.064]		[0.100]	
Heart	-0.284**	-0,159	-0.218**	-0,123	-0.477**	-0,252
	[0.056]		[0.065]		[0.104]	
Heart *Canada	-0.241**	-0,135	-0.241**	-0,136	-0.238*	-0,126
	[0.073]		[0.087]		[0.134]	
Stroke	-0.527**	-0,294	-0.488**	-0,276	-0.735**	-0,388
	[0.120]		[0.134]		[0.269]	
Stroke *Canada	-0.182**	-0,102	-0.228*	-0,129	-0,122	-0,064
	[0.052]		[0.130]		[0.315]	
Migraine	-0.557**	-0,311	-0.586**	-0,331	-0.420*	-0,222
	[0.110]		[0.126]		[0.232]	
Migraine *Canada	0,181	0,101	0,213	0,120	0,064	0,034
	[0.141]		[0.168]		[0.279]	
Back	-0.207**	-0,116	-0.218**	-0,123	-0,116	-0,061
	[0.090]		[0.105]		[0.174]	
Back *Canada	-0,058	-0,032	-0,054	-0,031	-0,146	-0,077
	[0.102]		[0.0121]		[0.195]	
Stomach	-0.282*	-0,157	-0.259**	-0,146	-0.611**	-0,323
	[0.168]		[0.132]		[0.303]	
Stomach *Canada	0,163	0,091	0.286*	0,162	0,438	0,231
	[0.189]		[0.168]		[0.353]	
Cataracts	-0,029	-0,016	-0,062	-0,035	0,087	0,046
	[0.069]		[0.080]		[0.143]	
Cataracts *Canada	0,069	0,039	0,057	0,032	0,068	0,036
	[0.088]		[0.103]		[0.173]	

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Table 3 (continued)

	All		Poor		Non-Poor	
	Coefficients	**ΔQaly**	**Coefficients**	**ΔQaly**	**Coefficients**	**ΔQaly**
Glaucoma	-0,023	-0,013	-0,046	-0,026	0,004	0,002
	[0.118]		[0.139]		[0.229]	
Glaucoma*Canada	0,096	0,054	0,171	0,097	-0,023	-0,012
	[0.147]		[0.176]		[0.272]	
Sight	-0.263**	-0,147	-0.229**	-0,129	-0.347**	-0,183
	[0.067]		[0.077]		[0.137]	
Sight*Canada	0.238**	0,133	0.235**	0,133	0,279	0,147
	[0.088]		[0.102]		[0.179]	
Hearing	0,040	0,022	0,029	0,016	0,081	0,043
	[0.048]		[0.056]		[0.096]	
Hearing*Canada	-0.230**	-0,128	-0,175	-0,099	-0.399**	-0,211
	[0.090]		[0.109]		[0.151]	
Canada	0.573**	0,320	0.755**	0,427	0,344	0,182
	[0.200]		[0.256]		[0.357]	
Age	-0.125*	….	-0,103	….	-0,137	….
	[0.069]		[0.080]		[0.139]	
Age Square	0,021	….	0,022	….	0,009	….
	[0.014]		[0.016]		[0.029]	
Male	-0,130	….	-0,074	….	-0,282	….
	[0.116]		[0.144]		[0.206]	
Age* Male	0,021	….	-0,079	….	0,219	….
	[0.109]		[0.132]		[0.205]	
Age Square*Male	-0,004	….	0,013	….	-0,028	….
	[0.022]		[0.026]		[0.043]	
Income	1.1E-5**	….	2.0E-5**	….	1,90E-06	….
	[9.4E-7]		[2.2E-6]		[2.7E-6]	
Income*Canada	-3.8E-6**	….	-2.1E-5**	….	4,30E-06	….
	[1.5E-6]		[4.6E-6]		[3.3E-6]	
High School+	0.384**	….	0.347**	….	0.415**	….
	[0.032]		[0.041]		[0.052]	
High School+ *Canada	-0.105**	…..	-0.153**	….	-0,121	….
	[0.054]		[0.076]		[0.086]	
Cutting Points						
_Cut 1	-1,192		-1,028		-1,648	
_Cut2	-0,324		-0,161		-0,750	
_Cut3	0,599		0,741		0,246	

Robust standard errors are reported in parentheses

** Significant at 5 percent

*Significant at 10 percent

Table 4. US, Canada and Spain

Dependent variable: Self-reported health

	All		Poor		Non-Poor	
	Coefficients	**ΔQaly**	**Coefficients**	**ΔQaly**	**Coefficients**	**ΔQaly**
Hypertension	-0.233**	-0,126	-0.231**	-0,127	-0.218**	-0,112
	[0.034]		[0.038]		[0.071]	
Hypertension*Spain	0.050*	0,027	0,062	0,034	-0,010	-0,005
	[0.027]		[0.081]		[0.138]	
Hypertension*Canada	-0,050	-0,027	-0,014	-0,008	-0,144	-0,074
	[0.054]		[0.065]		[0.102]	
Asthma/ Bronchitis	-0.348**	-0,189	-0.295**	-0,162	-0.524**	-0,268
	[0.088]		[0.109]		[0.143]	
Asthma/Bronch*Spain	-0.238*	-0,129	-0.291*	-0,160	-0,121	-0,062
	[0.135]		[0.167]		[0.236]	
Asthma/Bronch*Canada	-0.332*	-0,180	-0,256	-0,141	-0.608**	-0,031
	[0.173]		[0.205]		[0.291]	
Skin/Allergy	-0,009	-0,005	-0,038	-0,021	0,073	0,037
	[0.059]		[0.069]		[0.116]	
Skin/Allergy*Spain	-0.244**	-0,132	-0.253*	-0,139	-0,198	-0,101
	[0.112]		[0.138]		[0.218]	
Skin/Allergy*Canada	-0,124	-0,067	-0,063	-0,035	-0.270*	-0,138
	[0.083]		[0.100]		[0.156]	
Diabetes	-0.492**	-0,267	-0.556**	-0,305	-0.271*	-0,139
	[0.083]		[0.095]		[0.151]	
Diabetes*Spain	0.405**	0,219	0.386**	0,212	0.371**	0,190
	[0.116]		[0.138]		[124]	
Diabetes*Canada	0,126	0,068	0.247**	0,136	0,246	0,126
	[0.105]		[0.123]		[0.204]	
Arthritis	-0,043	-0,023	-0,056	-0,031	0,029	0,015
	[0.043]		[0.049]		[0.090]	
Arthritis*Spain	-0.488**	-0,210	-0.540**	-0,297	-0.513**	-0,263
	[0.086]		[0.099]		[0.178]	
Arthritis*Canada	-0.352**	-0,191	-0.372**	-0,204	-0.362**	-0,185
	[0.059]		[0.070]		[0.114]	
Heart Problems	-0.334**	-0,181	-0.264**	-0,145	-0.547**	-0,280
	[0.055]		[0.064]		[0.104]	
Heart *Spain	-0.086**	-0,047	-0,160	-0,088	-0.239**	-0,122
	[0.037]		[0.122]		[0.098]	
Heart*Canada	-0.240**	-0,130	-0.241**	-0,132	-0.214*	-0,110
	[0.074]		[0.088]		[0.118]	
Stomach Conditions	-0.267*	-0,145	-0.241*	-0,132	-0.616**	-0,315
	[0.157]		[0.127]		[0.306]	
Stomach*Spain	0,382	0,207	0,352	0,193	0,467	0,239
	[0.202]		[0.233]		[0.359]	
Stomach*Canada	-0,108	-0,059	-0,183	-0,101	0,408	0,209
	[0.193]		[0.213]		[0.471]	

CONTINUED….

Table 4 (continued)

	All		Poor		Non-Poor	
	Coefficients	**ΔQaly**	**Coefficients**	**ΔQaly**	**Coefficients**	**ΔQaly**
Sight	-0.283**	-0,153	-0.246**	-0,135	-0.381**	-0,195
	[0.068]		[0.076]		[0.139]	
Sight*Spain	0.190*	0,103	0,123	0,068	0,352	0,180
	[0.108]		[0.125]		[0.221]	
Sight*Canada	0.262**	0,142	0.257**	0,141	0.299*	0,153
	[0.090]		[0.104]		[0.181]	
Hearing	0,043	0,023	0,025	0,014	0,099	0,051
	[0.048]		[0.055]		[0.099]	
Hearing*Spain	-0.139*	-0,075	-0,152	-0,084	-0,069	-0,035
	[0.085]		[0.099]		[0.171]	
Hearing*Canada	-0.290**	-0,157	-0.240**	-0,132	-0.452**	-0,231
	[0.090]		[0.109]		[0.153]	
Spain	-0.108*	-0,059	-0,109	-0,060	-0.583**	-0,298
	[0.065]		[0.138]		[0.182]	
Canada	0.789**	0,427	0.981**	0,539	0.606**	0,310
	[0.072]		[0.103]		[0.194]	
Age	-0.134**	….	-0,108	….	-0,151	….
	[0.066]		[0.077]		[0.133]	
Age Square	0.024*	….	0,024	….	0,013	….
	[0.013]		[0.015]		[0.027]	
Male	-0,117	….	-0,056	….	-0,261	….
	[0.110]		[0.136]		[0.196]	
Age* Male	0,031	….	-0,067	….	0,205	….
	[0.104]		[0.126]		[0.195]	
Age Square*Male	-0,007	….	0,009	….	-0,025	….
	[0.021]		[0.025]		[0.040]	
Income	1.1E-5**	….	2.0E-5**	….	1,90E-06	….
	[9.5E-7]		[2.2E-6]		[2.8E-6]	
Income*Spain	-1.1E-5**	….	-2.0E-5**	….	-1,80E-06	….
	[9.5E-7]		[2.2E-6]		[2.8E-6]	
Income*Canada	-3.9E-6**	….	-2.1E-5**	….	4,30E-06	….
	[1.6E-6]		[4.7E-6]		[3.4E-6]	
High school+	0.391**	….	0.353**	….	0.429**	….
	[0.032]		[0.042]		[0.053]	
High school+ *Spain	-0.217*	….	-0,105	…..	-0.324**	….
	[0.111]		[0.166]		[0.159]	
High school+*Canada	-0.128**	….	-0.178**	….	-0.145*	….
	[0.055]		[0.077]		[0.087]	
Cutting Points						
_Cut 1	-1,199		-1,022		-1,683	
_Cut2	-0,299		-0,125		-0,750	
_Cut3	0,647		0,798		0,271	

Robust standard errors are reported in parentheses

The different impact between the US and Canada is reflected in the coefficient on the interaction between the Canada dummy variable and each disease. For example, the positive coefficient on diabetes * Canada in the eighth row of the table indicates that people with diabetes in Canada are relatively better off than they are in the US. The fact that the interaction term is less than the main effect in the first row indicates that even in Canada, people with diabetes are not in better health than people without diabetes.

The interaction terms between the Canada dummy and the different illnesses are not of a uniform sign. The US does statistically significantly better in the treatment of strokes, heart problems, arthritis, asthma or bronchitis, and hearing, but it does poorly in the treatment of diabetes. There are no significant differences in the treatment of hypertension, migraines, stomach problems (ulcers and other digestive problems) and back problems. For instance, people in Canada suffering from heart problems have a QALY weight of 0.71, while those in the US would have a QALY of 0.84. People that have a stroke in Canada have a QALY of 0.61, while those that suffered a stroke in the US have a higher QALY of 0.71. The opposite is the case for the treatment of diabetes, where people in Canada have a QALY weight of 0.82 while diabetics in the US have QALY weight of only 0.62.

Our regression also includes demographic and socioeconomic explanatory variables. As expected, income and education have a positive effect on health, and age has a negative effect, with older people being less healthy. Sex has no significant effect.

Table 4 compares the US, Canada and Spain, considering 9 different illnesses. Again, all the conditions have a negative impact on SHRS. Once again, there is a mixed result in looking at the country-specific interactions. Compared to Canada, the US is still the country with the best health care for heart conditions, asthma, arthritis and hearing, but it does poorly in the treatment of diabetes. Strokes are not asked about in Spain so this condition is not reported in the table.

This pattern of findings is generally true in comparing the US and Spain as well. The US does better than Spain in heart conditions, asthma, hearing conditions, and arthritis. Spain does significantly better than US in the treatment of diabetes and hypertension. The relatively poor performance of the US in care for diabetics is a common theme of our findings.

While not the immediate focus of our results, we comment on the Spain-Canada comparisons as well. In general, there is no clear winner between the two countries. Spanish people suffering from diabetes are clearly better off than those from Canada, but Canadians with arthritis are better off than Spaniards with arthritis. Most other conditions are about the same.

Income and education have a positive effect on health in all three countries, although the income effect is more important for the US and Canada than for Spain, and education is more important for the US. Again, age has a negative effect on health, although this effect decreases as people grow older.

Finally, Table 5 includes all four countries: the US, Canada, Spain and UK. Compared to the other countries, people in the US with heart and circulatory conditions, arthritis and hearing conditions still report themselves to be in the best health, while people with diabetes and stomach conditions report themselves worse off. Once again, Spain is the country with the best treatment for diabetes and the worst treatment for arthritis. Canadians with hearing problems are worse off than in any other country.

Table 5. US, Canada, Spain and UK

DEPENDENT VARIABLE: SELF-REPORTED HEALTH

	ALL		POOR		NON-POOR	
	Coefficients	Δ QALY	Coefficients	Δ QALY	Coefficients	Δ QALY
Asthma/Bronchitis	-0.317**	-0.167	-0.263**	-0.142	-0.503**	-0.245
	[0.090]		[0.111]		[0.148]	
Asthma/Bronch*UK	-0.345**	-0.181	-0.383**	-0.206	-0.208*	-0.101
	[0.112]		[0.149]		[0.115]	
Asthma/Bronch*Canada	-0.409**	-0.215	-0.337	-0.182	-0.641**	-0.313
	[0.178]		[0.211]		[0.306]	
Asthama/Bronch*Spain	-0.310**	-0.163	-0.359**	-0.193	-0.183	-0.089
	[0.137]		[0.167]		[0.241]	
Skin/Allergy	0.009	0.005	-0.022	-0.012	0.096	0.047
	[0.061]		[0.071]		[0.121]	
Skin/Allergy*UK	-0.143	-0.075	-0.049	-0.026	-0.279*	-0.136
	[0.101]		[0.155]		[0.158]	
Skin/Allergy*Canada	-0.153*	-0.080	-0.080	-0.043	-0.331**	-0.161
	[0.085]		[0.101]		[0.161]	
Skin/Allergy*Spain	-0.261**	-0.137	-0.276**	-0.149	-0.215	-0.105
	[0.113]		[0.137]		[0.223]	
Diabetes	-0.471**	-0.248	-0.532**	-0.287	-0.244**	-0.119
	[0.085]		[0.097]		[0.112]	
Diabetes*UK	0.173**	0.091	0.129	0.070	0.236**	0.115
	[0.098]		[0.183]		[0.103]	
Diabetes*Canada	0.176*	0.093	0.205*	0.110	0.324*	0.158
	[0.093]		[0.125]		[0.170]	
Diabetes*Spain	0.268**	0.141	0.350**	0.189	0.237	0.116
	[0.116]		[0.138]		[0.228]	
Stomach	-0.251*	-0.132	-0.223	-0.120	-0.625**	-0.305
	[0.129]		[0.193]		[0.310]	
Stomach*UK	0.261**	0.137	0.266	0.143	0.159	0.078
	[0.138]		[0.223]		[0.124]	
Stomach*Canada	0.152	0.080	0.214	0.115	0.340	0.166
	[0.196]		[0.216]		[0.373]	
Stomach*Spain	0.128	0.067	0.388	0.209	0.475	0.232
	[0.206]		[0.238]		[0.358]	
Heart/ Hypertension	-0.095**	-0.050	-0.063	-0.034	-0.193**	-0.094
	[0.039]		[0.045]		[0.077]	
Heart/Hyper*UK	-0.325**	-0.171	-0.397**	-0.214	-0.205**	-0.100
	[0.061]		[0.082]		[0.100]	
Heart/Hypert*Canada	-0.367**	-0.193	-0.350**	-0.189	-0.391**	-0.191
	[0.057]		[0.068]		[0.106]	
Heart/Hypert*Spain	-0.204**	-0.107	-0.223**	-0.120	-0.149	-0.073
	[0.070]		[0.082]		[0.136]	
Arthritis	-0.012	-0.006	-0.027	-0.015	-0.066	-0.032
	[0.044]		[0.051]		[0.093]	
Arthritis*UK	-0.469**	-0.247	-0.371**	-0.200	-0.598**	-0.292
	[0.064]		[0.084]		[0.114]	
Arthritis*Canada	-0.391**	-0.206	-0.409**	-0.220	-0.405**	-0.198
	[0.061]		[0.072]		[0.118]	
Arthritis*Spain	-0.626**	-0.329	-0.668**	-0.360	-0.579**	-0.282
	[0.087]		[0.099]		[0.180]	
Sight	-0.292**	-0.154	-0.253**	-0.136	-0.408**	-0.199
	[0.070]		[0.080]		[0.145]	
Sight*UK	0.173*	0.091	0.237*	0.128	0.250	0.122
	[0.099]		[0.136]		[0.170]	
Sight*Canada	0.259**	0.136	0.259**	0.140	0.285	0.139
	[0.093]		[0.106]		[0.187]	

CONTINUED....

Table 5 (continued)

	ALL		POOR		NON-POOR	
	Coefficients	Δ QALY	Coefficients	Δ QALY	Coefficients	Δ QALY
Sight*Spain	0.195*	0.103	0.117	0.063	0.386*	0.188
	[0.110]		[0.126]		[0.227]	
Hearing	-0.085	-0.045	-0.065	-0.035	-0.148	-0.072
	[0.069]		[0.056]		[0.102]	
Hearing*UK	-0.170**	-0.089	-0.116	-0.063	-0.261**	-0.127
	[0.074]		[0.104]		[0.126]	
Hearing*Canada	-0.349**	-0.183	-0.294**	-0.158	-0.519**	-0.253
	[0.092]		[0.110]		[0.158]	
Hearing*Spain	-0.186**	-0.098	-0.198*	-0.107	-0.118	-0.058
	[0.087]		[0.100]		[0.178]	
UK	0.567**	0.298	0.704**	0.379	0.285*	0.139
	[0.056]		[0.123]		[0.152]	
Canada	0.884**	0.465	1.088**	0.586	0.716**	0.349
	[0.074]		[0.105]		[0.202]	
Spain	-0.035	-0.018	-0.100	-0.054	-0.544**	-0.265
	[0.066]		[0.139]		[0.189]	
Age	-0.111*	….	-0.103	….	-0.081	-0.040
	[0.062]		[0.073]		[0.120]	
Age Square	0.018	….	0.022	….	-0.003	-0.001
	[0.012]		[0.014]		[0.024]	
Male	-0.058	….	-0.032	….	-0.132	….
	[0.103]		[0.132]		[0.175]	
Age* Male	-0.028	….	-0.102	….	0.066	….
	[0.098]		[0.122]		[0.172]	
Age Square*Male	0.007	….	0.017	….	0.005	….
	[0.020]		[0.024]		[0.035]	
Income	1.2E-5**	….	2.1E-5**	….	2.10E-06	….
	[9.7E-7]		[2.3E-6]		[2.9E-6]	
income*UK	1.2E-5**	….	-2.80E-05	….	1.7E-5**	….
	[4.3E-6]		[3.1E-5]		[5.9E-6]	
Income*Canada	-4.2E-6**	….	-2.2E-5**	….	4.30E-06	….
	[1.6E-6]		[4.8E-6]		[4.5E-6]	
Income*Spain	-1.1E-5**	….	-2.1E-5**	….	-1.90E-06	….
	[9.7E-7]		[2.3E-6]		[2.9E-6]	
High school+	0.400**	….	0.359**	….	0.443**	….
	[0.033]		[0.042]		[0.054]	
High school+ *UK	-0.356**	….	-0.256**	….	-0.435**	….
	[0.063]		[0.099]		[0.089]	
High school+*Canada	-0.134**	….	-0.187**	….	-0.155*	….
	[0.056]		[0.079]		[0.090]	
High school+*Spain	-0.217*	….	-0.089	….	-0.338**	….
	[0.114]		[0.168]		[0.166]	
Cutting Points						
_Cut 1	-1.132		-0.956		-1.619	
_Cut2	-0.222		-0.050		-0.669	
_Cut3	0.770		0.900		0.431	

Robust standard errors are reported in parentheses.

To help with summary interpretations, Table 6 shows the relative ranking of countries by conditions. More *'s in any cell indicate that the country does better. Looking at any particular country yields a mixed result – every country does well for some conditions and worse for others.

Table 6. Summary of Country Comparisons

Dependent variable: Self-reported health

Condition	US	Canada	Spain	UK
Asthma/Bronchitis	****	*	***	**
Skin/Allergy	****	***	*	***
Diabetes	*	***	****	**
Stomach	*	***	**	****
Heart/ Hypertension	****	*	***	**
Arthritis	****	***	*	**
Sight	*	****	***	**
Hearing	****	*	**	***
Hypertension	***	**	****	
Heart Problems	****	**	***	
Stroke	****	***		
Migraine	***	****		
Back Problems	****	***		
Cataracts	***	****		
Glaucoma	***	****		

**** corresponds to the country that does best for the treatment of this condition

*** is the second best, ** the third best and so on.

Overall, these results lead us to reject the hypothesis that the US has clearly superior outcomes compared to other developed countries. The US has better outcomes for heart disease, asthma or bronchitis, and arthritis, and significantly worse outcomes for diabetes and stomach problems. We cannot say that higher spending in the US buys significantly improved health across the board.

IV. Possible Explanations

The important question raised by the previous section is how to explain the differing results across countries. We raise and test three explanations.

Differences Between Rich and Poor

One possible explanation for these results is that outside of the US, countries have universal coverage systems, while that is not true in the US. As a result, the US may have better outcomes for the insured (since overall medical spending is the highest), but worse outcomes for the uninsured. In the elderly population that we analyze, of course, there is no difference in insurance status in the US; virtually everyone over age 65 in the US is enrolled in Medicare. But there are differences in insurance coverage in the non-elderly population, and these may translate into health differences during the retirement years.

To test this hypothesis, we separate our population into two groups: poor and non-poor, and we run the same model for the two types. Poor is not synonymous with uninsured,

but the two are correlated. Since we do not know about lifetime insurance coverage in the NHIS, income while elderly is a reasonably proxy. To classify people as "poor" we look at the whole population 18 or older and determine the level corresponding to the lower thirty-third percentile for that country. Any individual that has an income below the thirty-third percentile level is poor. We use income data for the entire population because we want to know the level of income for the elderly in the society as a whole, not just among the older population.

The third and fifth columns of Tables 3 to 5 present the results for poor and non-poor individuals respectively. In general, our results are very similar for rich and poor people: for conditions where the US does better than the other countries, both non-poor and poor do better, and for conditions where the US does worse, both poor and non-poor do worse. For example, among people affected by heart disease, the QALY weight for the poor is 0.74 and 0.88 in Canada and the US, respectively. The QALY weight of the non-poor is 0.62 in Canada and 0.76 in the US. Similarly, for those suffering from diabetes, the QALY weight of the poor in Canada is 0.85 and the weight for the US poor is 0.64. For non-poor Canadians, the weight is 0.92, while it is 0.75 in the US.

The third and fifth columns of Tables 4 and 5 expand the countries to include Spain (Table 4) and the UK (Table 5). The results are similar to the previous ones. For conditions where the US does better than the other countries, it does better for both poor and non-poor, and for conditions where the US does less well than the other countries, both poor and non-poor do less well. We thus reject the hypothesis that the pattern of results is explicable by differing effects by income.

Subjective Health Reporting

There are several possible limitations in using self-reported health status as a measure of an individual's health. One important concern is that people in different countries may perceive their health differently for cultural reasons. If people in Canada are less likely to report their health as very bad, this could influence our results. Norming by the overall population responses controls for this to some extent, but may not do so completely. Responses outside the typical range of the overall population may not be well captured by this adjustment.

To test for this, we have repeated the results using a more objective health measure: the number of ADLs that the individual has. ADLs are basic measures of functional status reflecting the ability to live independently and without substantial assistance. Not all countries ask about the same ADLs. As with our earlier regressions, we look at the common ADLs for each set of countries. The number of common conditions declines as we include more countries.

In particular, comparing the US and Canada, we can measure consistently 6 ADLs: preparing meals, shopping for groceries, walking, showering, doing light housework and doing heavy housework. When we add Spain to the sample, we drop one ADL (doing heavy housework). There were no common questions between the UK and Canada regarding their population's ability to perform certain activities of daily living, but the UK, Spain, and the US each asked about two different ADLs: difficulty in dressing, and walking. Hence our last analysis compares just these three countries.

There are a few, relatively minor, differences between this specification of the model and the previous one. The first one is due to the fact that we had to use the data from the NHIS Second Supplement on Aging for the US and hence we have a lower number of observations.[14] Also, given that our dependent variable is not qualitative, we use an OLS

[14] The supplement on aging is restricted to the population aged 65 and older. We impose this restriction in the other countries as well.

specification instead of an ordered probit. Note in interpreting the results that a higher number of ADL impairments is worse health; thus, a positive effect of an explanatory variable implies that the individual is worse off.

Tables 7 through 9 show the results for the number of ADL impairments. The results of this analysis are very similar to those using self-reported health. As expected, for all the three columns, the different health conditions have a positive effect on the number of ADLs and, hence, a negative effect on the individual's health. Once again, the US has a positive performance in the treatment of heart problems and a negative one for the treatment of diabetes. This is true when we compare the US and Canada, or when we add Spain and the UK to the samples. Our results using the number of ADLs as a measure of health thus strongly confirm our previous findings.

Table 7. US and Canada

Dependent variable: SUM ADLs

	All	Poor	Non-Poor
Asthma or Bronchitis	0.354**	0.367**	0.280**
	[0.041]	[0.047]	[0.079]
Asthma/Bronch*Canada	0,026	-0,003	0,064
	[0.091]	[0.116]	[0.155]
Skin/Allergy	0,024	-0.262**	0,03
	[0.070]	[0.090]	[0.135]
Skin/Allergy*Canada	0.277**	0.351**	0.215**
	[0.104]	[0.132]	[0.172]
Arthritis	0.312**	0.345**	0.200**
	[0.035]	[0.041]	[0.067]
Arthritis*Canada	0,026	-0,014	0,116
	[0.058]	[0.075]	[0.101]
Diabetes	0.427**	0.541**	0.354**
	[0.045]	[0.050]	[0.102]
Diabetes*Canada	-0.130**	-0.128**	-0.317**
	[0.057]	[0.056]	[0.158]
Hypertension	0.070**	0.064*	0,055
	[0.033]	[0.039]	[0.064]
Hypertension*Canada	-0,044	-0,090	0,099
	[0.059]	[0.077]	[0.100]
Heart	0.399**	0.305**	0.348**
	[0.035]	[0.040]	[0.072]
Heart *Canada	0.094**	0.073*	0.078**
	[0.041]	[0.042]	[0.033]
Stroke	1.104**	1.170**	0.603**
	[0.058]	[0.066]	[0.122]
Stroke *Canada	0.155**	0.104*	0.490*
	[0.069]	[0.055]	[0.287]
Migraine	-0,139	-0,127	-0,328
	[0.170]	[0.190]	[0.364]
Migraine *US	0,109	0,156	0,205
	[0.208]	[0.258]	[0.396]
Back	0,136	0.229*	0,212
	[0.100]	[0.117]	[0.169]
Back *Canada	0,164	0,112	0.422**
	[0.119]	[0.146]	[0.192]
Stomach	0.449**	0.531**	0,736
	[0.194]	[0.212]	[0.415]
Stomach *Canada	-0,138	-0,192	-0,521
	[0.226]	[0.259]	[0.448]
Cataracts	-0,080	-0.125**	0,029
	[0.036]	[0.042]	[0.072]
Cataracts *Canada	0.159**	0,117	0.239*
	[0.078]	[0.098]	[0.137]

Tabla 7 (continued)

	All	Poor	Non-Poor
Glaucoma	0.117**	0.145**	0,077
	[0.054]	[0.061]	[0.116]
Glaucoma*Canada	-0,040	0,106	-0,304
	[0.128]	[0.188]	[0.171]
Sight	0.593**	0.676**	0.254**
	[0.042]	[0.048]	[0.090]
Sight*Canada	-0.676**	-0.749**	-0.319**
	[0.075]	[0.098]	[0.126]
Hearing	0.072**	-0,048	0,139
	[0.034]	[0.039]	[0.127]
Hearing*Canada	0.380**	0.378**	0.361**
	[0.116]	[0.151]	[0.180]
Canada	-0.556**	-0.344**	-1.003**
	[0.083]	[0.167]	[0.248]
Age	-0.554**	-0.685**	-0,186
	[0.102]	[0.123]	[0.192]
Age Square	0.151**	0.173**	0.088**
	[0.019]	[0.023]	[0.037]
Male	-0.343*	-0.573**	0,230
	[0.173]	[0.225]	[0.284]
Age* Male	0,034	0,219	-0.440*
	[0.148]	[0.189]	[0.252]
Age Square*Male	-0,024	-0,052	0,050
	[0.029]	[0.036]	[0.050]
Income	-10.0E-6**	-1.6E-5**	-9.1E-6**
	[1.2E-6]	[2.8E-6]	[3.4E-6]
Income*Canada	-0.002*	-0,031	2,80E-02
	[0.001]	[0.028]	[0.021]
High School+	-0.068*	-0,054	-0,062
	[0.040]	[0.051]	[0.063]
High school+ *Canada	0,073	-0,046	0,071
	[0.060]	[0.096]	[0.089]
_constant	1,352	1.558**	1.069**
	[0.133]	[0.166]	[0.279]

Robust standard errors are reported in parentheses

** Significant at 5 percent

*Significant at 10 percent

4 age categories are included

Sum ADL=preparing meals+shopping for groceries+doing light housework +doing heavy housework+showering+walking

Tabla 8. US, Canada and Spain

Dependent variable: SUM ADLs

	ALL	POOR	NON-POOR
Hypertension	0.122**	0.096**	0.173**
	[0.028]	[0.033]	[0.055]
Hypertension*Spain	-0.043	0.019	-0.163
	[0.070]	[0.088]	[0.115]
Hypertension*Canada	-0.084*	0.029	-0.08
	[0.049]	0.064]	[0.081]
Asthma/ Bronchitis	0.247**	0.258**	0.185**
	[0.034]	[0.040]	[0.066]
Asthma/Bronch*Spain	-0.007	-0.047	0.089
	[0.113]	[0.133]	[0.209]
Asthma/Bronch*Canada	-0.007	-0.042	0.056
	[0.076]	[0.097]	[0.128]
Skin/Allergy	-0.215	-0.217	-0.243
	[0.166]	[0.177]	[0.161]
Skin/Allergy*Spain	0.148	0.147	0.184
	[0.136]	[0.172]	[0.187]
Skin/Allergy*Canada	0.254**	0.306**	0.247*
	[0.087]	[0.110]	[0.147]
Diabetes	0.432**	0.420**	0.447**
	[0.039]	[0.042]	[0.095]
Diabetes*Spain	-0.388**	-0.404**	-0.352**
	[0.092]	[0.110]	[0.171]
Diabetes*Canada	-0.157*	-0.023	-0.416**
	[0.083]	[0.109]	[0.135]
Arthritis	0.176**	0.215**	0.055
	[0.030]	[0.035]	[0.058]
Arthritis*Spain	0.373**	0.402**	0.367**
	[0.102]	[0.121]	[0.176]
Arthritis*Canada	0.071	0.024	0.172**
	[0.047]	[0.060]	[0.081]
Heart Problems	0.151**	0.189**	0.134**
	[0.030]	[0.034]	[0.063]
Heart *Spain	0.096**	0.084**	0.082*
	[0.044]	[0.039]	[0.043]
Heart*Canada	0.096*	0.08	0.129*
	[0.050]	[0.078]	[0.071]
Stomach Conditions	0.352**	0.302	0.257**
	[0.113]	[0.187]	[0.105]
Stomach*Spain	-0.258	-0.119	-0.116
	[0.219]	[0.259]	[0.425]
Stomach*Canada	-0.080	-0.012	0.236
	[0.195]	[0.221]	[0.428]

CONTINUED….

Table 8 (continued)

	ALL	POOR	NON-POOR
Sight	0.598**	0.630**	0.454**
	[0.035]	[0.039]	[0.073]
Sight*Spain	-0.354**	-0.449**	-0,025
	[0.099]	[0.113]	[0.207]
Sight*Canada	-0.639**	-0.661**	-0.457**
	[0.061]	[0.081]	[0.098]
Hearing	-0,054	-0,041	-0,090
	[0.038]	[0.033]	[0.059]
Hearing*Spain	0.275**	0,160	0.507**
	[0.090]	[0.103]	[0.182]
Hearing*Canada	0.164**	-0,013	0,216
	[0.094]	[0.155]	[0.146]
Spain	-0.605**	-0.549**	-0.758**
	[0.071]	[0.145]	[0.205]
Canada	-0.524**	-0.372**	-1.031**
	[0.066]	[0.134]	[0.204]
Age	-0.502**	-0.587**	-0,226
	[0.078]	[0.093]	[0.149]
Age Square	0.137**	0.150**	0.089**
	[0.015]	[0.018]	[0.030]
Male	-0,167	-0,265	0,135
	[0.129]	[0.164]	[0.221]
Age* Male	0,051	0,166	-0,251
	[0.114]	[0.142]	[0.201]
Age Square*Male	-0,024	-0,040	0,021
	[0.022]	[0.028]	[0.040]
Income	-6.9E-6**	-1.6E-5**	-6.6E-6**
	[1.0E-6]	[2.4E-6]	[2.9E-6]
Income*Spain	6.9E-6**	1.6E-5**	6.6E-6**
	[1.0E-6]	[2.4E-6]	[2.9E-6]
Income*Canada	-0.001*	-0.039*	0.036**
	[0.0007]	[0.022]	[0.017]
High school+	-0.094**	-0,034	-0.165**
	[0.034]	[0.043]	[0.055]
High school+ *Spain	-0,033	-0,117	0,092
	[0.082]	[0.079]	[0.144]
High school+*Canada	0.104**	-0,042	0.196**
	[0.049]	[0.079]	[0.074]
_Constant	1.072**	1.264**	0.935**
	[0.100]	[0.125]	[0.220]

Robust standard errors are reported in parentheses

Age corresponds to 4 age categories.

Sum ADL=preparing meals+shopping for groceries+doing light housework +showering+walking

Table 9. US, Spain and UK

Dependent variable: SUM OF ADLs

	ALL	POOR	NON-POOR
Heart/Circulatory	0.080**	0.091**	0.033**
	[0.013]	[0.015]	[0.014]
Heart/Circ*UK	0.092**	0.200*	0.056**
	[0.032]	[0.109]	[0.024]
Heart/Circ*Spain	0.104**	0.343**	0.126**
	[0.023]	[0.057]	[0.039]
Asthma/ Bronchitis	0.094**	0.090**	0.102**
	[0.015]	[0.017]	[0.033]
Asthma/Bronch*UK	0,035	0,023	0,022
	[0.074]	[0.119]	[0.096]
Asthma/Bronch*Spain	0,035	-0,005	-0,013
	[0.043]	[0.052]	[0.076]
Skin/Allergy	-0,112	-0,105	-0,133
	[0.290]	[0.341]	[0.147]
Skin/Allergy*UK	0.213**	0.313**	0.256*
	[0.106]	[0.151]	[0.151]
Skin/Allergy*Spain	0.087*	0.103**	0,073
	[0.041]	[0.051]	[0.063]
Diabetes	0.383**	0.188**	0.335**
	[0.017]	[0.019]	[0.038]
Diabetes*UK	-0.158*	-0.143**	-0.142**
	[0.080]	[0.065]	[0.069]
Diabetes*Spain	-0.262**	-0.179**	-0.142**
	[0.035]	[0.043]	[0.061]
Arthritis	0.149**	0.163**	0.107**
	[0.013]	[0.015]	[0.027]
Arthritis*UK	0,128	0.235**	0,007
	[0.101]	[0.141]	[0.143]
Arthritis*Spain	0,013	0,039	-0,013
	[0.037]	[0.045]	[0.062]
Stomach	0.204**	0,067	0,336
	[0.082]	[0.124]	[0.257]
Stomach*UK	-0,108	-0,022	-0,159
	[0.120]	[0.174]	[0.244]
Stomach*Spain	-0,025	-0,028	-0,018
	[0.091]	[0.102]	[0.065]
Sight	0.217**	0.210**	0.243**
	[0.015]	[0.017]	[0.034]
Sight*UK	-0.158*	-0.124*	-0.250**
	[0.094]	[0.035]	[0.120]
Sight*Spain	-0.192**	-0.169**	-0.257**
	[0.036]	[0.043]	[0.071]

CONTINUED….

Table 9 (continued)

	ALL	POOR	NON-POOR
Hearing	0.032**	0.031**	0,039
	[0.013]	[0.015]	[0.028]
Hearing*UK	0,048	-0,158	0,114
	[0.080]	[0.128]	[0.101]
Hearing*Spain	-0,009	-0,032	0,016
	[0.033]	[0.037]	[0.071]
UK	0.405**	0,108	0.520**
	[0.117]	[0.254]	[0.183]
Spain	-0.286**	-0.333**	-0.289**
	[0.025]	[0.052]	[0.082]
Age	-0.250**	-0,040	-0.325**
	[0.043]	[0.085]	[0.050]
Age Square	0.059**	0.029*	0.070**
	[0.008]	[0.016]	[0.009]
Male	0,120	0,186	0,128
	[0.088]	[0.149]	[0.110]
Age* Male	-0,086	-0,111	-0,095
	[0.071]	[0.125]	[0.088]
Age Square*Male	0,014	0,003	0,020
	[0.013]	[0.024]	[0.016]
Income	-2.4E-6**	-6.6E-6**	-2.9E-6**
	[4.6E-7]	[1.1E-6]	[1.4E-6]
Income*UK	-1,20E-05	3,10E-05	-1,20E-05
	[8.7E-6]	[5.9E-5]	[1.1E-5]
Income*Spain	2.4E-6**	6.6E-6**	2.9E-6**
	[4.6E-7]	[1.1E-6]	[1.4E-6]
High school+	-0.046**	-0,019	-0.075**
	[0.015]	[0.019]	[0.026]
High school+ *UK	0,005	0,318	-0,106
	[0.104]	[0.197]	[0.113]
High school+*Spain	0,024	0,034	0,050
	[0.024]	[0.030]	[0.040]
_constant	0.261**	0.648**	0.261**
	[0.122]	[0.068]	[0.122]

Robust standard errors are reported in parentheses

* Significant at 10 percent

**Significant at 5 percent

Sum ADL=dressing+walking

Acute Versus Chronic Disease

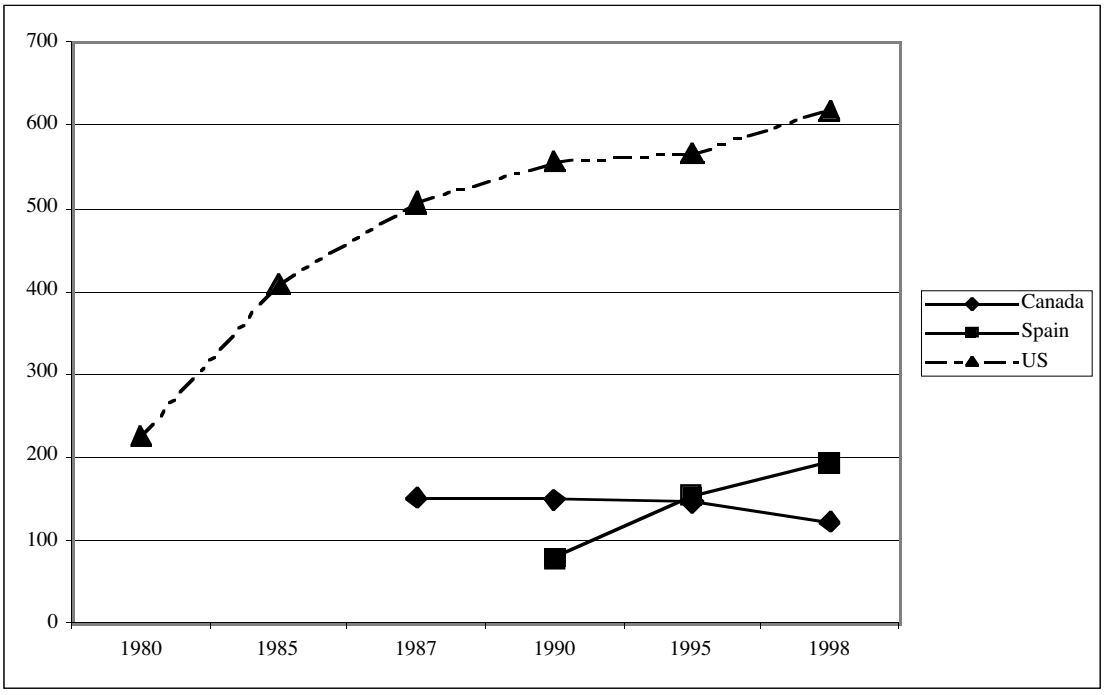
A third explanation is suggested by our findings: the US does relatively better at conditions where acute treatment is needed and relatively worse at chronic conditions. The comparison of heart disease and diabetes is particularly revealing. Heart disease is frequently treated in an acute setting, while diabetes is generally managed as a chronic disease. This could substantially influence the impact of medical care on health.

Heart Disease. Many individuals who report having had ischemic heart disease will have suffered from an acute event – a heart attack, angina, or other related condition. In such cases, there are many acute therapies that can be performed, along with ongoing chronic care. For a person who has a heart attack, for example, diagnostic surgical interventions such as

cardiac catheterization may be used, and treatment may consist of intensive surgical procedures such as open heart surgery or angioplasty.[16] The medical literature shows that these therapies can affect quality of life, in addition to length of life (Brorsson et al., 2002; Sedrakyan at al., 2003; Hlatky et al., 1997).

Medical systems that spend a lot can afford much more of this high-tech care than systems that spend less. The US spends the most on medical care and uses these intensive procedures the most. This is shown empirically in Figures 2, 3, and 4, which present the utilization rate for cardiac catheterization, bypass surgery, and angioplasty. In each case, the figures are scaled to the population as a whole.[17] The US uses these procedures far more than do other countries; use is three to five times greater in the US. The other three countries use them much less, and do so at relatively similar rates.[18]

Figure 2. Utilization Rates for Cardiac Catheterization
(number per 100,000 people 20 or older)



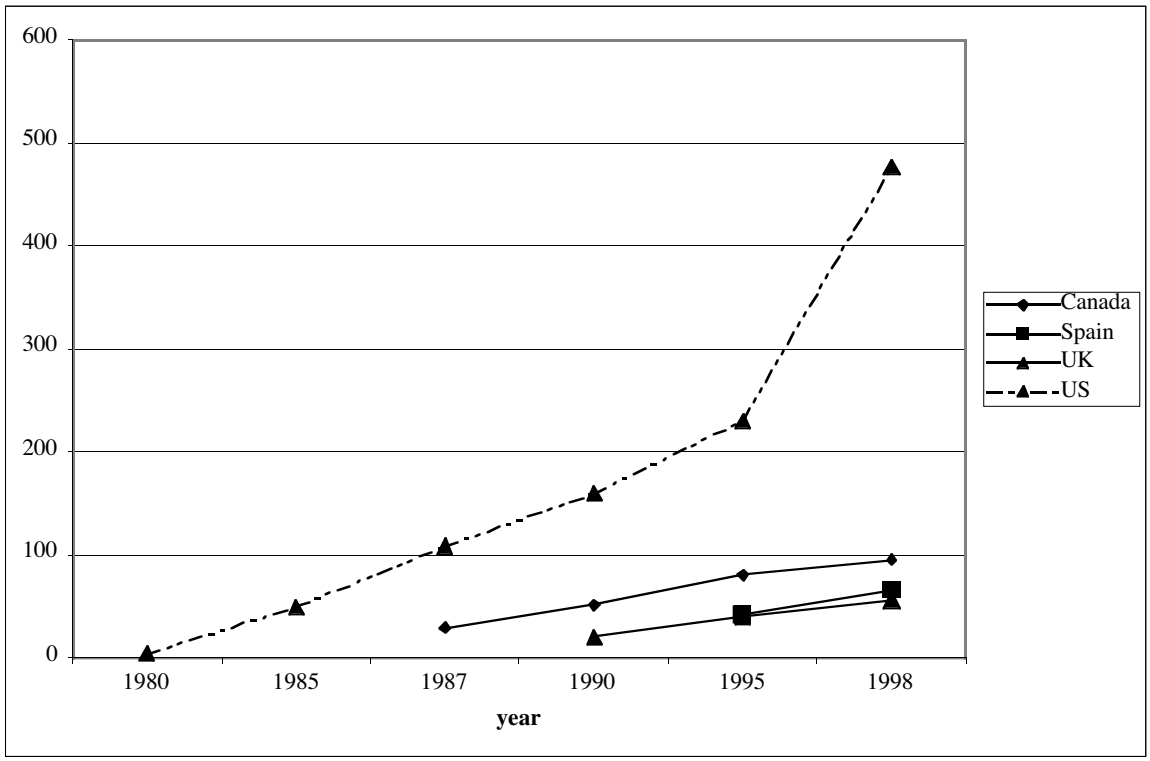
Source: OECD Health Data, 2002.

16 Cardiac catheterization is a diagnostic test that involves passing a fine tube (catheter) through a blood vessel to the heart and into a coronary artery. Bypass surgery involves opening the chest wall and creating a new blood path around the occluded artery. Angioplasty is a technique for treating narrowing or occlusion of a blood vessel or heart valve by introducing a balloon into the constricted area to widen it.

17 Ideally, utilization would be scaled by the share of people with an acute heart disease incident, but such data are not available.

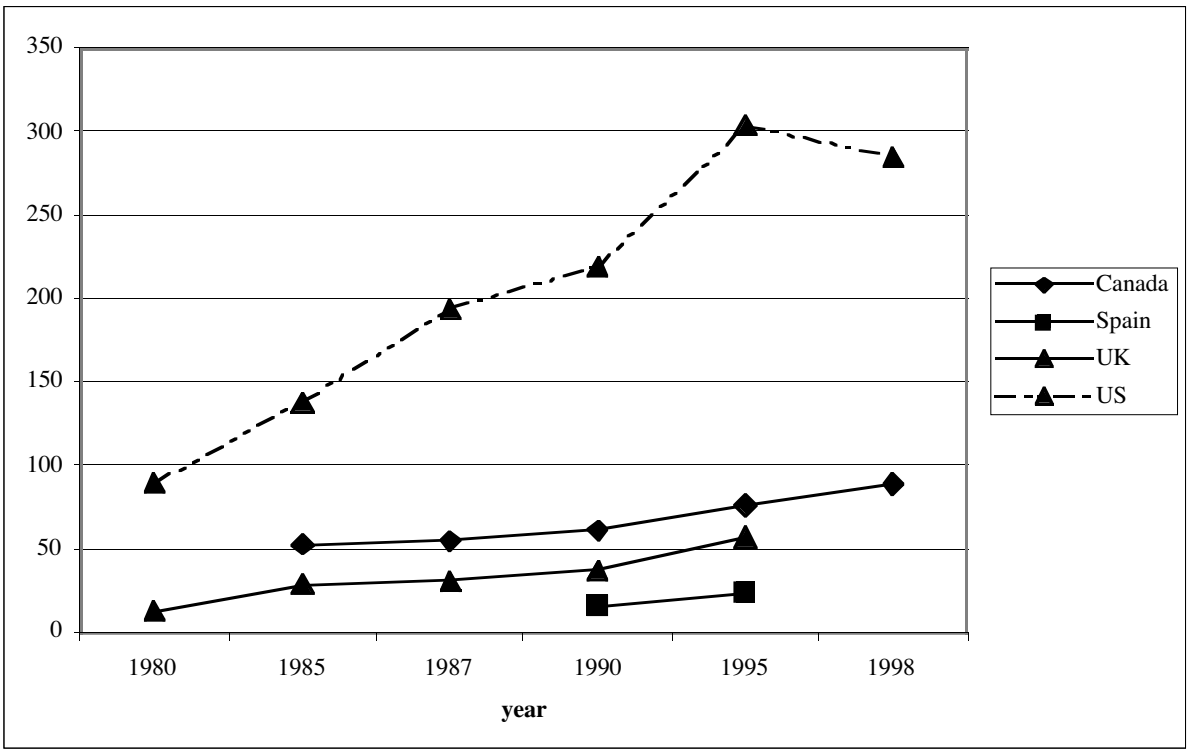
18 In the terminology of the TECH group, the US is an "early start/fast growth" country, Canada belonged to the "late start/fast growth" group, and the UK to the "late start /slow growth" class. A similar conclusion was reached by the OECD Study of Cross National Differences in the Treatment, Cost and Outcomes of Ischaemic Heart Disease (2003), which concluded that a lot of the differences observed across countries are due to the different health care systems. They found that Canada and the UK provide very limited incentives to adopt cost-increasing new technologies due to their global budgets and strong programs to regulate technology adoption.

Figure 3. Utilization Rates for Coronary Angioplasty
(number per 100,000 people aged 20 and older)



Source: OECD Health Data, 2002.

Figure 4. Utilization Rates for Coronary Bypass
(number per 100,000 people aged 20 and older)



Source: OECD Health Data, 2002.

This matches up with self-reported health of people with heart disease. People with heart disease in the US report themselves to be in substantially better health than people in other countries, and the average in each of these other countries is roughly similar.[19] Of course, this does not prove that increased use of these procedures is the cause of improved health. To be more definitive about this, we would need to link data on self-reported health with the particular diagnosis and treatment that an individual received; neither of these are available in any of the data sets we examine. But the evidence is certainly consistent with the theory. Additional work using other data sets could usefully test these other predictions.

Diabetes. Diabetes mellitus is a chronic condition that impairs the body's ability to produce or store glucose. Type 1 diabetes is usually diagnosed in children and is a situation where the pancreas produces little or no insulin. Type 2 diabetes is far more common (accounting for 90 percent of diabetes cases) and occurs when the body does not effectively use the insulin it produces. Untreated, or poorly treated, diabetes can cause severe problems, including vascular diseases (heart disease or stroke can result), small blood vessel disease (it can lead to blindness or kidney disease) and nerve damage or neuropathy (it can lead to amputation). Some of these complications are controlled for in our analysis (heart disease, stroke, and visual problems), and thus complications along these lines would not be associated with diabetes by itself. But not all complications would be picked up independently (kidney disease and nerve damage, for example). Better treatment of diabetes could well improve health through these pathways.

Diabetes requires continuous monitoring and therapeutic intervention. Type 1 diabetes requires the intake of insulin regularly. Type 2 diabetes is controlled through exercise and meal planning and possibly medications and/or insulin. This monitoring requires a lot of self-commitment, including self-testing of blood (about four times a day) and continuous diet and exercise control. This ongoing monitoring and treatment is provided in a chronic care setting, in contrast to the acute care treatments that are a larger factor for people with heart disease.

The success of the UK, Canada and, even more, Spain in the treatment of diabetes may come from differences in how they organize chronic care for diabetes. In particular, these countries stress a team-based approach that allows for an early detection of possible diabetes complications; they also emphasize training patients in methods of self-care. For instance, in Catalonia and in most of the other Spanish Autonomous Communities, the Diabetes Association organizes education seminars for diabetics and their families in coordination with the regional government. Also, in Catalonia some of the largest public hospitals have nurses exclusively dedicated to the provision of education on diabetes for the patients and their families, and most of the largest hospitals have nurses dedicated to educating on diabetes (but not full-time). Both Canada and the UK have recently established different platforms for the integrated treatment and monitoring of diabetes: in 1999 Canada started implementing the Canadian Diabetes Strategy, a five year program that has the goal of improving the prevention and control of diabetes. The UK has established the National Service Framework- Diabetes to determine the country's standards for the treatment, monitoring and prevention of diabetes.

The US, in contrast, has no such integrated approach. Patients are managed individually by their primary care physician, with most of the onus for successful treatment on the patient; most primary care physicians are ill-equipped to help people manage their disease.

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[19] Related evidence suggesting that greater use of intensive care improves the health of Americans relative to Canadians is in Pilote at al. (1994). That study made direct comparisons of functional status but did not normalize for the non-impaired group.

The failures of individuals in self-management of chronic disease are clear, particularly in the case of diabetes. Common measures of diabetes control suggest that no more than 35 percent of diabetics in the US have their blood sugar below recommended levels (American Diabetes Association) and a recent study from the US Center for Disease Control and Prevention found that 71 percent of diabetics also had high blood pressure. These numbers are much lower for Spain and Canada, where the percentage of diabetics with high blood pressure are 45 (EPICARDIAN, 2003) and 47 (Health Canada, Diabetes in Canada, 2002) respectively. Rates of medical examination for vision problems, problems with blood flow to extremities, and other complications are also low. As a result, diabetes complications are frequent in the US.

Further, substantial evidence shows that outcomes can be improved with appropriate chronic care interventions, of the type that occur elsewhere. Introducing systems that stress physician monitoring, outreach, and appropriate interventions has been shown to result in large improvements in diabetes outcomes (Beaulieu, Cutler, and Ho, 2002).

Thus, it is plausible that the poor organization of chronic disease care in the United States relative to other countries explains the difference in health outcomes for people with diabetes. Again, this is not proof of this proposition. But it suggests a type of data analysis that can shed more light on this hypothesis. Unfortunately, the data we examine do not have information on the nature of diabetes care provided. Thus, this test will have to await the analysis of other data.

V. Conclusions

The US spends much more on health care than Canada, Spain or the UK. The natural question is whether that increased spending buys improved outcomes. It has long been clear that mortality as a whole is no better in the US than in other countries. What was less clear is whether there are differences in non-fatal health outcomes. Our results provide among the first comparative looks at this question.

We present a mixed message: the US does much better for people with some conditions (most particularly heart disease), but does worse on others (especially diabetes).

The discrepancy between high quality of life for some conditions and low quality of life for others is not attributable to differing performance by income: the poor and non-poor fare similarly in the US. Nor does it appear to be attributable to measurement issues in determining a person's quality of life. We suggest that the difference may have to do with the nature of acute versus chronic disease care. The US tends to do better for conditions where there is an acute component to treatment: the availability and use of acute care is significantly greater in the US. The US does poorly, in contrast, for conditions requiring substantial chronic disease management. Countries that focus on this type of treatment seem to do much better. We suggest this hypothesis, and provide guidance on tests that might confirm or disprove it.

If this hypothesis is true, it raises the question about how medical systems are organized to treat various types of conditions. It may be that other countries focus on chronic disease care because they are cognizant of the limits on acute care and this is a reasonable substitute. Alternatively, it may be easier to focus on non-high tech treatments outside of the private market, where financial incentives are much less important. The political economy of medical system development, along with the exact nature for the results we observe, will have to await further research.

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