The Politics of Health Care Financing Models

Does the Source of Funding Matter for Health Care Outcome?

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Master's Thesis

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Abstract

Does the source of funding matter for the outcome of health care? The aim of this thesis is to analyze to what extent three different health care financing models affect the mortality from cardiovascular diseases. This is done by using OLS with PCSE, followed by two case studies to illustrate the findings. Based on two hypotheses the conclusion is that the National Health Service model and the Social Health Insurance model accounts for lower mortality rates than the Private Health Insurance model. The Social Health Insurance model additionally performs somewhat better than the National Health Service model. The extent of difference is, on the other hand, low, and the systems account for less than 1% of the differences in cardiovascular mortality. The case studies of Poland and Spain did neither present very clear changes in mortality rates affected by the change of financing model, which supports the overall conclusion.

At the same time, it is argued that despite the small differences between the models, the extent of explanatory power of the models is high. This is because of the life expectancy in OECD countries is very high, and the postponing of death has a limit. The lack of very clear evidence from the case studies is argued to be due to the slow moving effects of health care, and there is not necessarily reason to expect that a clear decrease in mortality should automatically follow a change of system. There are also great differences in how the models are organized in the different countries, and poor implementation of a system, as arguably has been the case for the social health insurance in Poland, could easily outweigh the general benefits associated with a particular system. Additionally, there seems to be issues regarding model change, and many characteristics from the old systems are often kept within the new.

Overall there is a significant correlation between the finance of health care systems and cardiovascular mortality, and given the premise of limited ways of reducing mortality in OECD countries, every improvement should be valued. This thesis therefore lays a solid framework for further discussion of health care policies in high-developed countries.

Keywords: healthy policy, health care finance models, cardiovascular mortality, health insurance, national health service, social health insurance

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I alone am responsible for the errors in this thesis.

Thordis M. W. Haugen
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List of Abbreviations

AC	Autonomous Community
AMI	Acute Myocardial Infarction
CHS	Communist Model
CVD	Cardiovascular Disease
EEC	European Economic Community
FE	Fixed Effects
FEVD	Fixed Effects Vector Decomposition
GDP	Gross Domestic Product
ICD	International Classification of Disease
IHD	Ischaemic Heart Disease
ISFAS	Instituto Social de las Fuerazas Armada
MUFACE	Mutalidad General de Funcionarios Civiles del Estado
MUGEJU	Mutalidad General Judicial
NHS	National Health Service
OECD	Organization for Economic Co-operation and Development
OLS	Ordinary Least Squares
PCSE	Panel-Corrected Standard Errors
PHI	Private Health Insurance
SHI	Social Health Insurance
SLD	Democratic Left Alliance
TSCS	Time-Series Cross-Section
UCD	Union of the Democratic Centre
UK	United Kingdom
U.S.	United States

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1 Introduction

All health care systems around the world face financial challenges. In the United States, for instance, this year's election is the third in a row were the central issue is "Obamacare" (Schneider 2013). One of the reasons why this health care reform is so hard for many to accept is the idea of 'individual mandate', which requires all Americans to buy health coverage (Mooney 2012 p. 61). Health care financing models is therefore a highly political topic, as indicated by the heated political rhetoric of American politicians:

> "Today America is threatened with a Stage Three cancer of socialism, and ObamaCare is Exhibit 1" (Rofsky 2013).
> *Todd Akin, Former representative for the U.S. Congress*

In general, the importance of health care systems has increased during the 20th century by reducing the occurrence of premature death and improving the health of billions of people. Health care systems have additionally played a major role in the rise of life expectancy in high-income countries (WHO 2000 p. 3). At the same time, this rise in life expectancy, together with the ageing of the population, have created an increase in expenses for the health care systems in developed countries (Blank & Burau 2010 p. 1). How this increase should be financed and distributed is a political question, and the role of the government in creating such distributions is of core concern of political science (Bradley et al. 2003 p. 193).

1.1 Does the Source of Funding Matter?

There are many examples of political campaigns being run on the question of how best to handle the rising health care costs, and more importantly, who should pay the bill. In 1992, the topic of health insurance, for instance, led Harris Wofford to victory in the Pennsylvanian Democratic primary for the U.S. senate. This made health insurance reform into a conspicuous issue in the presidential race, and a major concern for President Clinton's agenda (Morone et al. 1994 p. 48). The debate about financing is central outside the U.S. as well:

"The current care and support system doesn't work and is hugely unfair.
People face losing almost everything they've worked hard for" (Ashley 2014).
Norman Lamb, Minister of State for Care and Support, UK.

The quote above illustrates the political debate of how health care systems should, or should not, be organized. Is the health care system better left to private markets or is health care a human right that the government should provide for its citizens? The common debate regards preventable diseases, lifestyle choices and limits of services offered. Less focus has been paid to whether or not the source of funding really matters for the average citizen. Do certain systems perform better than others?

1.1.1 Different Models of Health Care Finance

In this thesis, three different models[1] of health care finance are carefully studied. These are the National Health Service (NHS), the Social Health Insurance (SHI) and the Private Health Insurance (PHI). The National Health Service is a tax financed model, a national system that covers the entire country's population. The Social Health Insurance model is financed through insurance schemes, normally dependent on a person's occupation, and covers the employee and her family (Blank & Burau 2010 p. 12). Primarily, the SHI system relies on payroll taxes as primary source of health care funding (Glied & Smith 2011 p. 10). The Private Health Insurance model operates with a private health insurance scheme, where it is every individual's choice whether or not to enroll (Blank & Burau 2010 p. 12).

The three models overlap with different political ideologies and traditions. In addition to the source of funding, they differ in regards of patient treatment, medicines, technologic development or initiatives related to surgery performance and preventive actions. In practice, however, all systems rely partly on public finance. In the OECD member countries, the health care sector is among the main expenses in the national economy (Glied & Smith 2011 p. 6). It is, at the same time, important to note that few countries fit into any single category, and the systems have developed their own financing over time (Glied 2008 p. 1).

[1] The term 'model' and 'system' when referring the NHS, SHI and PHI will be used interchangeably throughout the text.

1.1.2 Cardiovascular Diseases in the OECD

The organization for economic co-operation and development (OECD) was created in 1961. In its member countries, the growth in health spending has exceeded the growth in GDP by a substantial amount in the last 50 years (OECD 2011 p. 5). This suggests that there is room to improve efficiency of health systems in order to ensure that the money spent on health provides measurable benefits in terms of health outcome (OECD 2011 p. 10). With health care taking up such a large share of national budgets, the question of policies' influence on patient outcome is therefore highly appropriate.

Cardiovascular diseases (CVD) are the number one cause of death in an average OECD country[2] (OECD 2011 p. 28). These numbers are likely to increase in the future, and CVDs are going to remain the leading cause of death (WHO 2013). This is mainly due to cardiovascular risk factors being lifestyle related, and the economic development of OECD countries have made lifestyle factors a central burden of disease (OECD 2011 p. 8). Mortality from cardiovascular diseases is therefore a relevant choice of measure in comparative research on the performance of health care financing models in the OECD countries. Using the OECD members as sample is partly due to the quality and quantity of available information, but also due to the causal link between poverty and health. In less developed countries it would not always be appropriate to talk about the existence health care systems. Moreover, poverty would naturally impact health care financing, but not because of an ageing population as is one of the challenges in high-income countries.

1.1.3 Does the Source of Funding Matter?

This thesis' research question is therefore as follows:

> *To what extent does the National Health Service model, the Social Health Insurance model and the Private Health Insurance model affect cardiovascular mortality in OECD countries?*

There are great differences between the systems in terms of finance and coverage, to list a few. This suggests, on the one hand, that there are important lessons to be learned by comparing

[2] In Canada, Denmark, France, Japan & the Netherlands, cancer is now the leading cause of death. Cancer, however, is the second leading cause of death in OECD-countries, after diseases of the circulatory system. Using CVDs as dependent variable would therefore cover a larger share of the mortality statistics than cancer. Additionally, there are more than 100 different types of cancers, with differences in treatment opportunities, and using CVDs would also have advantages in terms of methodological issues (OECD 2013).

performance across countries, as this study intends to do. At the same time, no scholar has so far been able to recognize any single system as being the most productive, or as having the right combination of regulation and competition (Baily & Garber 1997 p. 143). However, as health care systems account for a high and growing share of public budgets (OECD 2011 p. 16), it seems that governments may believe that spending more, publicly, on health care, would lead to better health outcomes. Additionally, due to the economic recession following the financial crisis of 2008, there has been an increase in government deficits in many countries. To justify public spending on the health sector, Health Ministries would therefore need proven benefits in terms of health outcomes if the health care sector should be protected or prioritized when control of public spending has to be done (OECD 2011 p. 16). More research on the topic is therefore highly needed, and the timing of this thesis is more than right.

One clarification should be made: If one system does account for lower cardiovascular mortality than the others, this thesis would not be able to conclude about whether or not countries should adapt to this model. Firstly, this is because a government's action at one point in time gives base for what the sensible next step in each individual country should be. Once a policy is established, various groups have a place in that policy, and interest structures become embedded in ways that would make the system difficult to change (Glied & Smith 2011 p. 72). Secondly, the thesis does not consider the cost, both in regards of finance and health, of system change. Major reform could potentially exceed the gains of the new model in many years to come. In this sample, change of models usually occurs after epochs of 'high politics' of ideological conflicts. Over the last 50 years only 13 countries have changed model, and this have mostly followed a transition from dictatorship to democracy. Finally, the effects of the financing models might affect other diseases than CVDs as well, but given the high share these diseases have in the countries mortality statistics, it is a very important factor to take into account.

This thesis aim is to go beyond the political debate, and research the empirical outcome of the different political ideologies. This is important to create a framework for further discussion given the importance of health care systems in the OECD-countries society today.

1.2 Findings

The main findings of this thesis are that there are fairly small differences in outcome between the systems, but with the Social Health Insurance and National Health Service seemingly having lower cardiovascular mortality than the Private Health Insurance system. Additionally, the SHI

does perform slightly better than the NHS. There are, at the same time, insecurities about the extent of explanatory power between the models. When moving from the NHS to the SHI or PHI, the estimated difference in cardiovascular mortality is equivalent to less than 1%. This is supported by the regressions run with interpolated values[3], where the differences between the models are close to zero. In the illustrative case studies on Spain and Poland, the effect of model change is additionally hard to spot.

At the same time, it is argued that despite the small differences between the models, the extent of explanatory power of the models is high. This is because of the limits of a life and because when studying matters of life and death, every difference is important. The lack of very clear evidence from the case studies is argued to be due to the slow moving effects of health care, and there is not necessarily reason to expect that a clear decrease in mortality should automatically follow a change of system. There are also great differences in how the models are organized in the different countries, and poor implementation of a system, as arguably has been the case for the SHI system in Poland, could easily outweigh the general benefits associated with a particular system.

1.3 Structure

Chapter 2 provides an introduction to health care in political science, before explaining the differences between the three health care models, and why this should matter in regards of cardiovascular mortality. Chapter 3 gives an overview of the data used, and the operationalization of the variables, before Chapter 4 explains the choice of methodology. In brief, the thesis mainly run ordinary least square (OLS) models, with panel corrected standard errors (PCSE), supplemented by, as mentioned, two illustrative case studies. The results from the regressions are presented in Chapter 5, followed by the case of Spain and the case of Poland, two countries that have changed health care systems over the last decades. Chapter 8 discusses the overall findings, before the conclusion is presented in Chapter 9.

[3] The regressions run with interpolated values are not significant at a 0,1 level.

2 Theory

This chapter explains why political economy and political science is a natural choice of discipline for this type of research project. It then gives a presentation of the three main health care financing models, before discussing different features of the models that affects cardiovascular mortality. Additionally, a fourth model, a communist model is presented, due to the fact that several of the OECD-countries were either part of the Soviet Union or under another form of communism in the time period of study in this thesis.

2.1 The Politics of Health Care Financing Models

The presence of health care in political science literature is not proportional to the size of health care in government activities (Glied & Smith 2011 p. 58). Additionally, the comparative health system literature in political science is based on typologies and models, and few articles are tied to theoretical frameworks (Albrecht, Fitzpatrick & Scrimshaw 1999 p. 442). This has great implications for the limits of theoretical framework this thesis could possibly build on. Using a political economy approach to health, however, is fruitful, since health is a result of social, political and economic structures (Birn, Pillay & Holtz 2009 p. 134). This means that to conclude on the choice of health care financing models impact on cardiovascular mortality, it is necessary to control for factors that cannot be explained by the health care systems themselves, such as democracy or GDP. Only one of the models used in this paper is fully funded by public sources, but all three systems are heavily shaped by government policy, both in regards of regulations and investments (Glied & Smith 2011 p. 61). In democracies, elected political representatives create government policy. The decision of which health care financing model to use is therefore influenced by voting behavior[4] (Glied & Smith 2011 p. 67). Scholars of political science should therefore expand research on the topic.

The National Health Service, Social Health Insurance and Private Health Insurance models, as described below, can be argued to represent very different political ideologies. The PHI model, as in the United States, represents a market-maximized approach to health care delivery

[4] If voters were not able to influence public policy, there would be a severe crisis of democracy (Navarro et al. 2006 p. 1033). This paper will not discuss this any further.

(Reichard 1996 p. 80). The NHS-model, like the one in Denmark, one the other hand, minimizes the role of the market, which represents the social market economy the country has. The SHI-countries does additionally operate with a social market economy (Pontusson 2005 p. 81). It is therefore clear that health services are permeated by the social values of the different political systems, and that these values are responsible for the form health care institutions take (Reichard 1996 p. 81). For instance, political parties with egalitarian ideologies tend to implement redistributive policies (Navarro et al. 2006 p. 1033). Redistribution is of great concern in the health care sector, and all three models do operate with some sort of risk-pooling (Normand & Weber 2009 p. 26). The ideology of the health care sector is, on the other hand, not the monopoly of political parties. It is, for instance, possible to identify the ideology of the medical profession or that of different health care administrators (Klein 1983 p. 84). The power of these third party actors differs between the models, and will be further touched upon in section 2.7.

Additionally, the theory of path dependency is rather important in this thesis. Several of the countries changed financing model during the time period of study, and the illustrative cases presented in Chapter 6 and 7 show how part of the old models, or problems from the old models, is present within the new systems. At the same time, big health care reform is not the norm, and it is usually quite difficult to conduct. A path-dependent[5] sequence of political changes is decisions tied to previous decisions and existing institutions. This means that structural forces dominate, and policy movement is most likely to be incremental (Wilsford 1994 p. 252). This naturally applies to all behavior, but the main reason for including it here is because of the debate of structural features from old systems being kept when changing models, and to what extent this is an issue when operating with ideal models.

This is also important for understanding why some countries change their model of health care funding, while others do not. This is because some systems are structurally more open to reform than others. For instance, in the U.S., the system is rather decentralized with a non-hierarchical network of autonomous decision-agents. This is in contrast of more centralized systems with hierarchical orders of less autonomous decision-agents, such as the one in Germany (Wilsford 1994 p. 278). Centralized systems would be more open to change, since political agents have more control over the systems policies. Even if the thesis operates with ideal models, it is

[5] Path dependence in this thesis refers to the loose signal that the options available are constrained by previous choices, and does not rest on the more advanced understanding of the term from game theory and social choice theory were it is stressed that the same initial state may give different outcomes by different routes.

therefore important to note the systemic differences in the countries structures, and the implications this have when a change of model occurs.

2.2 National Health Service

"A comprehensive national health service [which would] ensure that for every citizen there is available whatever medical treatment he requires, in whatever form he requires it" (Pillay & Holtz 2009 p. 595).

William Beveridge

The first type of health care financing model presented is the National Health Service Model. Under this model, the state completely administers the health care services, and it owns or controls the delivery and production of them (Blank & Burau 2010 p. 13). There are four principles guiding the NHS (Scott 2001 p. 106). These are that access to health should be:

1. Universal
2. Comprehensive
3. 'Free at the point of delivery' to the patient
4. Financed primarily through general tax revenues

Using a tax financed systems allows redistribution to be related to both risk and income (Scott 2001 p. 19-20). At the same time, taxation systems are heterogeneous (Mossialos et al. 2002 p. 14), but NHS systems stereotypically rely on general taxation from the central government level (Glied & Smith 2011 p. 10). In countries such as United Kingdom, Canada and Sweden, for example, government funding of health care comes from the general revenue raised by the central government (Glied & Smith 2011 p. 264).

Some scholars (Glied & Smith 2011) operate explicitly with a model called National Health Insurance, which they separate from the National Health Service. The National Health Insurance is described as relying on taxation, but with the provision of services being under private practice (Glied & Smith 2011 p. 10). This is a most interesting debate in regards of what impact it might have on patient treatment and will be touched upon in section 2.7.1. The terms National Health System and National Health Insurance, however, is not consequently referring to the same division of systems. Sweden, for instance, is defined as NHS, but can also be referred to as " a

national health insurance system introduced in 1946 that went into effect in 1955" (Immergut 1992 p. 74). Since there is no clear development of National Health Insurance as an independent model, and the source of funding is through general taxation, this paper will not problematize this issue any further. The National Health Insurance will be considered as a variant of the National Health Service model, meaning that it will not be operationalized as a fourth model. This is mainly due to the narrow literature on the subject, and it would be a thesis in itself to classify which countries should be considered operationalized as using this model.

Although the NHS is usually associated with the United Kingdom, it was actually New Zealand who established the first National Health Service (Blank & Burau 2010 p. 13). The British case, on the other hand, is most helpful in explaining the ideology behind the model. This is illustrated by the election in 1945, which brought the Labour Party into Government (Klein 2006 p. 19). The NHS was implemented after this victory, and built on the recommendations given in the Beveridge Report quoted above (Birn et al. 2009 p. 598). The NHS can be held as the greatest socialist accomplishment of the Labour Government (Klein 2006 p. 1). To understand the ideological foundations of the NHS, however, one needs to view it through the wider context of the prevailing political landscape. Fabian reformers[6] like the Webbs, Liberals like Beveridge himself, and Tories like the Chamberlains all shared the belief in paternalistic knowledge (Klein 1983 p. 87). There was, in other words, political consensus under the creation of the model (Klein 2006 p. 2), and the debate had little socialist ideology, and was more a debate about the administrative apparatus (Klein 2006 p. 20).

In Europe, Margaret Thatcher became the figurehead of pro-market forces in the 1980s (Pontusson 2005 p. 1). Her agenda was to make the role of government to not do things for people, but rather create an environment in which people could do things for themselves (Klein 1983 p. 83). In the attempt of reorganizing the NHS, however, she was forced to defend the principle of universal access to health care regardless of ability to pay, due to the U.K. population's collective support for health care as a right (Birn et al. 2009 p. 599). This illustrates how politics, voters and parties, impact the models. This is also clear in Sweden, where the Conservative governments try to expand the private sector while the Social Democratic governments reduces it (Immergut 1992 p. 222).

[6] The term Fabian reformers originate from the wars between Rome and Karthago, were the general Fabius' strategy was to make very slow and cautious steps to win Rome back. In Britain the term "Fabian Society" referce to socialist organization, which laid much of the fundation of the Labour Party (Cole 1961).

Concluding on the NHS as a socialist system would be a mistake. It is, as the name implies, rather nationalized (Doyal 1981 p. 37). It is important to clarify that this model has support from many political parties. Additionally, in a report from the British department of health and social security dated to 1976, it states that the prime responsibility of his or her health falls on the individual, and that the governments role is limited to ensuring access to knowledge on health, and at least not create hindrances for those who decide to act on this knowledge (Department of Health and Social Security 1976 p. 62-63).

2.3 Social Health Insurance

The second model presented is the Social Health Insurance Model. This model combines the principles of public mandate with separate funding (Blank & Burau 2010 p. 75). Establishment, supervision and administration are commonly viewed as a public task (Normand & Weber 2009 p. 28). Some of the richest industrial nations have been brought about considerable degree of equality in the distribution of health services, due to the social insurance model (Breyer 1995 p. 137). The model is based on a concept of social solidarity, and contributions are paid as a percentage of the salary rather than according to the specific health risks of the individual. The risk is usually shared between employers and employees. Dependents of employers are also covered, which in effect ensures population coverage (Blank & Burau 2010 p. 75).

Social Health Insurance has no uniformly valid definition, but some characteristics are generally present. These are:

1. Insured citizens pay a regular, usually wage-based contribution
2. Independent associations manage and pay for health care
3. Social Health Insurance is compulsory for the majority of the whole population
4. There are several funds with variation in choice and risk-pooling
5. Unemployed are usually covered through government sickness funds
6. Employers and employees share responsibility for managing funds

In summary, the key features of the SHI are that contributions are paid based on ability to pay and the system provides a separate, transparent system for the flow of finances from the contributors to the sickness funds (Mossialos et al. 2002 p. 60).

In regards of the health reforms in the Netherlands and New Zealand, the term social insurance assumes a different meaning. Social insurance refers in these cases to a public scheme in which individual tax contributions are pooled and financed health vouchers whose value is set in regards to levels of health risk and ability to pay. The vouchers allow individuals to purchase an insurance policy covering basic health care from a number of competing public and private insurers or purchasers (Scott 2001 p. 20). This is, however, not channeled through employment.

In Europe, social health insurance has two distinct variants. One is the established systems of social health insurance in Western Europe, and the other are the former communist systems with newly established SHI models after the collapse of communism. In Western Europe the system have developed over a long time period, and many of the organizational features and regulatory relationships are the result of a process of adaptation to changing circumstances. In the former communist countries, on the other hand, the process of change has been more recent, radical and rapid. One of the main reasons why these countries decided on a SHI model is due to the separation between the insurer on the one hand, and the government on the other. This is supposed to bring greater approachability to the patient (Mossialos et al. 2002 p. 17).

The SHI model originated in Germany in the nineteenth century, and Germany actually has the oldest universal health care system in the world (Armstrong et al. 2011 p. 143). The earliest versions developed without any particular government intervention, and happened due to the large firms that were established in the era of industrialization. The workers in these firms organized themselves into trade unions, and when employers saw benefits in having healthy employees, they gave them support in creating sickness funds. In this way, a model was created where health insurance was provided for workers in firms, with the workers having much of the control. Some management and financial input, however, were left to the employers (Mossialos et al. 2002 p. 59). The different health insurance funds were organized along occupational, ethnic, religious, political, or geographical lines. In 1854, The Prussian Parliament formalized the system into law, requiring regular contributions from workers to be coordinated by their employers. Three decades later, Chancellor Otto von Bismarck introduced a series of social insurance programs. This was the start of the SHI model, which has later spread to several other countries. In 1985, 70 countries had adopted the German system (Birn et al. 2009 p. 595-596). The SHI therefore emerged from ideas of solidarity, but also a belief about health care leading to economic profit for the employers, and thereby the nation as a whole.

Later, between 1967 and 1986, 10 OECD countries abandoned the SHI in favor of the NHS model while at the same time all six of the OECD's new European countries, Czech Republic, Estonia, Hungary, Poland, Slovenia and Slovakia, abandoned their tax-financed, or communist, models in favor of the SHI (Wagstaff 2009 p. 3).

2.4 Private Health Insurance

As the name implies, the Private Health Insurance model is the model where the state is the least involved in direct funding of health care services. The main characteristic of the model is the purchase of private health insurance. This purchase is either done by the citizens themselves, or by their individual employers (Blank & Burau 2010 p. 12). This implies that the approach to regulation is driven by competition (Schmid, Cacace, Götze & Rothgang 2010 p. 471). What is emphasized is the notion that personal responsibility is the driver of individual action. Since the underlying ideology stress that freedom is the primary goal of society, government interference is kept at a minimum. Due to this health care is funded by the individual's ability to pay, and collective action with government regulation is seen as a threat to freedom (Maynard 2013 p. 1105). At the same time, the PHI does leave room for a publicly funded safety net for vulnerable groups such as the poor, the young or the elderly. It is therefore important to clarify that the main assumption behind this model is that the main part of the funding of health care is best left to market forces (Blank & Burau 2010 p. 12).

In this sample, the United States is the only nation that is categorized as using the Private Health Insurance model. Separating the country from the model is therefore difficult, if not impossible. This will be discussed in detail in Chapter 4. One can speak of a fundamental difference in philosophy between the U.S. and the other OECD countries. The United States represents a strong individualism of a free market society, while many European countries are funded upon the deep egalitarianism of a social welfare state (Armstrong et al. 2011 p. 3-4). It is therefore not surprising that these countries have chosen different financial models, but the issue arise when U.S. specific features is the only reference point for the model. For instance, the American approach to health care tends to be disease-focused, which creates a society where patients are viewed on background of their medical conditions, and not the other way around (Stulberg 2014). This might have impact on the mortality from cardiovascular diseases in the U.S., but is not necessarily an intrinsical feature of the Private Insurance Model. There are, on the other

hand, insecurities about the operationalization of Switzerland, and a robustness test will be run where Switzerland is categorized as PHI until 1996.

The private insurance model as operationalized in the U.S. is however a deprived model. When the insurance companies expand their markets, they are not looking for people in need of health care services, but instead customers who demand more services. Additionally, the insurance companies invest millions of dollars in political parties. This is done both to guarantee their immunity from state ownership, but also to retain state subsidies, which they need to stay profitably in business with minimal risk linked to the company. Despite the use of the PHI model, the U.S. spends just under 15% of GDP on public health care, compared with around 8-9% in Western Europe (Hart 2006 p. 16-17). Operating with the PHI as main model is therefore not a guarantee of keeping public funding of health care at a minimum.

One major political difference between this model and the two others is that the basic idea that health services are essential needs that people have the right to receive does not apply to the same extent. This is because it is in direct conflict with the idea of prices being the determinant of distribution of health care services (Sharp, Register & Leftwich 1994 p. 236). The PHI is in fact the only model were health care could be argued to be a byproduct. This is because the main goal of the insurance companies is the profit required to justify the business of either entrepreneur professional or corporate providers. Even when operating with health gain as a direct objective, it is never the only product (Hart 2010 p. 11).

2.5 Hybrid Models

It is quite common for several models to operate within one country. For instance, the phrase "national health insurance" in the United States, refers to government programs, such as Medicare and Medicaid, and other programs where government revenues are used to guarantee universal access to basic health care (Scott 2001 p. 20). In Germany, on the other hand, about 10% of those who are covered by the SHI model, purchase supplementary insurance for instance for private hospital rooms (Birn et al. 2009 p. 596). Germany, together with Chile, remains the only countries in the sample where certain socio-economic groups can opt out of the otherwise compulsory social health insurance system and switch to a private insurance plan (Pütz & Hagist 2006 p. 225).

One way of understanding hybrid models is to view them as a mild form of convergence. This means that because of the combination of financing models, the similarities between countries increase (Schmid et al. 2010 p. 456). This is important because having hybrid models increases the chance of similarities in the results between the countries.

The PHI model is perhaps the most used as a hybrid, and governments often look to PHI as a possible means of facing some health system challenges, such as increasing system capacity (Colombo & Tapay 2004 p. 7). In the United Kingdom private insurance and private ownership of the elements of production are found (OECD 1987 p. 24), even though the country as a whole is never categorized as using the PHI model. In the OECD health care systems, the varying role of PHI does first of all root in historical roles of private health care and coverage (OECD 2004 p. 79).

2.6 Communist Model

As previously stated, the regression models are run with an alternative categorization of the countries, to test if the categorization of Hungary, Czech Republic, Slovakia, Slovenia, Estonia and Poland as using a communist model, instead of categorizing them as NHS, would have impact on the results. A communist model would naturally have similarities with the NHS, given the role of the Government. There are, one the other hand, differences in the funding due to the role of the free market and the implications this has on taxation. Czechoslovakia, Poland and other Eastern European countries adopted some characteristics of the Soviet system, but all communist countries should in someway function differently from the NHS. The communist model was built on local councils, which were in charge of health care. These councils were under a central body, in charge of the entire system. Additionally, all the private hospitals, clinics, and pharmacies were nationalized. Poland is the exception in this case, and private provision was not completely abolished. This will be elaborated in Chapter 7. Central planning is one of the main characteristics of this model, and the national government estimated the numbers of health workers needed and placed personnel accordingly. Distributions of resources came from the top down. Still, as in many countries, the health system was marked by unequal quality across regions and remained underfunded through the entire age of communism (Birn et al. 2009 p. 600-601). Revenue for health care was generated mainly from the revenue of national enterprises, and due to the health care sector being considered 'non-productive', the overall public spending was low.

Despite this, most countries offered their population a comprehensive range of services (Mossialos et al. 2002 p. 83).

In contrast to the stepwise creation of health care systems in, for instance, Germany and the UK, the Soviet system was born of radical transformation. The People's Commissariat of Health Protection was established in July 1918 (Birn et al. 2009 p. 600). Due to the enormous territory and the variety of conditions, health commissariats were set up in a decentralized manner in each of the Soviet republics. Under the new Constitution of 1923, which was reaffirmed in 1936, the federal government established rules for the protection of health, with similar principles of Communist health care applied in all republics (Birn et al. 2009 p. 600).

In countries from the former Soviet bloc, the health care systems had already begun to deteriorate in prior decades due to underinvestment, poor quality of care, corruption, and an overall shortage of resources (Birn et al. 2009 p. 611). In the aftermath, one of the biggest issues post-communist health care systems face, is the increase in use of out-of-pocket payments. This is clearly illustrated through the case of Poland later in the thesis. Before the transition, most of the former communist countries guaranteed free health care to their citizens (Mossialos et al. 2002 p. 91). The communist welfare states additionally left a rare structural legacy based on full employment and enterprise-related benefits for the post-communist governments to address (Orenstein 2008 p. 83). This is, on the other hand, not a major problem in the countries in this sample (Mossialos et al. 2002 p. 91).

2.7 Why Should the Models Affect Cardiovascular Mortality?

The request of greater efficiency, fairness and responsiveness from health care systems has been outspoken during the 20th century and is still a goal today (WHO 2000 p. 13). Given the political debate about their financing, it is important to answer why they, theoretically, should affect mortality. This section discusses how the three models differ in regards of universal coverage, equity and quality and quantity of services provided. These are to a great extent overlapping topics, but the thesis has found the sectioning very beneficial when explaining the causal chains between the models and cardiovascular mortality rates. Additionally, the sustainability of the

models is implemented in the debate, since potential existence of unsustainable mechanisms would highly impact the models future.

2.7.1 Universal Coverage

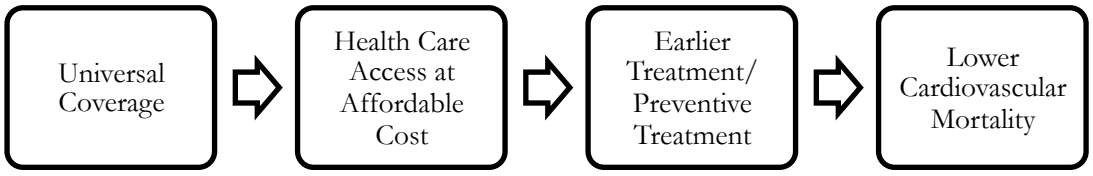

Figure 2.1: Causal Chain of Universal Coverage on Cardiovascular Mortality. This figure shows the causal implications of why universal coverage should affect cardiovascular mortality.

Universal coverage can be defined as access to health care services at an affordable price. This would include the criteria of population coverage, but the provision of both quality and a decent quantity of services for essential needs must additionally be offered (Normand & Weber 2009 p. 31). The implementation of universal coverage, however, is a political rather than a technical issue (Stuckler et al. 2010 p. 2). This is partly because providing full coverage would include both those who can afford to pay for health care, but also those who cannot (Sharp et al. 1994 p. 250). The reason why universal coverage affects cardiovascular mortality is because not having health care coverage has evident consequences for health status. In the United States, for instance, those who are not covered by insurance receive fewer preventive and diagnostic services and tend to be very ill when diagnosed (Carrin 2009 p. 233). As the name 'preventive care' suggests, it is because of this effect that universal coverage is so important for the mortality of cardiovascular diseases.[7] The causal chain is therefore that universal coverage provides health care access at an affordable cost, which then again leads to preventive treatment that lowers cardiovascular mortality.

In regards of population coverage the rule of thumb is that countries using the NHS offer coverage to their populations (Armstrong et al. 2011 p. 143). This is, as mentioned, one of the main features of the NHS model. In Spain however, who changed to the NHS model in 1986, the population coverage is not 100%, and it is important to note that the models do leave room for such special arrangements. This will be further discussed in Chapter 6. In regards of

[7] It is important to stress that access to medical treatment cannot explain all patterns of health status. Health services offer treatment for disease, and procedures cannot prevent many chronic conditions or genetic factors (Robinson 2007 p. 531).

preventive care it is, at the same time, not possible to conclude on the amount of preventive care that is offered, since the nations does not require their citizens to see a doctor. The argument about population coverage leading to more preventive care is therefore based on the assumption of the probability of seeing a doctor being higher when the patients have the possibility of seeing a doctor.

Adopting the SHI model is also a common way of establishing population coverage, but the process might be long. Belgium, for instance, used 118 years from the first social health insurance laws were implemented to population coverage was achieved. Korea, on the other hand, used 26 years (Carrin & James 2005). This is because while the NHS offers population coverage from the very beginning, the SHI often operates as a voluntary system in a transitional stage (Normand & Weber 2009 p. 27). The model is therefore not always compulsory, and in such countries there would not be full population coverage. At the same time, the political motivation for implementing population coverage is clear in both the NHS and SHI. Germany, who is operationalized as using the SHI model, is a social market economy, which is based on a fundamental principle of solidarity. This is a belief of providing needs for all citizens would be both desirable and beneficial for the society (Armstrong et al. 2011 p. 143).

The PHI, as operationalized in the United States, shows a different picture. 47 million people were uninsured in 2013, and millions more were underinsured (Seipel 2013 p. 54). Despite viewing mean values of mortality, high numbers of people outside the health care system, should theoretically affect the regression results negatively. It is though important to note the effect variance of only operating with the U.S. as using the PHI.

On behalf of this, one should expect the PHI model to affect the mean cardiovascular mortality more negatively than the two other models. In contrast to the solidarity and economic argument of population coverage behind the NHS and SHI, the PHI has another ideological reasoning. In the U.S., one of the challenges is linked to attitudes about social groups. Behavioral indicators are most important for Americans opinions about universal coverage of health care. This is more important than both race and class-related topics. Beliefs about groups and behaviors, on the other hand, are intertwined (Gollust & Lynch 2011 p. 1063). The public opinion behind the PHI in this sample is therefore that behavior determines right to care, rather than viewing care as a right of all citizens.

At the same time, the definition of universality also includes provision of services of essential needs. In practice, many countries promise universal coverage, while they, at the same time, ration care or have long waiting lists for treatment (Tanner 2008 p. 34). Waiting lines certainly became a common complaint about public health services in the United Kingdom, Sweden, and other countries in the 1980s (Pontusson 2005 p. 188), and the picture is still the same. In Denmark, for instance, the wait to see a specialist and the wait for elective surgery can sometimes be dragged on for weeks or sometimes even months (Armstrong et al. 2011 p. 8). The NHS model has been severely criticized for this, but it is additionally a challenge in the SHI. Implementing he PHI, on the other hand, creates quicker access to care. Additionally, encouraging the development of the PHI as a hybrid model has been used as a way of reducing waiting time in public systems. In France, for instance, the private health care sector have helped to finance doctors and hospital treatments, when the SHI has fallen short (OECD 2004 p. 177-178). Those who are covered under the PHI would therefore have faster access to care or specialist treatment, which would indicate less severe conditions when treatment is provided.

Another aspect that is interesting in regards of universal coverage is the notion about access at an affordable cost. In Norway, for instance, the Conservative party has proposed the possibility of free choice of treatment at the government's expense, as a way of shortening the waiting lines (Høyre 2013 p. 26). This is in no way contradictory to the NHS model, since the funding would still be public, but utilizing health care services outside the public sector would help the model to reach the broader understanding of universal coverage for the citizens. Having such arrangements would therefore compensate for the negative effects discussed above.

One can therefore conclude that in regards of population coverage, the NHS performs better than the two other models. This is mainly due to the long time span there might be between the implementation of SHI and completion of population coverage. In the OECD-countries however, this is mainly a problem of the past, and one should therefore expect small differences between the two models. It is therefore especially the PHI who is expected to account for higher mortality rates due to the lack of population coverage. In regards of provision of access to essential services at an affordable cost both the NHS and SHI struggles with the problem of waiting lists. At the same time, the reason why many people is not covered under the PHI is exactly due to the affordability of insurance, where the price of health insurance is based on health risks (Normand & Weber 2009 p. 27). Lack of waiting lists would therefore not benefit

the overall conclusion of universal coverage, and provision of access at an affordable cost seems to be a challenge in all three models.

2.7.2 Equity

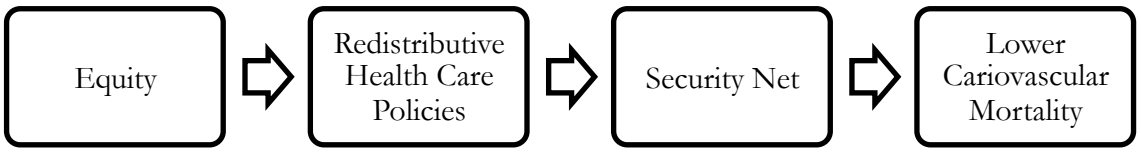

Figure 2.2: Causal chain of Equity on Cardiovascular Mortality. This figure shows the main causal mechanisms of why equity should affect cardiovascular mortality.

The definition of equity in health care is that differences between groups of people that can be avoided, or other differences than can somehow be corrected, is absent (WHO undated b). The question of equity therefore overlaps with the discussion about universal coverage. To figure out if a financing model is equitable assumes that equity is a relative and not an absolute category (Saltman p. 105), since one is discussing degrees of equity. The causal chain between equity and cardiovascular mortality is thus that redistributive policies must be implemented to prevent avoidable differences between people, and this would again create a security net, which would lower cardiovascular mortality.

While the distribution of health care delivery varies between the models, all OECD-countries implement some form of policies to redistribute resources to increase the equity in distribution of health care (Glied & Smith 2011 p. 59). Redistributive policies are positively associated with health outcomes (Navarro et al. 2006 p. 1035). The NHS model shifts almost the entire burden of health care costs to the government and redistributes income from taxpayers to the users of health services (Sharp et al. 1994 p. 250). Again, in Denmark, all citizens have equal access to health services (Armstrong et al. 2011 p. 12).

Redistributive policies are, as mentioned, positively linked to health outcome (Navarro et al. 2006 p. 1035). All the OECD-countries have implemented some form of redistributive health care policies to increase equity, but there is variation between the models (Glied & Smith 2011 p. 59). In the NHS model the distribution operates through the taxation system, by giving the

government almost the entire cost of health care. The population would therefore normally not pay for services directly (Sharp et at. 1994 p. 250). Again, in Denmark, every citizen has equal access to health services (Armstrong et al. 2011 p. 12), and the provision of services does not depend on the individuals' economic contribution.

The same goes for the SHI model, were the system separates payments from people with different estimated risk levels and redistributes wealth from individuals with low expectations of risk, to those with higher levels of risk (Scott 2001 p. 19). The key difference from the NHS model is that entitlements to services is based on payment of contribution, which are earmarked, pooled, and administrated in a separate budget (Normand & Weber 2009 p. 27). Even though services are based on contribution, most systems operate with a security net for those who are outside the workforce. This is illustrated in Poland in Chapter 7.

As one can tell, both the SHI and NHS have all the causal mechanisms from equity to lower cardiovascular mortality. There is, however, a difference between the systems that might affect equity. In Germany, for example, the development of the social health insurance funds has been very fragmented. They consist of a great number of actors, which often have competing interests. All these actors are involved in negotiations of health care system structuring. Additionally, many actors maintain separate funds for agricultural workers or the self-employed. If such fragmented funding systems are not properly regulated by government agencies, it might lead to inequities among groups of beneficiaries. This is because the different funds can entrench competing plans (Birn et al. 2009 p. 597). Another factor that possibly lower the equity in the SHI is that in Germany and the Netherlands higher income earners is allowed to opt out of the scheme (Saltman, Busse & Figueras 2004 p. 108). This would remove more affluent people from the funds, which would result in lower levels of redistribution.

As mentioned, it is not contrary to the PHI model to operate with a security net for some groups of the population. The United States, for instance, operates with programs, which offer important help with health care costs and services to those who are unable to pay. At the same time, not all form of security nets can be measured through government activities, and Americans have high levels of volunteerism, and privately contribute money and time to thousands of organizations that focus on health needs and research (Armstrong et al. 2011 p. 12).

The reasoning behind this difference between on the one hand the PHI, and the NHS and SHI on the other, in regards of equity, is found in the ideological fundaments the models build on. The PHI operates on a belief of the importance of personal responsibility for moral well-being. Unearned rewards are therefore seen as weakening the motives, which assures economic well-being. The NHS and SHI do not link economic failure with moral depravity in this way. The importance of personal responsibility does therefore triumph over the equality of opportunity that the SHI and NHS focus on (Maynard 2013 p. 1106-1107).

In regards of equity, one should still expect small differences between the models. The main argument for equity is operating with a security net, and in this regard all three systems would perform similar. This is despite the overlap between the topic of universalism, since a security net is a looser term than universal coverage, and does not necessarily require coverage of all essential needs.

2.7.3 Quality and Quantity of Services Provided

The problems with measuring health systems impact on mortality from cardiovascular diseases on the base of equity, is the fact that full equity exists if everyone is equitably worse of. The absence of avoidable differences does not automatically mean that the services provided are of high quality, or that the quantity of services is sufficient to cover all cardiovascular health concerns. This also overlaps with universal coverage, since a certain quantity of services must be provided to meet requirements in the definition, and would therefore also have political implications in the countries were the government decide which services that should be covered. Access to services of essential needs does not, however, imply much about the quality of these services. Moreover, it is important to note that the causal chain presented below does not debate if a high quantity, for instance, affect the quality of services negatively. The causal chain applies when both the quality and the quantity of services are at a high level.[8]

[8] One should note that stressing the quality of services as a problem is of little use if providers cannot find a low cost way provide services of high quality. See Øvretveit (2002) for further detail.

Figure 2.3: Causal Chain of High Quality and Quantity of Services on Cardiovascular Mortality.

There are several concerns in this debate. Firstly, it is difficult to decide on which quantity of health care services that are essential to good health. This issue is of highest importance in the NHS, since it is up to the government to decide on what services should be offered. Most systems, however, cover a wide range of services (Sharp et al. 1994 p. 250). As societal norms change, it is far from obvious where to draw the line between "frivolous" and essential health care needs (Pontusson 2005 p. 188). This is shown in the models where the PHI believes that the individuals themselves knows best what kind of welfare they need, and a market approach to health argues therefore that the services offered are the services needed. The NHS and SHI, on the other hand, argue that individuals do not know what welfare they need when they are sick (Maynard 2013 p. 1109), and other instances should therefore decide on which services to provide.

It has further been argued that the NHS system and quality of care is incompatible (Seipel 2013 p. 56). Providing a wide range of health care for all citizens requires a strong financial commitment to having high taxes (Armstrong et al. 2011 p. 313). Additionally, the NHS could never meet the demands for health care conceivable in a consumer market. This is because as the patients climb up the socioeconomic ladder, the demand for service rise, and patients expect more treatment than what is sometimes provided (Hart 2006 p 7). Additionally, as new forms of treatment and new technology are available, the expectations of the health care system increase. This has implications for the funding. In Sweden, for instance, the health care system is not sustainable without a further rise in tax levels, and even government officials acknowledge that taxes are at the maximum and cannot go higher without repercussions (Armstrong et al. 2011 p. 314). Given the ageing of the population, this is a severe challenge to the NHS model. At the same time, as people with less severe conditions seek treatment, waiting times will rise even further than the current level, and the only way of reducing wait times is by increasing taxation[9] (Armstrong et al. 2011 p. 9). Both the ageing of the population and higher demands of what the

[9] It is possible to speculate about developing more effective ways of treatment, or developing more cost-effective methods, but this debate falls outside the scope of this thesis.

system can offer is therefore challenging to the financing of the NHS model. It appears difficult, if not impossible, to limit the annual increases in health care costs while at the same time providing a high quality and quantity of services (Sharp et al. 1994 p. 249).

A backside of high taxes is the danger of young college graduates and other workers to lose motivation to work, or seek careers outside the country (Armstrong et al. 2011 p. 314). If this is the case, the best doctors might leave the country if offered jobs in countries with lower tax levels. This hypothetical scenario would naturally lead to lower quality of services. Additionally, if it is possible for high-income earners to seek treatment outside of the system, their willingness to pay taxes, which support the system, are bound to diminish (Pontusson 2005 p. 189). Across the OECD, about 15 percent of all tax revenue is devoted to health care. This proportion is steadily increasing, and varies among the members. The distribution of tax revenue through health care requires much regulation. This is regulation of provider prices and organizations, but also a regulation of quality (Glied & Smith 2011 p. 61). This is in many ways a debate about the sustainable development of the system, and having to rely on the general revenue is a challenge for the future of the NHS. Even though the SHI leaves room for public funding, it does not compete directly for a share of the public budget like the NHS does (Normand & Weber 2009 p. 25), and the challenge is therefore somewhat diminished.

Taxes and public spending is a clear advantage of the PHI model in regards of sustainability. Additionally, the private sector may have the ability to find more approachable and efficient answers to policy challenges facing health systems, and could possibly permit governments to cut public health sector costs (OECD 2004 p. 170). The underlying argument for using PHI is precisely that the market is best at finding solutions (Birn et al. 2009 p. 540). The problem is that the assumption of the price of a service being determined by demand for that service, does not necessarily apply to health care. Firstly, the patient cannot control when or how to purchase services (Birn et al. 2009 p. 541). Consumers are probably less informed about medical services than about anything else they buy (Sharp et al. 1994 p. 235). At the same time, once the decision of entering the health care system is made, the patient does not have control of further costs, since the physician controls the medical decisions because of her specialized knowledge. In a way, suppliers can therefore create their own demand (Birn et al. 2009 p. 542). A continuing of this information gap is not sustainable. An established function of government in health care has been to redress information gaps through regulatory action. The complexity of biological processes means that consumers face very high information costs in assessing the health

implications of various goods and services, and may be vulnerable to undue influence from providers (Glied & Smith 2011 p. 59). These information asymmetries remain, despite efforts to improve public understanding of health (Normand & Weber 2009 p. 25).

If government regulations do diminish the quality of care, the NHS model is expected to perform poorer than both the SHI and PHI. The PHI, for instance, view profit as an effective way of motivating suppliers to respond to demanders needs (Maynard 2013 p. 1108). On the other hand, the two models often limit health care supply, including the provision of some kinds of care, only to specific age groups. For instance, in Minnesota health insurance could be denied due to preexisting conditions. This is, on the other hand, eliminated in the Affordable Care Act (Health Reform Minnesota 2014). This type of problem is typically overlooked or minimized in NHS systems (Ferguson & Leistikow 2000 p. 14).

As previously mentioned, the NHS, but also the SHI struggles with long waiting lists for health services. This is a torn in both the quality and quantity of care. The PHI, on the other hand, is a way to increase system capacity (Colombus & Tapay 2004 p. 7). This is because of the above-mentioned motivation of profit and the strong incentives suppliers have of adopting least-cost methods of provision (Maynard 2013 p. 1108). When it comes to productivity and system capacity, the PHI system has often financed the delivery of larger treatment volumes by offering higher payments to providers. Financial incentives linked to payment mechanisms exert a direct impact upon doctor's productivity (OECD 2004 p. 178). This is also the case for the SHI, where the autonomy of providers and the development of explicit purchasing arrangements are measures that are used to increase the efficiency in the health care system (Normand & Weber 2009 p. 28-29).

Logically, the doctors in the PHI should therefore have incentive to treat more patients compared with the NHS, which would again lead to a healthier outcome. Based on this logic the doctors would additionally have initiatives to treat patients at and early stage, since preventive care is less expensive. At the same time, varying amounts of money charged for health services, in the PHI, may go to purposes having no health benefit at all. According to insurance companies, separating clinical decisions from financial considerations means physicians have little incentive to save. In fact, they may have strong motivations for overuse and 'provide a maximum level of services.' The policies of the health insurance funds are therefore important in controlling direct expenditures (Birn et al. 2009 p. 542). Some medical procedures are patently

useless, others surely dangerous. Evidence show that in the U.S. heart attack patients is almost eight times as likely to undergo coronary-artery bypass surgery compared to their Canadian counterparts. There are, however, no differences between the patients in long-term outcomes (Birn et al. 2009 p. 543). The study, however, does not take lifestyle factors into account, and there is neither any information provided about the patient's health status before the surgery was performed.

These wasteful initiatives that exists in the PHI is absent in both the NHS and SHI. The SHI can actually help to increase patients' rights as clienteles of health care providers. The transparency of prices, costs & expenditure is also greater compared to the PHI (Normand & Weber 2009 p. 28). So even though the SHI to some extent struggle with waiting lists, the system do benefit from the positive effects of operating with insurance schemes. The effect of health insurance is, overall, to move consumers down their respective individual demand curves, resulting in an increase in market demand, that is, an increase in the quantity demanded at any given price (Sharp et al. 1994 p. 256).

On the other hand, the SHI model does face some issues. In the polish case discussed in Chapter 7, for instance, there are several limitations to services due to low funding of the sector. It also struggles with conflicts against low salaries of young doctors and nurses in combination of weak governance within the sector (Golinowska & Kozierkiewicz 2008 p .84). This is mainly a specific problem linked to Poland, but the system does not offer mechanisms to capture such problems. The SHI may also require more administrative effort to register workers in the informal sector and to collect contributions from them (Normand & Weber 2009 p. 29).

Additionally, the PHI, as operationalized in the United States, experiences an uneven quality of health care distribution. The poor and minorities have problems with gaining access to health care, and when they do, the services provided are not always of a high quality (Seipel 2013 p. 55). The role of third party actors might also offer some issues for the PHI. For instance, the health care industry and providers of health care have delivered amazing technological advances, but are also distinctively powerful interest groups. There are often formidable pressures to adopt new technologies before proper evaluation is possible (Glied & Smith 2011 p. 1). In regards of quality and quantity, the SHI is therefore expected to be the most favorable model.

2.7.4 Hypotheses

The discussion above examines the universal coverage, equity and quality and quantity of services provided in the NHS, SHI and PHI. The NHS, closely followed by the SHI is theoretically supposed to perform better than the PHI, in regards of universal coverage. The two other discussions overlap with this discussion, and the disadvantage of the PHI is therefore further strengthened.

The first hypothesis of this thesis is therefore:

H_1: *The NHS and SHI have lower cardiovascular mortality rates than the PHI.*

There are however differences between the NHS and SHI. Even though the SHI might not implement universal coverage immediately as the NHS does, this is not a major concern in the sample of this thesis. The models are therefore expected to offer similar levels of universal coverage. At the same time, all models are expected to perform similar in regards of equity. Given the problems the NHS face in the competition of resources from the national revenue, combined with the positive effects of operating with an insurance scheme, the SHI should therefore have some benefits when compared to the NHS.

The second hypothesis of this thesis is therefore:

H_2: *The SHI performs somewhat better than the NHS in the OECD countries.*

These hypotheses will be tested through the regressions run in Chapter 5.

3 Data and Operationalization

This chapter presents the data used in this thesis, and explains how the different variables are operationalized.

3.1 Sample

The sample consists of the OECD-countries, and they are studied in the time period 1960-2011. There are several exceptions from this rule. Due to lack of data on the dependent variable, Turkey is not included in the regressions. Some of the countries have undergone major changes between 1960 and 2011. Germany was separated in two countries until the reunification in 1990. Estonia, on the other hand, were part of the Soviet Union until 1991, just as Slovenia was a member of Yugoslavia until 1991. Czech Republic and Slovakia, on the other hand, were one country, Czechoslovakia, until 1992.This has impact on the availability of data for the separate countries, which will be discussed later in this chapter. The OECD's data for Israel is collected by the Israeli government and does not position on the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank.

3.2 Dependent Variable

The dependent variable of this study is mortality from cardiovascular diseases (CVD). Cardiovascular disease is a broad term, which covers pathologic processes affecting the entire arterial circulation. This means that many different diseases such as stroke, transient ischemic attacks, angina, myocardial infarction, and critical limb ischemia are defined as CVDs (Wilson & Douglas 2013). This study operates with four variables to measure the mortality caused by CVDs. These are mortality from diseases of the circulatory system, mortality from ischaemic heart disease (IHD), mortality from acute myocardial infarction (AMI) and mortality from cerebrovascular disease. All four variables are collected from OECD's own statistical database (OECD Stats undated), and measured in number of deaths per 100 000 population. This is an age-standardized rate, where 2010 is used as the reference population. The computing of the rate can be found in appendix 3 together with an overview of break in series of each of the OECD countries. The OECD classifies the variables using the International Classification of Diseases (ICD) system, and a full overview of the coding is provided in appendix 2.

The first variable, mortality from diseases of the circulatory system, includes all diseases in the circulatory organs, which is the heart and the vessels. This is a broad definition of cardiovascular diseases.[10] The definition covers all major cardiovascular diseases, and would, for instance, consist of coronary heart disease, which is the most common cardiovascular disease, but also of stroke and other diseases related to the heart and the veins. IHD and stroke were responsible for most of the mortality due to cardiovascular diseases in 2009 (García-Armesto et al. 2010 p. 15), and half of the cases of CVDs are in the ischaemic heart disease category (Wilson 2014). Using such a broad definition would therefore be a solid approach, since it would contain all major diseases, and thereby also the largest budgetary expenses.

Mortality from ischaemic heart disease[11], which forms the basis of the second measure, is diseases of the blood vessels supplying the heart muscle (WHO 2013). IHD is manifested by myocardial infarction, angina pectoris, hearth failure and coronary death (Wilson 2014). The third variable, mortality from Acute Myocardial Infarction, more commonly known as heart attack, is therefore a subcategory of ischaemic heart disease. To classify as myocardial infarction the blockage must occur in one of the arteries of the heart muscle itself – a coronary artery. All ischaemic heart diseases are the result of the oxygen carried in the blood being inadequate to sustain muscle. Muscle has a very high metabolic rate and oxygen demand, and requires a lot of blood. Ischaemic can loosely be translated to 'not enough blood' (Des Moines University undated). In 2009, IHD alone was responsible for an average of 15% of all deaths in OECD countries (OECD 2011 p. 28). These two variables capture the single largest group of cardiovascular diseases, and the results from regressions using these two measures would therefore have strong concept validity.

The fourth variable used to measure cardiovascular mortality is mortality from cerebrovascular disease. This is diseases of the blood vessels supplying the brain (WHO 2013), and is manifested by stroke and transient ischemic attack (Wilson 2014). Using these four variables will therefore provide a solid concept validity of CVDs.

Even though diseases of the circulatory system offer the broadest measure of cardiovascular mortality, it is not said that the results from this regressions is the best measure on the impact of

[10] There are also other cardiovascular diseases, not included in the ICD codes used as definition of diseases of the circulatory system. These illnesses, however, is not a direct cause of mortality. See Folkehelseinstituttet (2014) for further information.
[11] Ischaemic heart disease can also be labeled coronary heart disease (Kannam, Aroesty & Gersh 2014).

the models. The main risk factors for cardiovascular diseases that can be treated or prevented by the different health care systems are obesity, high blood pressure, diabetes and raised lipids. Other risk factors, such as an unhealthy diet and physical inactivity, usually show up in individuals through these four factors (WHO 2013). In regards of ischaemic heart disease, 90% of events occur in individuals with at least one risk factor present (Wilson 2014). Having lower mortality rates therefore indicates that the system additionally is good at preventative measures. At the same time, given the high amount of behavioral choices, the health care financing models explanatory power over cardiovascular mortality should be highest in regards of mortality from acute myocardial infarction, precisely due to the acuteness limiting the long-term explanations. This is also the case when viewing the system changes in Spain and Poland, and is due to the acuteness of treatment.

3.3 Independent Variable

This study operates, as discussed, with three main health care financing models, the NHS, SHI and PHI, and the regressions are additionally run with a fourth category to control for the communist model (CHS) used in some of the countries up until the 1990s. The regressions with three categories are referred to as Model 1, while the regressions with four categories are referred to as Model 2.

Most studies on health care financing do operationalize the countries into the three different systems. The problem is, that very few articles puts the systems into a historic context, and often studying cross sections at only one point in time. It is therefore difficult to find a throughout list of the historic development of the models in OECD countries that covers the entire epoch from 1960 to 2011.

Saltman, Busse & Figueras (2004) have categorized almost all the European countries for the time period of research. Compared to major scholarly writings, the citation rate is modest, but this seem to be the case for all similar articles. The questions about this source' reliability, on the other hand, is not urgent, given the fact that it is published in cooperation with the WHO, on behalf of the European Observatory of Health Systems and Policies. Additionally, there is an advantage to use a source that have operationalized many countries, since this would create a consistency in the logic behind the categorizations, which again would lead to higher reliability of the operationalizations in this thesis.

The categorizations of Canada, the U.S., Mexico, Chile, Korea[12] and Japan is found in Carrin's book *Health Systems Policy, Finance, and Organization* (2009). This book additionally indicates that there have been no major changes in health care financing models in later years. Saltman, Busse & Figueras operationalizations from 2004 are therefore still valid. There are neither any changes in later years, to the author's knowledge at least.

New Zealand & Australia are categorized by Blank & Burau (2010). This is a textbook in comparative health care policy, and has similar citation rates as the previous works. For the three remaining countries, Slovenia, Israel and Turkey, the thesis has turned to the *Health Systems in Transition* series. These are indebt analysis of the different countries conducted by the WHO.

Table 3.1 Operationalization of the Independent Variable

Country	Source	Model 1			Model 2			
		NHS	SHI	PHI	CHS	NHS	SHI	PHI
Australia	Blank & Burau 2010 p. 73	1960-2013				1960-2013		
Austria	Saltman, Busse & Figueras 2004 p. 26		1960-2013				1960-2013	
Belgium	Saltman, Busse & Figueras 2004 p. 26		1960-2013				1960-2013	
Canada	Carrin 2009 p. 150	1960-2013				1960-2013		
Chile	Carrin 2009 p. 217		1960-2013				1960-2013	
Czech Republic	Saltman, Busse & Figueras 2004 2004 p. 3	1960-1991	1992-2013		1960-1991		1992-2013	
Denmark	Saltman, Busse & Figueras 2004 p. 26	1973-2013	1960-1972			1973-2013	1960-1972	
Estonia	Saltman, Busse & Figueras 2004 p. 3	1960-1991	1992-2013		1960-1991		1992-2013	
Finland	Saltman, Busse & Figueras 2004 p. 26	1960-2013				1960-2013		
France	Saltman, Busse & Figueras 2004 p. 26		1960-2013				1960-2013	
Germany	Saltman, Busse & Figueras 2004 p. 26		1960-2013				1960-2013	
Greece	Saltman, Busse & Figueras 2004 p. 26	1983-2013	1960-1982			1983-2013	1960-1982	

Table 3.1: Continues on page 31.

[12] Korea refers in this thesis to the Republic of Korea and not the Democratic People's Republic of Korea.

Hungary	**Saltman, Busse & Figueras 2004 p. 3**	**1960-1988**	**1989-2013**		**1960-1988**	**1989-2013**	
Iceland	Carrin 2009 p. 150	1960-2013			1960-2013		
Ireland	Saltman, Busse & Figueras 2004 p. 26	1960-2013			1960-2013		
Israel	Rosen & Merkur 2009 p. 42	1995-2013	1960-1994		1995-2013	1960-1994	
Italy	Saltman, Busse & Figueras 2004 p. 26	1973-2013	1960-1972		1973-2913	1960-1972	
Japan	Carrin 2009 p. 150		1960-2013			1960-2013	
Luxembourg	Saltman, Busse & Figueras 2004 p. 26		1960-2013			1960-2013	
Mexico	Carrin 2009 p. 218		1960-2013			1960-2013	
Netherlands	Saltman, Busse & Figueras 2004 p. 26		1960-2013			1960-2013	
New Zealand	Blank & Burau 2010 p. 17	1960-2013			1960-2013		
Norway	Saltman, Busse & Figueras 2004 p. 26	1967-2013	1960-1966		1967-2013	1960-1966	
Poland	Saltman, Busse & Figueras 2004 p. 3	1960-1998	1999-2013	1960-1998		1999-2013	
Portugal	Saltman, Busse & Figueras 2004 p. 26	1979-2013	1960-1978		1979-2013	1960-1978	
Republic of Korea	Carrin 2009 p. 229		1960-2013			1960-2013	
Slovak Republic	Saltman, Busse & Figueras 2004 p. 3	1960-1993	1994-2013	1960-1993		1994-2013	
Slovenia	Albreht et al. 2009 p. 37	1960-1991	1992-2013	1960-1991		1992-2013	
Spain	Saltman, Busse & Figueras 2004 p. 26	1986-2013	1960-1985		1986-2013	1960-2013	
Sweden	Saltman, Busse & Figueras 2004 p. 26	1960-2013			1960-2013		
Switzerland	Saltman, Busse & Figueras 2004 p. 26		1960-2013			1960-2013	
Turkey	Tatar et al. 2011 p. 37		1960-2013			1960-2013	
United Kingdom	Saltman, Busse & Figueras 2004 p. 26	1960-2013			1960-2013		
United States	Carrin 2009 p. 227			1960-2013			1960-2013

Table 3.1: Overview of the categorization of OECD-countries on the independent variable. The table shows the operationalization both Model 1, with three categories, and Model 2, with four categories.

The manual scoring of the independent variable was done with high precision, and the reliability is therefore considered high. The low variety in sources used in the operationalization contributes to a heightening of the concept validity, since it limits the possible variation between different scholars definitions. There may, however, be a poor link between definition and operationalization for any one scholar. This is often considered the most important threat to validity. Despite this, the validity and reliability of the operationalization of the independent variable is considered high.

3.4 Control Variables

There are five main control variables in this study, which cannot be explained by actions within the different health care financing models. This is important because operating with control variables that potentially correlate with the health care system would create a bias in the sample, since they could affect mortality through the health care model itself. By excluding control variables, such as cholesterol levels or high blood pressure, one would therefore avoid post-treatment bias. The control variables used are age, alcohol consumption, GDP, tobacco use and regime type.[13] These are all variables that the health care models do not directly influence through medical treatment, but they could all possibly affect cardiovascular mortality. This is discussed in the below.

3.4.1 Age

Despite the dependent variable being an age-standardized rate, the effect of age on cardiovascular mortality is so important that the regressions are run with a control of how large percent of the people in the population that are above age 65. The majority of people affected by cardiovascular diseases are somewhere in their 60s, and the risk increases with age (Wilson 2014). This is the case for both men and women (Jousilahti et al. 1999 p. 1165). This is mainly because veins become firmer as a person age, and it is therefore harder for blood to flow easily through them. Additionally, fatty deposits collect along the artery walls throughout life, and this would further slower the blood flow (Resnick 2014).

[13] The causal chain of gender and cardiovascular mortality is not clear. Sex is therefore not used as a control variable. This is mainly due to the similar levels of mortality in pre-menopausal women, and much of the assumed effect on sex would therefore be controlled for through the age-variable (Jani & Rajkumar 2006 p. 359). At the same time there is not a common understanding of estrogen levels impact on cardiovascular health (Jousilahti et al. 1999). More medical research must therefore be provided before sex is submitted as a control variable. As of for now, it would not be clear what effect the variable would explain, and it is therefore not included.

3.4.2 GDP

Income level, operationalized by GDP per capita[14] is also an important control factor One reason for this is that it is difficult to manage your health if you are worried about putting food on the table or paying your rent (Stulberg 2014). Access to money therefore determines your level of stress (Kadlec 2012), which is an important determinant of health. Lower socioeconomic status is also correlated with greater risk of health problems (Clay 2001). Since this thesis view health as a measure of mean mortality rates throughout the population, GDP would be the most accurate measure of wealth. GDP per capita is not expected to be affected by the choice of health care financing system.[15]

3.4.3 Alcohol Consumption

Operating with a control variable for alcohol consumption is problematic, due to the fact that moderate consumption has a protective effect in regards of cardiovascular diseases, while binge drinking is a major risk factor (Wilson 2014). Heavy drinkers, for instance, have an increased risk of cardiovascular death compared to moderate consumers. At the same time, moderate consumers have a lower mortality rate than abstainers (BMJ 1991). The variable used here measures liters of consumption, and does therefore not contain a control of consumption pattern. Additionally, there are several hypotheses about the positive benefits of wine consumption. This is, on the other hand, problematic to conclude on, since specific types of alcoholic drinks are associated with differences in patterns of drinking (BMJ 1996). In any case, alcohol consumption may be a relevant control variable and is therefore included in the regressions.

3.4.4 Tobacco Use

Tobacco use is one of the main risk factors for developing a CVD (Wilson 2014), and the control variable is therefore included in the regressions. The reason why smoking affects cardiovascular mortality, is due to the vascular calcification, modification of the lipid profile, thrombosis and inflammation that tobacco use causes (Hirooka et al. 2013 p. 119). It does not take very large doses of tobacco to increase the risk of, for instance, AMI. Tobacco use additionally increases the risk of sudden cardiac death, stroke and several other cardiovascular diseases (Bullen 2008 p. 883).

[14] Measured in constant 2005 U.S. dollars.
[15] It can be argued that improving health raises GDP by raising workers productivity. At the same time, improving health may have negative economic effects by, for instance, demographic dynamics. GDP could therefore be an endogen factor of health care. See Acemogly, Rogoff & Woodford (2009) for further details.

3.4.5 Democracy

Baum & Lake[16] (2003) argue that democracy is an important determinant of public health. More democratic states tend to provide higher levels of public health, as measured by a variety of output indicators including infant mortality, life expectancy, and immunizations. Democratic governments take responsibility for the overall level of public health and regulate private providers to ensure that outcomes fall within politically acceptable limits. As the base of political participation expands, citizens often demand improved health care (Baum & Lake 2003 p. 336-338). This is supported by Wigley & Akkoyunly-Wigley (2011 p. 649) who argue that democratic societies are healthier because elected representatives must satisfy a wider range of supporters. Health services must therefore reach a broader range of the population.

The democracy variable is classified by Cheibub, Gandi & Vreeland (2010). The main characteristics of a democracy in this operationalization are that the executive selection is not directly elected, there is election of the legislature, and multiple parties are legally allowed. In regards of parties, there must also exist parties outside the regime front, and elections are contested. It is important to note that Czech Republic and Slovakia share the coding of Czechoslovakia from 1960-1992. Estonia is included from 1991, and the thesis has used the classification of U.S.S.R. between 1960-1990. Germany is coded from 1990 in the dataset, and the thesis has used the values of West Germany up until then. For Slovenia, the values of Yugoslavia are used between 1960-1990. The main control variables are listed in the table below:

Table 3.2: Control Variables

Variable	Label	Code	Source	Missing
Age	Population ages 65 and above, % of total population	POP65	The World Bank (undated a).	0
GDP	GDP per capita measured in constant 2005 US$	GDP	The World Bank (undated b).	236
Alcohol consumption	Alcohol consumption, measured in liters per capita aged 15 and above	ALCL	WHO (undated c).	216
Tobacco use	Percent of population aged 15 and above who are daily smokers	POPSMOKE	WHO (undated c).	1151
Democracy	Dummy variable if democratic according to definition given in the source	Democracy	Cheibub, Gandhi & Vreeland (2010).	0[17]

Table 3.2: Overview of the control variables used in the regression models in Chapter 5, with variable name, label, code, source and number of missing values.

[16] Baum & Lake (2003) builds on Lake and Baum (2001).

[17] The data from Cheibub, Gandhi & Vreeland does not have values for 2009-2011. I have therefore coded all OECD-countries as democracies in these three years, to reduce the amount of missing data. The only OECD-country this might be problematic for is Turkey, but Turkey is not a part of the sample. There could also be issues regarding for instance Mexico and some of the eastern European countries, but given that they were granted status as democracies in 2008, I do not find it in contrast to the coding given by Cheibub, Gandhi & Vreeland.

The thesis therefore operates with these five control variables, which are not expected to be affected by the choice of health care system.

4 Research Design and Method

"The content of "science" is primarily the methods and the rules, and not the subject matter, since we can use these methods to study virtually anything"
(King, Keohane & Verba 1994 p. 9).

This chapter presents the research design of the thesis, and the methods that are used to give an answer to the research question. This study combines cross-national statistical evidence with two illustrative case studies. The case studies regards Poland and Spain, which have both changed financing model under the period of study. They should therefore be able to provide more in-debt information about the results from the regressions. Qualitative and quantitative research designs in the social sciences should arguably be viewed as complementary, instead of competing approaches when choosing a research design. Both approaches have individual strengths (King, Keohane & Verba 1994 p. 3), and the combination of methods is therefore considered a solid framework for answering to what extent the NHS, SHI and PHI affects mortality from cardiovascular diseases.

First, the theory behind the statistical model will be explained. The chapter will then move on to discussing methodological issues, such as fixed effects and missing values. Finally, the theory behind case studies will be presented.

4.1 Time-series cross-section

4.1.1 OLS with PCSE

This section gives an introduction to the theory behind OLS with PCSE, the main estimation technique used in Chapter 5. The method used in this thesis rests on Beck & Katz' (1995) understanding of time-series cross-section (TSCS) data. The format of the TSCS data is characterized by a repeated number of observations on different cross section units, as the values of cardiovascular mortality on OECD countries between 1960-2011 are. The time period is considered to be relatively long, since it covers 51 years.

The reason why the use of OLS is problematic in TSCS data is due to temporal and spatial properties in the error terms. The method presented in Beck & Katz takes account for this large

number of parameter errors that is present in TSCS, while keeping the parameter estimate from OLS. The interpretation of the results would therefore be as in OLS regressions. This is because the OLS standard errors are replaced by panel-corrected standard errors (Beck & Katz 1995 p. 634). OLS with PCSE additionally allows for the estimation of coefficients in unbalances panels, as there is in this study, and takes the possibility of differences in the variance of the error terms (i.e. heteroskedasticity) for the different panels into account.

4.1.2 Prais-Winsten

The particular model used is called Prais-Winsten[18], and can be found in Prais & Winsten (1954). Prais-Winsten is basically a transformation of the values, so that the OLS regression would be appropriate. More technically, this procedure allows, in theory, the estimated rho-coefficients to be consistent with the assumption for parameter estimates across the countries. This would then again lead to a higher precision of the estimates, because the numbers of observation that could contain errors would be limited (Feng 2004 p. 274). Prais-Winsten estimators are therefore also referred to as Nonlinear Least Squares estimators (Ostrom 1990 p. 34).

4.2 Methodological Issues

Even though the overall research design of this thesis is solid, there are mainly four methodological issues, namely omitted variable bias, measurement error, missing values and fixed effects. This is elaborated in this section.

4.2.1 Endogenity and Omitted Variable Bias

There are no clear theoretical indications of the dependent variable of this thesis affecting the core independent variable. Hence, the direction of the causal chain should be fairly straightforward. The most plausible endogenity problem is if countries with high cardiovascular mortality rates, for instance, all change to the same financing model because it is believed to improve the mortality statistics. This hypothesis, however, have not been explored in the theory on health care models, at least to the authors knowledge, and more research must be provided before this possible problem of endogenity could be further elaborated. Endogenity problems would therefore be linked to factors correlating with the dependent variable that is not adjusted for in this thesis. Normally, endogenity is quite difficult to test for, and here the inferences are

[18] If the reader is familiar with the Cochrane-Orcutt Estiamtion, Prais Winsten additionally use the equation for the first time period (Wooldridge 2013 p. 846).

based on assumptions about what the plausible causal relationship underlying a potential correlation could be. This means that a correlation between health care system and CVD mortality should come from the former causing the latter, controlling for the variables entering the regression models. If there are endogenity issues to the relationship investigated in this thesis, the causal conclusions drawn could be invalid.

Another similar issue is omitted variable bias, which is the possible existence of a variable that affects both the core independent variable (x) and the dependent variable (y). In regards of omitted variable bias, there are potentially a number of factors that could underlie such bias. For instance, stress is one factor that could impact both x and y. This can be illustrated by having a wider institutional model with weaker safety nets as an omitted variable that could affect both the choice of PHI as financing model, but also CVD mortality by potentially increasing stress levels in the society as a whole. The issue with such problems is that stress related topics is not necessarily linked to the health care financing models, but to country specific factors, such as labor market policies or equality between sexes in regards of work around the house, or pressure of providing for a family. The causal conclusions from this thesis are therefore not considered extremely threatened by endogenity or omitted variable bias, even though there would always be problematic to guarantee the non-existence of these problems.

4.2.2 Measurement Error in the Variables

The possibility of measurement error is always a challenge in quantitative research. In regards of the data collected from the OECD, The World Bank and WHO, one should assume that the countries have different routines for reporting the causes of death, or other measures such as tobacco use or alcohol use. This, however, is not possible to account for in this thesis, and there is good reason to suppose that the OECD, The World Bank and WHO presents reliable statistics.

In the classifications of the health care systems measurement errors are present if a country is wrongly operationalized into a category. The two main areas of concern in this regard are the former communist countries, but also Switzerland. Switzerland is sometimes characterized as using the PHI model up until 1996 (Cheng 2010 p. 1442). The thesis has solved this potentially methodological problem of measurement error by running the regressions with alternative operationalization to test the robustness of the main model.

Additionally, as mentioned in Chapter 2, most countries operate with some degree of a hybrid model. Degrees of model use could have impact on the conclusion, for instance, if the private health care accounts for a large share of the SHI or NHS, more affluent people could opt out of the system, and receive possible higher quality treatment in a private facility. If this is a common tendency, it would lead to a lower overall mortality rate, which would show itself as a result of the main model, but would actually be due to the hybrid characteristics.

A similar problem regards the previously explored issues of path dependency. If the countries, which change model during the period of study, systematically keep features from the old model within the new, one could experience serious issues with measurement error in regards of the existence of what would in practice resemble a hybrid model.

Hybrid models are not taken account for in this thesis due to the scope of the project. Classifying the countries into different degrees of models would be a project in itself. The issue would neither be solved by controlling for a dummy of whether or not a hybrid model exists, since the degree of use would be essential for drawing conclusions. This could have implications for the validity, but since this thesis aims at explaining to what extent the main model used affects cardiovascular mortality, the issue with hybrid models is somewhat reduced.

4.2.3 Missing Values and Interpolation

Some of the variables used in the analysis contain missing values. This particularly applies to the variable of acute myocardial infarction, which starts in 1980. There are also issues with missing values on the control variables, especially the control for tobacco use. Descriptive statistics of all explanatory variables are presented in table 4.1.

Table 4.1: Descriptive Statistics for All Variables					
Variable	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
Diseases of the circulatory system	1478	572.543	243.461	170.7	2325.8
Ischaemic heart disease	1478	234.601	134.002	9.2	756.8
Acute Myocardial Infarction	925	99.347	56.160	7.5	302.7
Cerebrovascular disease	1478	157.031	77.308	40.6	448.7
Age	1716	11.982	3.539	3.307	23.668
Alcohol consumption	1602	10.462	3.916	1.5	26.04
Tobacco use	565	29.805	9.381	13.1	61
GDP	1480	22779.67	14046.57	1467.095	87716.73
Democracy	1716	.823	.381	0	1

Table 4.1: Descriptive statistics of explanatory variables.

Table 4.1 show that the tobacco use variable only have 565 observations. This might create lower significance levels for regressions where this variable is included. This is also a problem in the case of Germany, which lacks data prior to 1990 on the dependent variable, due to OECD not having available data prior to the unification of the country. Similar problems apply to some of the former communist countries, or other countries classified as non-democratic in the period of study.

One method of solving the issue of missing values is by interpolation. This is to estimate the missing values by calculating the average of the values post- and prior in time to the gap. This is a problematic method, since it would assume that none of the missing values differ from the overall trend of the variable. It would also treat these estimates as true values, and one would not be able to know for sure if the results represent the real values. Using interpolation is therefore not a part of the main model, but will be controlled for afterwards to be able to make more solid conclusion about the models robustness.

4.2.4 Fixed Effects

As mentioned, using a fixed effects model is a way of controlling for country-specific factors that are non-observable or in other ways difficult to control for. These effects are constant in time. This could, for instance, apply to cultural differences in regards of eating habits, food quality or general daily routines. OLS with PCSE is an inappropriate model to use when such effects exist. Basically, when using a fixed effects (FE) model one suppose that every country have a fixed,

non-observable constant that is correlated with the other variables in the regression. Fixed effects operates with the following equation:

$$\gamma_{it} = \alpha + \gamma_1 + \Sigma X\beta + \varepsilon_{it}$$

where γ_i is a fixed country specific effect that affects cardiovascular mortality. One of the ways of solving this equation is by adding dummy-variables for all the countries in the sample, except for one country. The dummy d_i, should be equal to 1 for country i, and zero elsewhere. When testing for fixed effects in the data used in this study, one tests if all the coefficients of the dummy-variables equals 0, since that would mean that there is no individual differences. This can be done by an r-squared f-test.

An r-squared f-test compares R^2 for two models, where one has included the fixed effects, and the other has not, to figure out if they are significantly different from one another. This would mean that at least one of the fixed effects regressions equals zero. When creating dummies for all variables minus one, and then running the f-test, the f-value equals 72,85, which mean that there is almost certainly fixed effects present in this thesis. This should therefore be taken into account, so that the estimates on the effect of health care systems gets more precise.

At the same time, by using a fixed effects model, one cannot use any independent variable that does not vary temporally as an explanatory variable (Beck & Katz 2001 p. 492). This is because FE cannot be calculated when the variable under research does not change over time, since the estimator would not be identified. This is, for instance, the case for the PHI model in this study, and there is also very little variation on the other health system dummies. Countries change their health system quite infrequently, and this makes it difficult to investigate changes over time while controlling for country-specific factors. Using a fixed effects model might also lead to many parameters to estimate, which would make it difficult to reveal any other possible effects.

An alternative would be to use fixed effects vector decomposition (FEVD) models, which would take into account that health care systems are slow moving. Given the data used in this thesis, the OLS with PCSE would be just as good, since the FEVD model would create such a high number of estimates, which would make it hard to separate them from each other and draw a conclusion. This would therefore only create different methodological problems, and a FEVD model will not be used.

Fixed effects are therefore not used as the main model, but given the above-mentioned high f-value a FE-model would be used as robustness test for the results.

4.3 Case Studies

This study performs, as mentioned, two case studies. These regard the change of health care model in Poland and Spain. Using a country as a case makes the external boundaries clear, and it is possible to draw conclusions of whether or not the model change affects the cardiovascular mortality rate (Gerring 2007 p. 19). The cases have been chosen to make an in-debt addition to the findings from the quantitative analysis. Both countries have, as mentioned, changed model during the period of research, which makes an effect on cardiovascular mortality, or lack thereof, much more illustrating than the regressions does. The advantages of including case studies are additionally that they often focus on information that might otherwise be ignored. The in-debt analysis goes beyond the ordinary descriptions, and highlights reasons behind the possible changes. The politics of health care finance is usually as complex as the structures which function within them. In this regard, the case studies can serve to remind researchers of the complexity of the political world (McNabb 2010 p. 105). This is found especially beneficial in order to achieve the necessary level of detail and depth to explore the relatively understudied topic of this study.

There are some methodological issues concerning the conclusions one can draw from single cases. Rueschemeyer (Mahoney & Rueschemeyer 2003) is skeptical of what he considers the most conventional view of single case studies, namely that the only theoretical outcome would be hypothesis generation that can be tested in more numerous cases. Even though one can draw conclusions of how the models affected cardiovascular mortality in Spain and Poland, there is no guarantee that these conclusions can be generalized. The external validity of a case is therefore not as high as its internal. On the other hand, one can argue that the cases are somewhat representative of neighboring countries, which underwent similar political changes in the time period of study. Operating with countries with similar backgrounds strengthens the external validity of the cases. The main reason behind the case studies is, however, the illustrative effect. Additionally, the political science literature on health care models is narrow, and the possibility of hypothesis generation would therefore be an added bonus to the thesis framework for further scholarly debate.

5 Results

This chapter presents the results from the main OLS with PCSE model, as discussed in chapter 3 and 4. The chapter will then move on to robustness testing of the model.

5.1 OLS with PCSE

As explained in Chapter 4, the main model of regression uses a Prais-Winsten transformation of the data. The coefficients presented in the following tables can therefore be interpreted in the same way as OLS regressions. The broadest measure of cardiovascular disease is, as mentioned, diseases of the circulatory system. This is therefore the first regression presented.

Table 5.1: Model 1 - Mortality from Diseases of the Circulatory System as Dependent Variable

	a **b/t**	**b** **b/t**	**c** **b/t**	**d** **b/t**	**e** **b/t**
SHI	-40.945 (-1.62)	-16.351 (-0.87)	36.771 (0.99)	-21.794 (-1.23)	-21.794 (-1.23)
PHI	-85.512^ (-1.90)	5.551 (0.13)	75.484*** (3.39)	152.455*** (8.64)	152.455*** (8.64)
Age	-28.837*** (-5.82)	-27.973*** (-7.86)	-6.471 (-1.18)	2.696 (0.77)	2.696 (0.77)
Alcohol		5.007* (2.43)	13.995* (2.34)	18.681*** (4.95)	18.681*** (4.95)
Tobacco Use			13.716*** (6.91)	8.743*** (7.75)	8.743*** (7.75)
GDP				-0.008*** (-9.70)	-0.008*** (-9.70)
Democracy					221.139*** (3.73)
Constant	1005.498*** (14.70)	863.817*** (15.53)	52.490 (0.51)	211.139*** (3.73)	
N	1478.000	1428.000	543.000	527.000	527.000

Table 5.1: Regression of diseases of the circulatory system. Column 1 explains which control variable that is included in the different regressions. NHS is used as reference category.
Significance level: ^=0.10, *=0.05, **=0.01, ***=0.001

Table 5.1 illustrates the health care financing models impact on cardiovascular death, using diseases of the circulatory system as measure of cardiovascular disease. When all control variables are included (regression e), countries using the SHI experience approximately 22 fewer deaths per 100,000 people than the countries using the NHS. The SHI coefficient is, on the other hand, not significant at a 0.10 level. One does therefore not have strong enough evidence to keep the hypothesis about the SHI performing somewhat better than the NHS.

In regards of the PHI, on the other hand, table 5.1 shows that when all control variables are included, the PHI accounts for 152.455 more deaths from circulatory diseases per every 100,000, compared to the NHS. This coefficient is additionally significant on a 0.001 level. Based on the results from the regression, there is reason to believe that the NHS and SHI perform better than the PHI, and the hypothesis is therefore kept.

It is also interesting to note that, despite the theoretical assumption about democracy leading to better health, having a democratic regime accounts for approximately 211 more deaths per 100,000 than its non-democratic counterpart. This does, on the other hand, probably correlate with other factors that follows a transition to democracy, and not democracy per se.

As mentioned, some authors categorize Switzerland as using the PHI until 1996. The model has therefore been run with this alternative operationalization to make sure that the main model is robust. When categorizing Switzerland as PHI on the diseases of the circulatory system variable the following coefficients are estimated:

Table 5.2: Alternative Operationalization of Switzerland

	Coef.	Std. Err.	z	P>IzI	95% conf	intervall
SHI1	-24.191	18.661	-1.30	0.195	-60.766	12.385
PHI1	145.107	19.161	7.57	0.000	107.552	182.662
Age	2.719	3.511	0.77	0.439	-4.163	9.601
Alcohol	18.490	3.762	4.92	0.000	11.116	25.863
Tobacco use	8.650	1.124	7.70	0.000	6.447	10.853
GDP	-.008	.001	-10.01	0.000	-.010	-.007
Democracy	221.258	55.263	4	0.000	112.945	329.570
rhos	0	0	0	.601	0	0

Table 5.2: Regression of diseases of the circulatory system with Switzerland categorized as PHI until 1996.

As one can read from table 5.2, the coefficient for the PHI is reduced from 152.455 to 145.107 deaths per 100,000. The coefficient is still significant at a 0,01 level. There is little change in the SHI coefficient. A similar trend is found when running the regression with ischaemic heart disease as dependent variable. All coefficients are almost unchanged when using the acute myocardial infarction and cerebrovascular disease as measure of cardiovascular disease. These regressions can be found in appendix 1. There does therefore not seem to be any notable differences when using the alternative operationalization of Switzerland, and this problem is therefore not elaborated any further.

Diseases of the circulatory system are, as mentioned, a very wide definition of cardiovascular diseases. Three other operationalizations of cardiovascular diseases are therefore used.

Table 5.3: Model 1 - Mortality from Ischaemic Heart Disease as Dependent Variable					
	a **b/t**	**b** **b/t**	**c** **b/t**	**d** **b/t**	**e** **b/t**
SHI	-16.736* (-2.29)	-14.029* (-1.99)	-2.642 (-0.13)	-18.388 (-1.01)	-18.388 (-1.01)
PHI	110-499*** (2.99)	133.820*** (3.36)	112.509*** (6.93)	155.476*** (8.97)	155.476*** (8.97)
Age	-7.845*** (-4.12)	-9.378*** (-5.58)	-3.634 (-1.30)	5.633^ (1.92)	5.633^ (1.92)
Alcohol		0.602 (0.71)	3.844 (1.23)	5.633^ (1.92)	5.633^ (1.92)
Tobacco use			6.827*** (7.23)	5.034*** (5.46)	5.034*** (5.46)
GDP				-0.004*** (-5.75)	-0.004*** (-5.75)
Democracy					73.397* (2.10)
Constant	317.630*** (13.00)	309.099*** (13.45)	29.218 (0.62)	73.397* (2.10)	
N	1478.000	1428.000	543.000	527.000	527.000

Table 5.3: Regression of ischaemic heart disease. Column 1 explains which control variable that is included in the different regressions. NHS is used as reference category.
Significance level: ^=0.10, *=0.05, **=0.01, ***=0.001

The results for ischaemic heart disease, as presented in table 5.3 are very similar to the ones from the overall measure from diseases of the circulatory system. The coefficients for the SHI variable is only significant in regression a and b, but the overall trend is that the countries using the SHI experience fewer deaths than the countries using the NHS. The results are still not significant, so the findings are not clear enough to keep the hypothesis.

In regards of the PHI the coefficient is significant at a 0.001 level, and by accounting for 155.476 more deaths per 100,000 compared to the NHS, the hypothesis of the NHS and the SHI producing lower death rates from cardiovascular diseases than the PHI seem to be accurate in regards of ischaemic heart disease.

Table 5.4: Model 1 - Mortality from Acute Myocardial Infarction as Dependent Variable					
	a **b/t**	**b** **b/t**	**c** **b/t**	**d** **b/t**	**e** **b/t**
SHI	-9.708*** (-2.708)	-12.448*** (-3.50)	-44.424*** (-5.54)	-45.178*** (-5.82)	-45.178*** (-5.82)
PHI	10.669 (1.31)	11.480 (1.46)	16.590** (2.99)	17-507** (2.82)	17.507** (2.82)
Age	-3.816*** (-6.31)	-4.186*** (-6.71)	-4.277*** (-3.86)	-3.880*** (-3.32)	-3.880*** (-3.32)
Alcohol		1.353** (2.98)	7.038*** (5.94)	6.633*** (5.46)	6.633*** (5.46)
Tobacco use			2.358*** (3.76)	2.372*** (3.76)	2.372*** (3.76)
GDP				-0.000 (-0.85)	-0.000 (.)
Democracy					34.591^ (1.74)
Constant	144.179*** (17.37)	136.807*** (19.86)	30.491 (1.45)	34.591^ (1.74)	
N	925.000	910.000	421.000	407.000	407.000

Table 5.4: Regression of acute myocardial infarction. Column 1 explains which control variable that is included in the different regressions. NHS is used as reference category.
Significance level: ^=0.10, *=0.05, **=0.01, ***=0.001

Table 5.4 presents the results when acute myocardial infarction is used as measure for cardiovascular diseases. The results for this regression differ from the two previous operationalizations of CVDs. Firstly, the coefficient for the SHI is significant at a 0,001 level. Based on this, on can therefore conclude that the SHI accounts for approximately 45 fewer acute myocardial infarction deaths per 100,000 compared to the NHS. There is therefore evidence to support the second hypothesis.

Additionally, the PHI performs slightly better in regards of AMI, and accounts for approximately 18 more deaths per 100,000 than the NHS does. This is still a higher death rate than the two other systems, and is therefore compatible with the findings from the two previous regressions.

Table 5.5: Model 1 - Mortality from Cerebrovascular Disease as Dependent Variable					
	a **b/t**	**b** **b/t**	**c** **b/t**	**d** **b/t**	**e** **b/t**
SHI	-5.946 (-1.44)	-3.443 (-0.94)	11.919 (1.36)	-12.995^ (-1.91)	-12.995^ (-1.91)
PHI	-42.125*** (-4.83)	-37.782*** (-3.74)	-24.114*** (-3.97)	-1.249 (-0.24)	-1.249 (-0.24)
Age	-8.067*** (-6.76)	-8.446*** (-8.84)	-2.848* (-2.50)	0.165 (0.16)	0.165 (0.16)
Alcohol		1.566** (3.05)	4.136** (3.09)	6.050*** (6.28)	6-050*** (6.28)
Tobacco use			4.057*** (6.79)	2.308*** (4.49)	2.308*** (4.49)
GDP				-0.003*** (-7.82)	-0.003*** (-7.82)
Democracy					81.153*** (3.35)
Constant	251.005*** (15.95)	237.140*** (16.06)	9.309 (0.37)	81.153*** (3.35)	
N	1478.000	1428.000	543.000	527.000	527.000

Table 5.5: Regression of cerebrovascular disease. Column 1 explains which control variable that is included in the different regressions. NHS is used as reference category.
Significance level: ^=0.10, *=0.05, **=0.01, ***=0.001

The last regressions are run with cerebrovascular diseases as measure of cardiovascular diseases. This is also the operationalization that produces the most differing estimates of the four variables. In regards of the SHI, the coefficient is significant at a 0.10 level, and indicates that the SHI performs somewhat better than the NHS. The coefficient for the PHI, on the other hand, indicates that there is little separating the system from the NHS in regards of cerebrovascular death. The coefficient is not significant at a 0.10 level when all control variables are included, and one does therefore not have strong enough evidence to dismiss hypothesis one.

The overall findings from the OLS with PCSE regressions supports the first hypothesis, and the NHS and SHI seems to produce lower mortality rates from cardiovascular diseases than the PHI. Cerebrovascular diseases stands out, but given the significance levels of the three first regressions, one can safely make this conclusion. In regards of the SHI, the results are more mixed, and it is only AMI and cerebrovascular disease that produce significant coefficients. The overall trend seems, on the other hand, to lean towards the SHI performing somewhat better than the NHS, and both hypothesis is therefore kept.

It is though important to note how small the differences are. Even if the PHI accounts for approximately 155 more deaths than the NHS in regards to diseases of ischeamic heart disease, this is only an increase of 0.16%. This is the highest difference between the two systems. When it

comes to the SHI, on the other hand, the largest significant coefficient is -45.178, and regards acute myocardial infarction. This is an improvement of approximately 0.05%, which is a rather small difference. On the other hand, in matters of life and death, every life saved is a victory, and the absolute numbers should therefore play an important role when concluding on performance between the systems. Additionally, it is important to note that these estimates would represent very different numbers of actual deaths in the OECD countries, given the differences in absolute mortality rates between the countries. This will be further discussed in Chapter 8.

5.2 Communist Model

As mentioned, categorizing Estonia, Poland, Czech Republic, Slovakia, Hungary and Slovenia as using the NHS during the era of communism, is possibly problematic. The following regressions have therefore included the communist models as a fourth category of the independent variable.

Table 5.6: Mortality from Diseases of the Circulatory System as Dependent Variable

	a **b/t**	**b** **b/t**	**c** **b/t**	**d** **b/t**	**e** **b/t**
SHI	44.003** (2.72)	14.936 (1.01)	58.455* (2.04)	-18.825 (-1.04)	-18.825 (-1.04)
PHI	-16.473 (-0.45)	24.693 (0.59)	102.804*** (5.57)	154.155*** (8.64)	154.155*** (8.64)
CHS	224.683*** (3.39)	71.513 (1.44)	923.210*** (2.87)	158.644** (2.81)	158.644** (2.81)
Age	-23.301*** (-4.33)	-25.968*** (-6.57)	-4.977 (-1.05)	2.646 (0.76)	2.646 (0.76)
Alcohol		4.782* (2.33)	15.088** (2.94)	18.873*** (5.05)	18.873*** (5.05)
Tobacco use			13.715*** (7.63)	8.764*** (7.72)	8.764*** (7.72)
GDP				-0.008*** (-10.37)	-0.008*** (-10.37)
Democracy					202.482*** (3.63)
Constant	874.134*** (12.60)	824.198*** (14.08)	-2.129 (-0.02)	202.482*** (3.63)	
N	1478.000	1428.000	543.000	527.000	527.000

Table 5.6: Regression of diseases of the circulatory system using for operationalization of the independent variable. Column 1 explains which control variable that is included in the different regressions. NHS is used as reference category.
Significance level: ^=0.10, *=0.05, **=0.01, ***=0.001

Table 5.6 shows that when operating with four kinds of health care financing systems, the coefficient for the SHI system is still not significant at a 0,10 level. When moving from NHS to PHI, the number of deaths per 100,000 has only changed by 2 values, and PHI answers to 154 more deaths than the NHS. This is interesting since the CHS countries were operationalized as

NHS last regression, and now CHS coefficient shows that the system explains approximately 159 more per every 100,000 deaths from diseases of the circulatory system. The coefficient is significant at a 0,01 level. Overall, the alternative operationalization of the independent variable does not give very different results.

When using the alternative operationalization on the ischaemic heart disease variable, the coefficients for the SHI and PHI system are approximately identical. The communist model does, on the other hand, reduce the death rate by 145 deaths per 100,000. So far, this model is therefore very varying when it comes to cardiovascular diseases in the communist system, and much could probably have to do with routines for reporting deaths. The results for acute myocardial infarction and cerebrovascular disease do not vary much either, and the robustness of the first model is therefore considered to be good in regards of operationalization of the independent variable.

5.3 Robustness Tests

5.3.1 Mulitcolinearity

	NHS	SHI	PHI	Circulatory	Age	Alcohol	Tobacco Use	GDP
NHS	1.000							
SHI	-0.870	1.000						
PHI	-0.325	-0.325	1.000					
Circulatory	0.077	-0.123	0.084	1.000				
Age	0.168	-0.089	-0.163	-0.339	1.000			
Alcohol	-.223	0.240	-0.015	0.064	0.157	1.000		
Tobacco	-0.056	0.115	-0.108	0.625	-0.351	-0.014	1.000	
GDP	0.114	-0.131	0.023	-0.536	0.0365	-0.088	-0.363	1.000

Table 5.7: Correlation matrix for independent- and control variables in model 1. Democracy was omitted from the regression.

One of the problems in the regressions is the lack of significant results for the SHI coefficients. One possible reason for this could be due to co-linearity. As presented in table 5.7, the co-linearity between the NHS and the SHI is very high, and is a possible reason for lack of significant coefficients for the SHI.

5.3.2 Missing Values

Another possible solution to the problem of significance could be due to the high number of missing values. This is especially problematic when including the control variable for tobacco use, as mentioned in Chapter 3. In regards of diseases of the circulatory system, the variable only

accounted for 8 per every 100,000 deaths, and excluding it from the regression should therefore not be as problematic as the theoretical assumption suggests.

The results for diseases of the circulatory system did not produce coefficients significant at a 0.05 level for the SHI system. The regressions using mortality from cerebrovascular disease did produce significant results with tobacco use included, and excluding the variable did not affect the level of significance.

Table 5.8: Model 1 - Mortality from Ischaemic Heart Disease without control for Tobacco Use

	Coef.	Std. Err.	z	P>|z|	95%Conf.	Interval
SHI	-12.313	6.020	-2.05	0.041	-24.112	-.515
PHI	140.478	39.704	3.54	0.000	62.659	218.296
Age	-5.372	1.804	-2.98	0.003	-8.907	-1.836
Alcohol	.969	.842	1.15	0.250	-.681	2.619
GDP	-.002	.001	-4.53	0.000	-.003	-.001
Democracy	17.879	5.908	3.03	0.002	6.300	29.459
Constant	288.427	21.526	13.40	0.000	246.246	330.628
Rhos	.946	.945	.863	.955	.941	.925

Table 5.8: Regression for ischaemic heart disease with all control variables except for tobacco use, included. NHS is reference category.

Table 5.8 presents the regression for ischaemic heart disease, without controlling for tobacco use. The SHI coefficient is now significant at a 0.05 level. Additionally, excluding tobacco use led to significant results at a 0.001 level for the SHI on the acute myocardial infarction variable. This supports the previous conclusions about the SHI performing somewhat better than the NHS.

5.3.3 Interpolated Values

Another way of controlling for missing values is by interpolating them. When interpolating all variables there were no significant results. This is with the exception of the PHI being signficiant on a 0,1 level when testing the mortality from diseases of the circulatory system variable. The lack of significance does also apply to model 2, where, as previously explained, the independent variable is operationalized in four categories. The regressions can be found in appendix 1. This is probably due to the lack of values for many variables between 1960 and 1980. This creates a lot of variation, which would be unexplainable noise for the PCSE model. The error term therefore increases, which would increase the p-values and lower the significance level.

On the other hand, the point of running a model with interpolated values in the first place was to obtain values on countries that could be systematically missing. There is a possibility that the interpolated results are true, and there is no way to conclude for sure that these coefficients are not the 'true' results. The presence of such results would indicate that the correlation between cardiovascular mortality and the health care financing models is not significant.

What is most interesting is that the health care financing models coefficients, despite not being at a significant level, are close to zero in all regressions. This further indicates a lack of effect of the financing models on cardiovascular mortality.

5.4 Fixed Effects

As explained in Chapter 4, there are indications that suggest that there are country specific effects that cannot be controlled for. A fixed effects model is therefore conducted. As mentioned, this omits the PHI variable due to lack of variation.

Table 5.9: Fixed Effects using Mortality from Diseases of the Circulatory System

	a b/t	b b/t	c b/t	d b/t	e b/t
SHI	-94.747 (-1.25)	-53.725 (-1.12)	-231.643 (-1.34)	-52.060* (-2.69)	-52.060* (-2.69)
o.PHI	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)
Age	-64.729*** (-6.00)	-62.687*** (-6.71)	-25.666^ (-1.87)	-15.963* (-2.25)	-15.963* (-2.25)
Alcohol		3.716 (0.64)	3.729 (0.50)	7.513* (2.21)	7.513* (2.21)
Tobacco use			13.785*** (6.16)	7.750** (3.20)	7.750** (3.20)
GDP				-0.009** (-3.38)	-0.009** (-3.38)
o.Democracy					0.000 (.)
Constant	1413.180*** (9.16)	1323.473*** (8.33)	453.973 (1.48)	678.910*** (3.77)	6.78.910*** (3.77)
N	1478.000	1428.000	543.000	527.000	527.000

Table 5.9: Fixed effects model of diseases of the circulatory system used as operationalization of the independent variable. Column 1 explains which control variable included in the different regressions. NHS is used as reference category.
Significance level: ^=0.10, *=0.05, **=0.01, ***=0.001

In regards of diseases of the circulatory system, the coefficient is now significant at a 0,01 level. The number of deaths reduced has additionally increased. Testing the data on a fixed effects model does therefore not change the main conclusion. It rather strengthens it.

When using the ischaemic heart disease or the cerebrovascular disease variable, the SHI coefficient is not significant at a 0.05 level, and the AMI variable does not differ remarkably from the main model either.

5.5 Conclusion on Correlation

The findings from the main model indicate that the NHS and SHI correlates with lower cardiovascular mortality than the PHI. The coefficients for the SHI however, are not significant in all regressions. As mentioned earlier, the AMI variable is of especially high importance when comparing the models. In this regression the coefficient for the SHI is significant on a 0,001 level, and supports the hypothesis of the SHI performing somewhat better than the NHS. Based on the main model both hypotheses are therefore kept.

When testing the robustness of the models however, the results differ. Firstly, the operationalization of the independent variable seems to be good, and using the communist model or the alternative operationalization of Switzerland does not make any major impact to the original findings. In attempts to heighten the level of significance, the exclusion of the variable for tobacco use supports the conclusion of keeping both hypotheses by creating significant coefficients for the SHI while the original interpretations can be kept. When interpolating the missing values, however, the results indicate that both hypotheses should be dismissed. On one hand, this is an important finding, and the overall conclusion should keep in mind the possibility of no correlation between financing model and mortality. At the same time, none of the results using interpolated values were significant, and the thesis will not dismiss the original findings based on generated values creating coefficients that are not on a significant level. Further, when controlling for fixed effects, the results supports the keeping of the second hypothesis.

Based on this, both hypotheses are kept, and the rest of the discussions rest on the existence of a correlation between the dependent and independent variable. When comparing the findings in percent, however, the differences become almost non-existent. This will be further elaborated in Chapter 8.

6 The Case of Spain

This chapter is going to illustrate the findings from Chapter 5, through the case of Spain. Spain changed from the Social Health Insurance model to the National Health Service model in 1986 (Cabides & Guillén 2001 p. 1209). There are relatively few countries that have changed health care financing model, and Spain is therefore a natural choice when picking cases. Additionally, Spain does in some aspects represent the Southern European Countries. Spain, Portugal, Greece and Italy all changed from a SHI-model of health care finance to the NHS-model in the 1970s-1980s. With exception for Italy[19], the National Health Service was established in the years immediately following the transition from dictatorship to democracy. In Spain, this was possible exactly due to this process of democratization and the role of the parties on the left, in power for the first time (Toth 2010 p. 329). Additionally, Spain is therefore a good clear example of an ideological change in regime making an influence on the health care financing model.

As Chapter 5 has shown, there are small differences in the mortality rates of cardiovascular disease between countries using the SHI and the NHS, but the SHI model perform slightly better. One should therefore not expect to find any major changes following the change of model. A change would, however, support the hypothesis of the SHI performing better than the NHS.

This chapter will first present a short historical backdrop to ensure that the reader understand the political context the model change occurred in. The Chapter will then discuss different aspects of the two models that theoretically should affect cardiovascular mortality in Spain, and make comparisons between the two eras to see if they are supported by the empirical evidence. To make the analysis more straightforwardly to the reader, the mortality rates of Spain will be compared to those of France, a neighboring country, which kept the SHI system the entire period of research.

[19] In Italy, the change was not approved on the back of regime change, but the transition from SHI to NHS was made possible thanks to particular political and economic circumstances. See Toth 2010 p. 329, for further information.

6.1 Political History

In the period of study, Spain has gone from a dictatorship to a democracy. In 1939, General Franco came to power after the Civil War. His regime lasted until his death in 1975. During his time in power, new policies produced high economic growth rates, and Spain rapidly became an industrialized country. After Franco's death, the country got a new constitution, dating to 1978, and underwent a fundamental transformation of the state, political structure and legal framework. One of the changes was the change in health care financing model. Spain additionally joined the European Economic Community (EEC) in 1986 (Carr et al. undated), and this new political status promoted the introduction of expansionary measures in order to meet EEC recommendations and to tight the gap with the more developed European welfare states (Guillén 2002 p. 61).

Theoretically, one should expect a positive effect on democracy on health, even though this is not clearly supported in the regressions. Given the ten year gap between regime change and change of health care financing model, one should be able to separate the effects from one another.

6.1.1 Social Health Insurance in Spain

The first laws on social health insurance in Spain can be dated back to the 1940s, and were adopted under Franco's regime (Toth 2010 p. 328). The first attempt to develop the model took place in the 1930s and was at the time supported by all political parties, although under different ideological and political motivations. After the Civil War, the Francoist government recovered many of the earlier SHI proposals, and social security-related health care was run by the Ministry of Labor and Social Security from 1942 to 1977 (García-Armesto et al. 2010 p. 39).

In the 1960s, the SHI-model developed an extensive publicly owned network of centers and services for general medical care, specialized outpatient care and inpatient care in Spain. The motion can be said to have reached its highest point with the establishment of an extensive modern public hospital network. The public sector has owned 70% of available hospital beds and employed 70-80% of hospital doctors since the middle of this decade, a feature that is still characteristic today, and explains why the vast majority of health care providers are publicly owned (García-Armesto et al. 2010 p. 40).

Some of the challenges in the SHI in Spain were the problem of health care networks being accountable to different departments. This led to poor coordination and inadequate organization. Additionally, primary care and preventive care were severely underdeveloped, ad there were also an extreme uneven geographical distribution of health care resources (García-Armest et al. 2010 p. 41).

After Franco's death, the Spainsh Welfare state was radically transformed (Guillén 2001 p. 1209). One of the major changes was the political decentralization of the state structures (García-Armesto et al. 2010 p. 9). Spain is now territorially organized in autonomous communities (ACs) (García-Armesto et al. 2010 p. 2). In regards of health care, this transformation was not complet until the end of 2002. Today, Spain operates with 17 regional ministries of health, which have the primary jurisdiction over the organization and delivery of health services within their territory. Health expenditure is thus mainly determined by the regional administrations (García-Armesto et al. 2010 p. 37).

Another distinctive change in Spain, but also in the other Southern European welfare states, was the adoption of universal access of health care after the change to democratic regimes (Toth 2010 p. 325). The Spanish constitution was approved in 1978 (Toth 2010 p. 329), and established the right to health protection for all citizens (García-Armesto et. al. 2010 p. 41). Further, the new constitution recognizing the right of all citizens to a healthy environment together with necessary public health services. Achieving equity in the territorial distribution of health care resources, as well as in access to health care, did additionally become a new goal (García-Armesto et. al. 2010 p. 41-42). Between 1976-1978 the transition process was led by the center-right Union of the Democratic Centre (UCD), and the coalition further governed between 1979-1982 (García-Armesto et. al. 2010 p. 12).

6.1.2 General Health Law of 1986

The Spanish Socialist Workers' Party won power in the elections of 1982, and the General Health Law was passed during their first term in office (Toth 2010 p. 329). The establishment of the NHS, however, had become a long-standing aspiration among many politicians (Guillén 2002 p. 50). This is for instance illustrated by the mentioned implementation of universal coverage in the constitution from 1978. The most important change following the General Health Law was the uniting of all pre-existing health care networks into a single institution (Cabides & Guillén 2001 p. 1209).

The General Health Law gave all citizens free access to health care. The financing of the health care system became public, and was mainly financed through general taxation. The law also adopted the integration of different health service networks under the social health insurance structure (García-Armesto et al. 2010 p. 42). The overall concern of the law was to secure a more equitable distribution of health resources (Abel-Smith 1985 p. 14).

Three publicly funded mutual funds were the exception to the structure described above. These are the Mutalidad General de Funcionarios Civiles del Estado (MUFACE), Mutalidad General Judicial (MUGEJU) and Instituto Social de las Fuerazas Armada (ISFAS). These funds serve exclusively ministerial employees, personnel active in the judicial system, and the armed forces, and occupy a unique quasi-public position. Civil servants are the only group authorized to opt out of the NHS, and may choose to seek private provision of health care. Their members – about 5% of the population – enjoy privileged treatment compared with other groups, being able to choose, at no additional cost, whether to be treated through the NHS or by private insurance companies. The majority of those covered opt for private care (Toth 2010 p. 331, García-Armesto et al. 2010 p. 42). This basically means that the professions who historically were not obliged to insure themselves against the risk of sickness even before the 1986 reform kept the same treatment after the creation of NHS (Toth 2010 p. 331).

When the Law was implemented, there were already high levels of coverage in Spain. This made the implementation process less controversial, and the Spanish reform did neither have to deal with powerful independent health funds. The positive economic cycle in the late 1980s also helped the implementation of the model, by allowing public expenditure growth (Guillén 2002 p. 61). There was therefore, to a large extent, political consensus behind the model change.

6.1.3 National Health Service in Spain

As stated, when the NHS was implemented, certain sickness funds were not only kept alive, but they continued to operate according to the principles of the old social health insurance system. This was also the case in Greece and Portugal (Toth 2010 p. 332). This illustrates the concerns form Chapter 2, of keeping features from the old model within the new.

At the same time, there were several changes to the health care system after the implementation of NHS. Patients got, for instance, the right to choose primary doctors and pediatricians within

health care areas (Cabieds & Guillén 2001 p. 1211). Between 1996 and 2004, the centre-right People's Party (PP) was the governing party in Spain. This had implications for how the government operationalized the NHS. For instance, the Conservative Party authorized that public hospitals should be converted into private enterprises. As in Britain under Thatcher, the reaction of the socialist opposition, the unions and users' associations was so intense that the text of the decree was changed a day after its publication to assure the public ownership of public hospitals (Cabides & Guillén 2001 p. 1211). This means that after just 10 years of the implementation of the NHS, it had gained so much support that a political party could not change it.

In Chapter 2, the paper showed that taxation is the main funding source of the NHS. Taxation, however, did not fully replace payroll taxes until 1999 (Lopez-Casasnovas, Costa-Font & Planas 2005 p. 221). Further changes to the model is shown in figure 6.1:

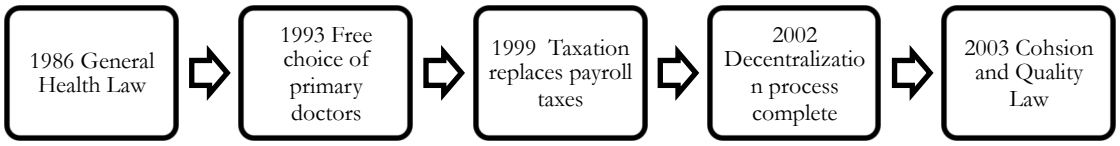

Figure 6.1: Time-line of NHS development in Spain

The Cohsion and Quality Law of 2003, passed by the Conservative Government, states the need for strengthening geographical equality of health protection as well as quality of care (Lopez-Casanovas, Costa-Font & Planas 2005 p. 222). This is therefore a considerable attempt to improve equity in the Spanish health care system.

6.2 Differences Between the Systems

This section is going to present some differences between the systems. Additionally, some of the topics are, as mentioned, illustrated by comparisons between Spain and France.

6.2.1 Universality

As discussed in Chapter 2, universality is one of the main features of the National Health Service that should positively affect the outcome of cardiovascular diseases, by making health care

services available for the entire population. This is, on the other hand, also a feature of the SHI, and the change from SHI to NHS should theoretically therefore not have major impact on cardiovascular mortality. In Spain under the SHI system, public coverage was already high, and 96% of the population was covered in 1986 (Cabides & Guillén 2001 p. 1209). Today, the Spanish National Health Service still does not offer coverage for everyone, but 99.5% of the population is covered. Spain is therefore an exception in regards to NHS-systems, since all the other countries using NHS cover the entire population. The 0.5 percent that is excluded is, on the other hand, composed of high-income self-employed professionals (Toth 2010 p. 331). When 96% of the population already was covered, there is no obvious reason to believe that the increase of 3.5% would be a major reason why deaths from cardiovascular diseases have dropped.

Another way of viewing universality is by the fact that in southern European countries, rights guaranteed on paper are not always honored in practice. Long waiting lists often limit access to services, which are formally guaranteed by right (Toth 2010 p. 338). In Spain, waiting lists vary between regions, but are a problem everywhere (Tanner 2008 p. 14). This would therefore restrict the access to care, but there are no findings that indicate that this is a trend linked to the change between the SHI and NHS.

There should therefore not be any major differences between the two models in Spain.

6.2.2 Mortality Rates

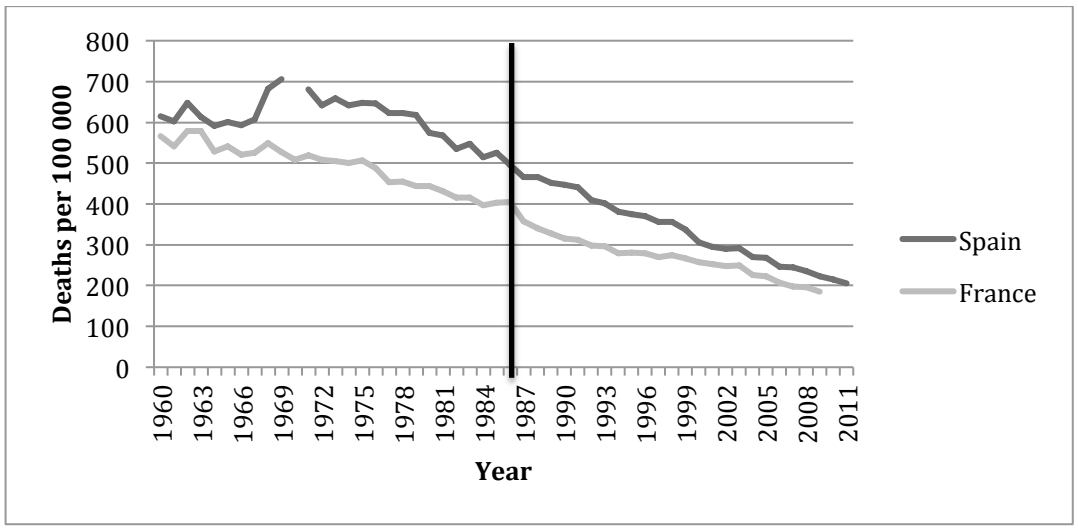

Figure 6.2: Number of deaths per 100,000 from diseases of the circulatory system in Spain and France. The vertical line marks 1986 – year of health care financing model change in Spain.

As one can read from figure 6.2, the death rate has steadily decreased after the change to NHS in 1986, but this decrease started long before the model change. There is neither any sudden change in death rates after the regime change. The lack of effect on regime change on diseases of the circulatory system overlaps with the lack of significance in the empirical results. It also follows France' rate, who, as mentioned, have kept the SHI model the entire period. France does have a lower death rate than Spain, but this was the case before the change of system as well, and the countries are actually closing in together, just as in the early 1960s.

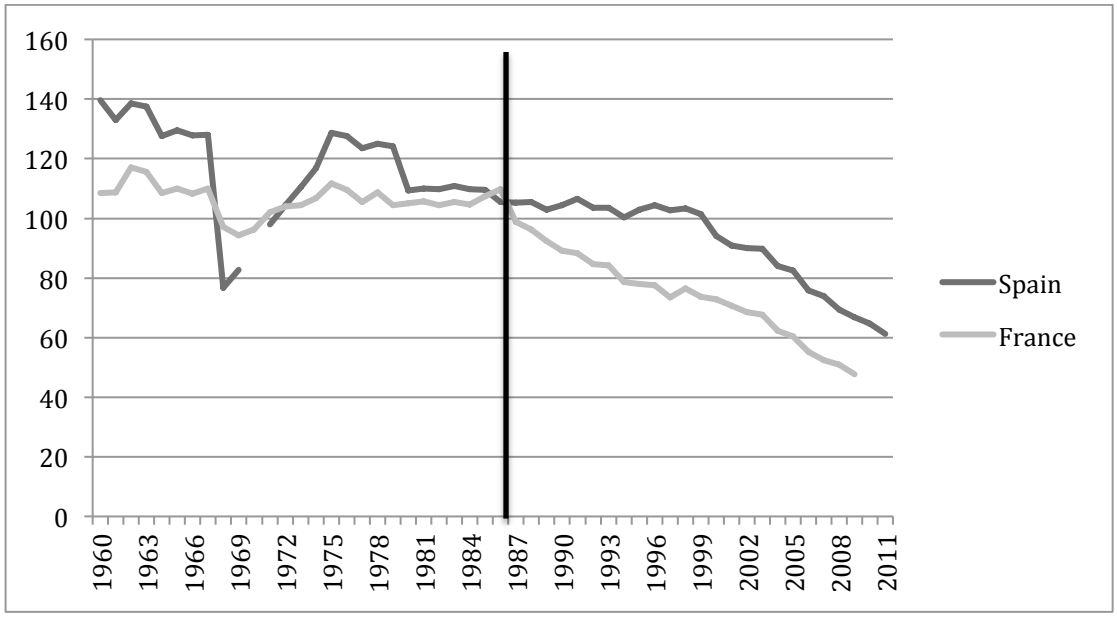

Figure 6.3: Number of deaths per 100,000 from ischaemic heart disease in Spain and France. The vertical line marks 1986 – year of health care financing model change in Spain.

In regards of ischaemic heart disease there is also a decrease in the mortality rate after the change of model. During the last almost 30 years, the drop has, on the other hand, been greater in France than in Spain, and the Spanish decrease seem to have been moving slower than the French. This supports the findings in Chapter 5, and SHI seems to be slightly better than NHS at treating iscaemic heart disease. This thesis does not offer an explanation for the sudden drop in the late 1960s since it is neither linked to regime change or the implementation of the NHS.

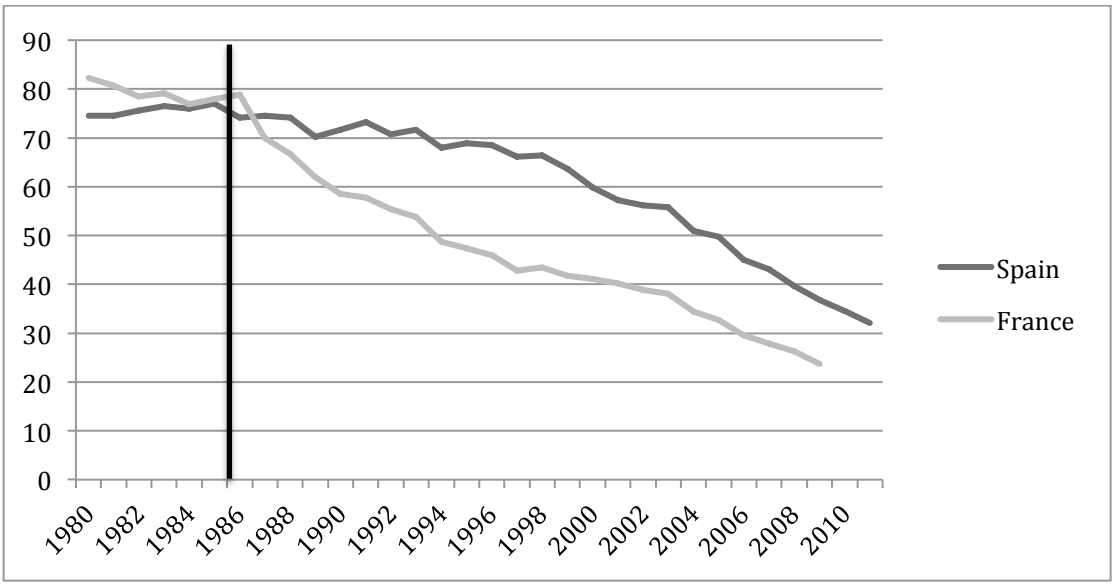

Figure 6.4: Number of deaths per 100,000 from acute myocardial infarction in Spain and France. The vertical line marks 1986 – year of health care financing model change in Spain.

In Chapter 5, AMI was the variable with highest significance on the SHI coefficients, and the difference between the models should therefore be most visible here. Additionally, due to the discussed acuteness of treatment, this is the measure were effects from a new model would have the fastest explanatory impact, since many of the in-system risk factors are slow moving. In the comparison between Spain and France, the second thesis therefore finds support. The countries were approximately at the same level prior to the change, but France has undergone a faster reduction in number of deaths than Spain has.

Unfortunately, the AMI variable is missing until 1980. One can therefore not tell if the change of regime had any impact on the mortality rate.

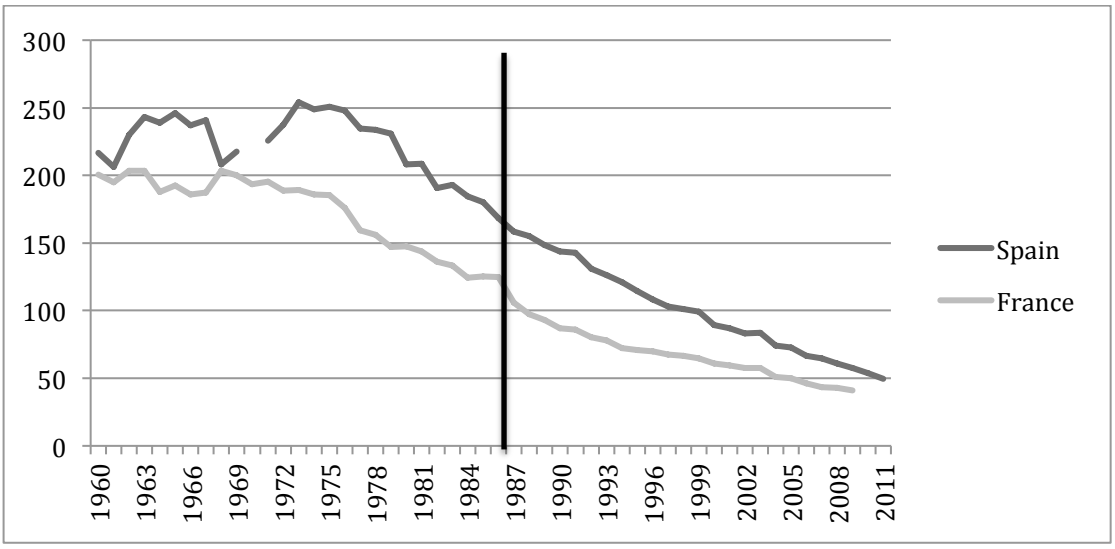

Figure 6.5: Number of deaths per 100,000 from cerebrovascular diseases in Spain and France. The vertical line marks 1986 – year of health care financing model change in Spain.

In regards of cerebrovascular diseases figure 6.5 does not show any sign of regime change after 1986, and the countries have had similar and steady reductions in number of deaths. Spain does, on the other hand, seem to be closing in on France' level in the later years. The result is not surprising given the small difference between the models found in the regressions.

6.2.3 Equity

There is little available research on the equity of the Spanish SHI system. What is worth noting, however, is that the redistributive effects of the NHS are not very clear. In 1987, a year after the implementation of NHS, people with similar health problems did not receive similar treatments, and there was a pro-rich bias. Ten years later, in 1997, the problems of equity were just as high, but the bias was now pro-poor. Evidence indicates that low-income individuals were more frequent users of health services from 1987 and onwards, while emergency services saw an increase in high-income users (Lopez-Casanovas, Costa-Font & Planas 2005 p. 229). 1987 was just after the model change. The numbers from this year should therefore be more influenced by the SHI model than the NHS. Given the change in bias, the overall equity level between the systems is therefore not changed. At the same time, the findings strongly indicate that the health care financing model does impact the utilization of health care resources, with NHS being pro-poor and the SHI being pro-rich. Further studies should therefore research if this trend is prominent in other countries as well. If, on the other hand, the 1987 findings cannot be accounted to the SHI, the change in bias within the NHS model is still very interesting, since it undermines the effect of model change by showing a major change within the same systemic framework.

6.3 Summary

The case of Spain does to some extent illustrate the findings from Chapter 5. The thesis does not find any major changes in cardiovascular mortality that can be accounted to the change of health care financing model. As mentioned in Chapter 3, the AMI variable does not have as slow-moving effects as the other, and the difference in mortality development between France and Spain straight after 1986, therefore supports the hypothesis of the SHI performing better than the NHS to some extent. The change of model is, at the same time, not very prominent, and the overall picture shows a limited effect of model change. Apart from this the changes have mainly been in form of decentralization and organization of health care personnel, which is not features linked to the specific models. In the case of Spain the health care reform was therefore not strictly linked to the ideal models, even though the source of financing changed. Given that some of the old health care funds were not abolished, further supports that the models have major variation between countries, and further research should focus on the specific elements in each country, to see if these have more impact on cardiovascular mortality than the ideal model as a whole.

7 The Case of Poland

The second illustrative case study regards Poland, which changed to the Social Health Insurance model in 1999. There are, as mentioned, few countries that have changed model in the period under research. As Spain represented Southern-European countries changing from SHI to NHS, Poland represents another set of countries that have gone from the communist model, were health care was part of the command economy, to the SHI (Wendt, Agartan & Kaminska 2013 p. 88). The communist model is not a part of this thesis' study per se. Still, given both the theoretical and empirical findings about the favorable performance of the SHI, Poland should expectedly illustrate very clear improvements due to the change of model. Additionally, the gap between regime change in 1991 and the health care system change in 1999 makes it simpler to distinguish the two from one another. Poland is also the most populous country in Central and Eastern Europe, and is thus of relevance since an improvement in health care would affect very many people.

This chapter will first give a historical backdrop, before explaining the changes both after the fall of communism and with the implementation of the SHI. The chapter will then move on to a comparison between the two decades.

7.1 Political History

7.1.1 Pre-Communist Era and Health Care Under Communism

Prior to communism, Poland used the SHI model, and 7% of the population was covered in 1939. The ministry of health was created in 1945 and health was then declared a public responsibility. After the Second World War, Poland was under communist rule. In this regard, Poland, however, differs from the other countries in the eastern bloc by resisting some aspect of the Soviet model, and private practice for instance was never formally abolished. It did, on the other hand, become much diminished during the era (European Observatory on Health Care Systems 1999 p. 4-5). Social expenditure was given low priority by the Communist Regime, and this led to low standard of buildings, widespread outmodedness of equipment and low moral by the medical personnel, which had very low wages (Millard 1995 p. 179). The system distributed resources without financial performance being taken into account, and the home regions of top leaders, for instance, had much higher standard of health care than less favored sectors

(McMenamin & Timonen 2002 p. 104). Corruption and bribery were also widespread (Millard 1995 p. 180). Additionally, the entire system had little connection between resource allocation, demand for services and need for services (McMenamin & Timonen 2002 p. 104). Patients' rights were also seemingly unheard of, and patients were often kept uninformed of their own condition (Millard 1995 p. 180).

7.1.2 The Transition Era

After the fall of communism, Poland experienced rapid changes in Government, but the health care system remained predominately state funded throughout the 1990s. The role of the private sector, on the other hand, increased (McMenamin & Timonen 2002 p. 104).

The main argument for delaying a health care reform was due to the economic instability in the transition era, but reform was additionally difficult to implement due to the frequent changes in government (European Observatory on Health Care Systems 1999 p. 7-11). In 1992-93 the Government was Solidarity dominated with Liberal participation. Solidarity, on one hand, favored privatization of the health care system, and the creation of several small independent insurance institutions. The Liberals, on the other hand, wanted regional health care institutions with limited privatization. Additionally, there were conflicts within Solidarity, and there was therefore no proposal before the fall of the Government in 1993 (McMenamin & Timonen 2002 p. 106-107).

When the Post-Communists and Peasant Government came to power in 1993, they adopted the Liberal proposal (McMenamin & Timonen 2002 p. 107). Under the Democratic Left Alliance (SLD), however, the ministry was strongly influenced by the medical elite associated with teaching hospitals. This led to a proposal for revised administrative structure, so that the country would be organized into regions, which corresponded with medical academy locations (Kornai, Haggard & Kaufman 2001 p. 257). When the Solidarity/Liberal Government came to power again in 1997 they rejected the act passed by the SLD, and proposed a plan close to the one from 1992/93. The final bill was, on the other hand, closer to the post-communist version. This was due to the Liberal minister of finance, Leszek Balcerowicz, concern of small independent insurance companies would have a high potential of creating debt, which would burden the state. Overall, the main characteristic of the transition era can be said to be that there seems to have been more concern about how to avoid the problems that were associated with the communist

health care system, and less thought to how the transformation should happen (McMenamin & Timonen 2002 p. 107-108).

7.1.3 Social Health Insurance in Poland

The establishment of 16 regional health insurance funds and a separate fund for uniformed public employees, such as the army and railroad workers, came into effect on January 1st 1999 (European Observatory on Health Care Systems 1999 p. 7). Within this SHI system, participation is mandatory for everyone who pays income tax, but it is not conditional to pay contributions to receive health care. The people who are not paying income tax are paid for out of the state budget (McMenamin & Timonen 2002 p. 108). The 1999 reform was designed to improve patients' choice in services by introducing a competitive health care structure. This was mainly done by separating purchaser from providers through negotiated contracts (Pieprzyk 2013 p. 31), which was financed by the independent health care funds (Wendt, Agartan & Kaminska 2013 p. 91). Both public and private hospitals, laboratories and clinics competed against each other for contracts with the funds. Patients are additionally free to choose between all providers contracted by their Health Fund when seeking medical care (McMenamin & Timonen 2002 p. 110).

The health care funds did, on the other hand, become politicized very soon after their creation, since territorial governments appointed the members of the funds' boards. They were therefore replaced by a single national fund in 2003. The Polish SHI system uses therefore a state-run instead of a corporatist-run model of management (Wendt, Agartan & Kaminska 2013 p. 91). This has lead to a monopoly on health insurance, and instead of employees choosing an insurer on the base of predicted health needs, there is no alternative to the national health insurance fund. This system encourages providers to limit or deny treatment because insurance funds pay a small sum to providers to cover a specific number of patients over the year (Filinson, Chmielewski & Niklas 2004 p. 388).

The Polish SHI system had trouble from the start. There were delays in channeling money from the government to the health funds, and the government therefore had to give loans to the health funds to keep the system going. There was also a lot of confusion in the initial stages, and patients were unsure which hospitals and health centers they could visit and how their bills would be paid (McMenamin & Timonen 2002 p. 110, 113). With the hunger strikes and

roadblocks by nurses in December 2000, the reform proved a public relations disaster for the government (McMenamin & Timonen 2002 p. 114).

The main issue with the implementation of the SHI was, however, that the governance structures found in western Europe was missing at the start of the transformation, and have not been created since (Wendt, Agartan & Kaminska 2013 p. 91). In other words, the old management structures were not prepared to meet the challenges of the SHI (Pieprzyk 2013 p. 42). An efficient and equitable system cannot be created by putting in place a market-friendly environment when the necessities for effective operation of market forces are absent (McMenamin & Timonen 2002 p. 111).

Another issue with the Polish health care system is informal payments. This was both an issue under communism, but also under the SHI. This limits the supposed gains in efficiency and equity that the SHI should bring (McMenamin & Timonen 2002 p. 103). For physicians, the receiving of informal payments have been estimated to be twice the value of their salaries (Nekoeimoghadam et al. 2013 p. 6). There does not seem to exist a strategy for fixing this issue, and the SHI cannot work as intended before this is established (McMenamin & Timonen 2002 p. 116).

It is therefore clear that the SHI model, as implemented in Poland, does not function as intended and there are still major problems even more than a decade after the implementation. This impacts mainly the quality and quantity of services provided, but the practice of informal payments would also challenge both equity and universal access. One can also conclude on that several features from the communist model is still an issue, which supports the previously discussed assumptions of path-dependency in regards of model change.

7.2 Comparing the Models

7.2.1 Universalism

The communist model offered universal access to health services (European Observatory on Health Care Systems 1999 p. 16). The SHI, on the other hand, covers 98% of the population. The group without health insurance is nevertheless entitled to free health care at the point of delivery (Mossialos 2011 p. 55, 70). In the implementation phase of the SHI there were problems with limitation in access for those who had not paid their premium, but this problem has

gradually been regulated (Golinowska & Kozierkiewicz 2008 p. 19). The major challenge to universalism in Poland rather relate to very long waiting lists for planned services (Mossialos 2011 p. 71). Overall, there is therefore little reason to believe that there have been major positive effects in health outcome based on changes in the universal aspect of health care, since the latter has, generally, not changed much.

7.2.2 Mortality Rates

Poland has lower life expectancy rates than Western Europe (European Observatory on Health Care Systems 1999 p. 2), and the improvement that was observed in life expectancy from 1993-1999, prior to the health care reform, can mostly be explained by better diet (European Observatory on Health Care Systems 1999 p. 2). This was, in turn, a result of market transformation, which allowed for a higher consumption of vegetable oil (Mossialos 2011 p. 10). When subsidies for animal fats during the socialist era disappeared, consumption fell dramatically while the intakes of polyunsaturated fats, fruits, and vegetables all increased after the introduction of a market economy (BMJ 2012). Binge-drinking is also much more common in Eastern Europe compared to the rest of the sample, which suggests that alcohol has been an important factor in the high rates of cardiovascular death (Britton & McKee 2000 p. 330).

All of the former communist countries have changed to the SHI model of health care finance. Ideally, one should have compared Poland to a former communist country, which had either kept the communist model, or changed to the NHS or PHI. Since such a country does not exist, Hungary will be used as comparison to illustrate if the countries experience a similar development causally following the change of model. Hungary and Poland are the two former communist countries with the least missing values on the dependent variable. Hungary changed to the SHI model in 1989.

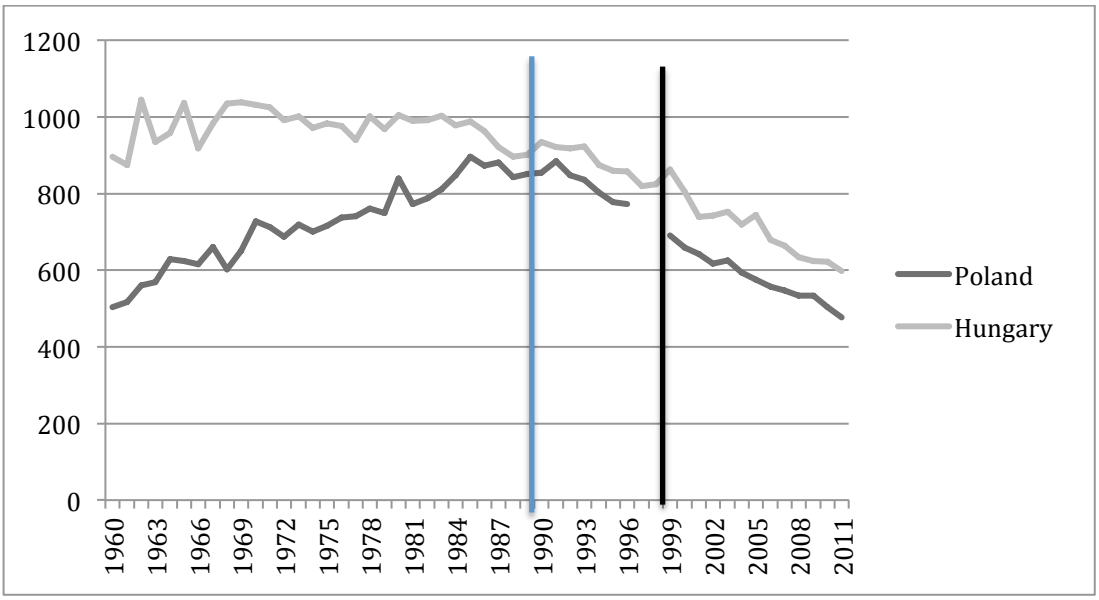

Figure 7.1: Number of deaths per 100,000 from diseases of the circulatory system in Poland and Hungary. The black line marks 1999, which is the year the SHI was implemented in Poland. The blue line marks 1989, which is the year the SHI was implemented in Hungary.

Figure 7.1 show the development of mortality from diseases of the circulatory system in Poland and Hungary. Prior to the fall of communism, Hungary's death rate was somewhat higher and more stable than Poland's, who saw an increase in deaths up until the late 1980s. What is interesting is that both countries experienced a decrease after the fall of communism. In Hungary this overlaps with the change of health care model, while the gap between regime change and health care system change in Poland makes it easier to spot that the implementation of SHI did not start the downward trend.[20] Based on this it is therefore not clear that it was the implementation of SHI that accounts for the improved rate of cardiovascular mortality in Poland. This is not surprising, given the poor implementation discussed above. Identification by these overall numbers will additionally be difficult since the substantive effect is relatively small, as indicated in the regressions.

In regards of ischaemic heart disease, the picture is a little different. This is illustrated in figure 7.2.

[20] This additionally supports the theoretical assumptions about the positive effect of democracy on health, despite the empirical results for the democracy variable in Chapter 5. The assumption of the negative impact on democracy being due to lifestyle changes that are negative for the circulatory system is therefore strengthened.

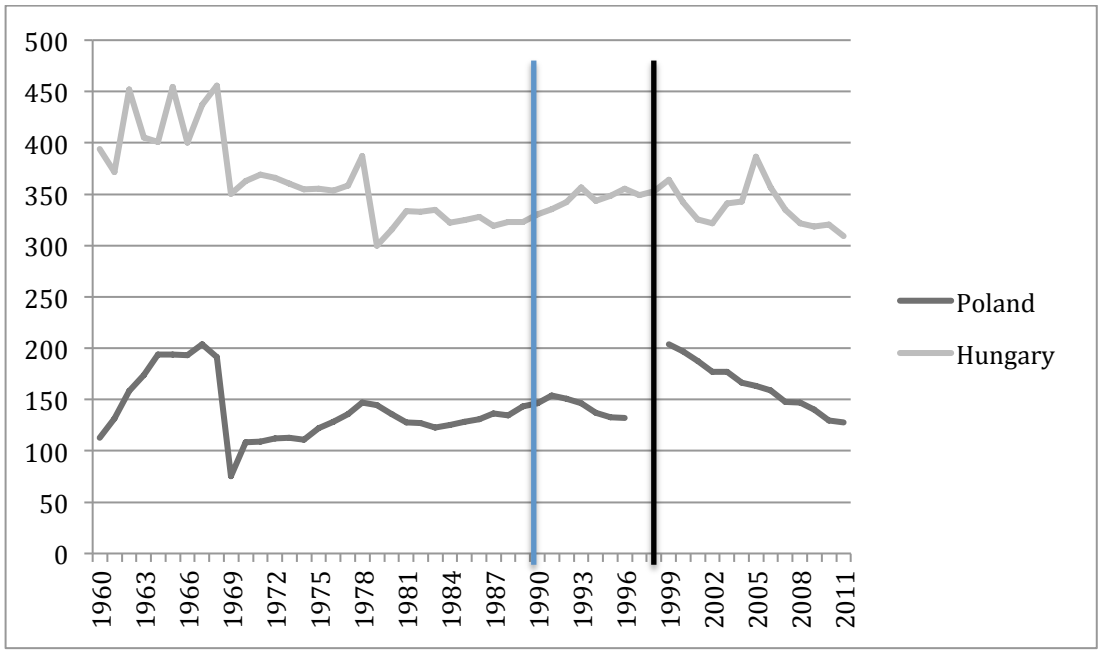

Figure 7.2: Number of deaths per 100,000 from ischaemic heart disease in Poland and Hungary. The black line marks the year 1999. The blue line marks 1989.

Ischaemic heart disease has not seen a major decline in Poland and Hungary during the last 50 years. Unfortunately the Polish transition period lacks data, but the increase is most likely due to a change in reporting routines. Looking back at the development for Spain and France in the previous chapter, there was a decrease in deaths from ischaemic heart disease since the late 1980s. In numbers, the decrease is greater for Hungary than for both Spain and France, but for Poland there were 112,7 deaths per 100,000 in 1960, and 127,8 per 100,000 in 2011. This is an overall increase, and none of the changes seem to be due to either regime change or change of health care financing model. The health care systems in Hungary and Poland have therefore not been capable of treating other possible causes mortality from of ischaemic heart disease, and the extent of explanatory power given to the SHI in these two countries are therefore limited.

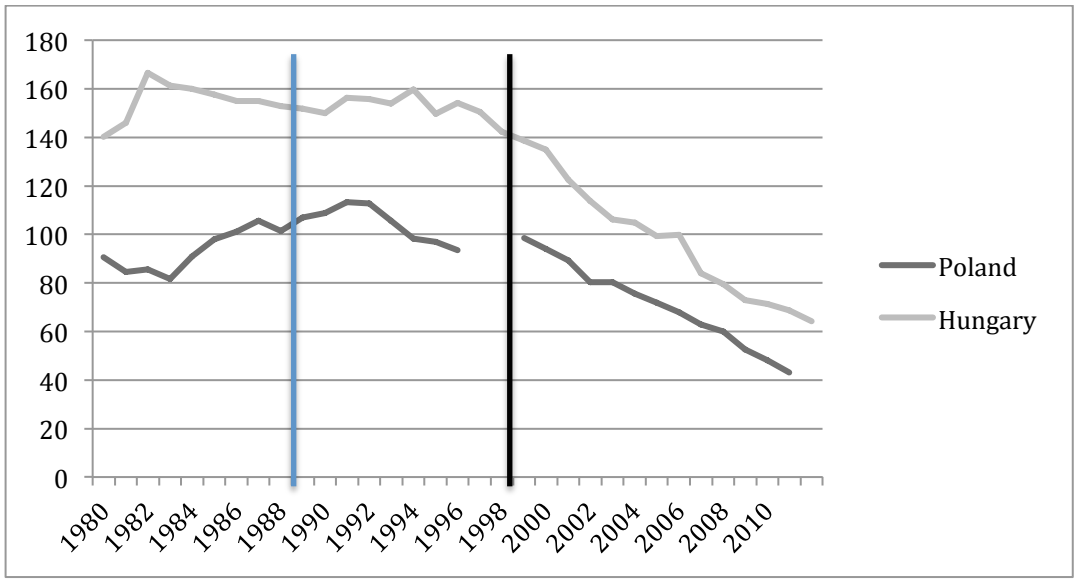

Figure 7.3: Number of deaths per 100,000 from acute myocardial infarction in Poland and Hungary. The black line marks the year 1999, the year the SHI was implemented in Poland. The blue line marks 1989, which is the year the SHI was implemented in Hungary.

When viewing the mortality from acute myocardial infarction there seem to be more support for the hypothesis in Chapter 2. The lack of data for Poland in the transition period is very unfortunate, but the decrease seems to start after the change of model. What is interesting is that the decrease in Hungary does neither start immediately after the change of regime. This weakens a possible conclusion of the SHI being the causal reason behind the decrease in Poland, since Hungary's model change is dated to 1989.

Additionally, the mortality rate from cerebrovascular diseases does neither clarify the effect of health care financing model change in the two countries. It is, on the other hand, important to note that this is the variable with least significant estimates in the regressions in Chapter 5. It was also the estimates that differed the most from the overall findings.

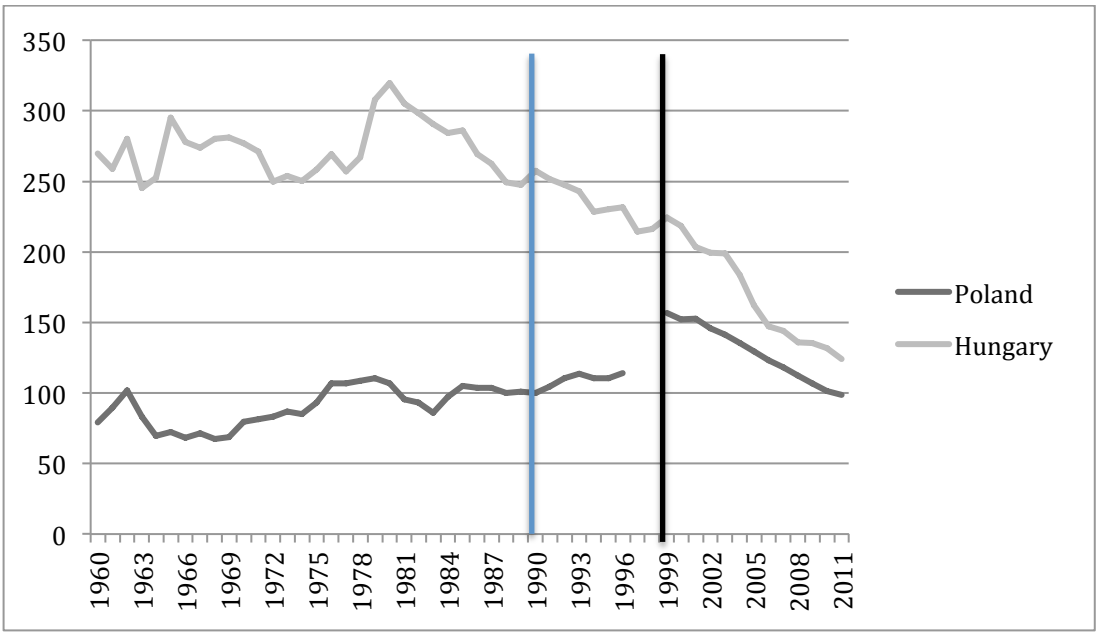

Figure 7.4: Number of deaths per 100,000 from cerebrovascular disease in Poland and Hungary. The black line marks the year 1999. The blue line marks 1989, which is the year the SHI was implemented in Hungary.

In the case of Poland, there has actually been a decrease in mortality from cerebrovascular disease after the implementation of the SHI. The increase between 1996 and 1999 are believed to be due to changes in reporting routines. When comparing Poland to Hungary, on the other hand, one can see that the decrease in Hungary started around 1980, and not after 1989. The number of deaths is additionally higher in Poland in 2011 than in 1960, which makes it difficult to make a conclusion about positive impact of the SHI.

7.3 Summary

Overall, there is no clear improvement in the cardiovascular mortality rate in Poland followed by the change to the SHI. Firstly, this is not unexpected due to the poor implementation of the model. Secondly, the increase in reported deaths after the model change indicates that the reliability of the statistic from the communist era is poor. Discussing the effect of model change is therefore problematic. It is essential to note that there have been a decrease from 1999 to 2011 on all four variables, and a possible trend could maybe be discovered in ten or twenty years from now. Given the lack of data from the transition period it is, at the same time, difficult to separate regime change effects from model change effects. There is, however, a steady decrease on the acute myocardial infarction variable, which indicates that the SHI do have a positive influence on the mortality rate, by reducing it. Again, the lack of data for the transition period comprises the certainty of this conclusion.

8 Discussion

So far this thesis has shown that the theory and first hypothesis in Chapter 2 is supported by the coefficients from the regressions in Chapter 5. In regards of the second hypothesis, however, the results are not as robust, but the overall trend is in favor of support. The first hypothesis stated that the NHS and SHI would perform better than the PHI, while the second hypothesis said that the SHI would perform somewhat better than the NHS. The case study about Spain does not reject any of the hypotheses, even though the effect of system change is hard to spot. The case of Poland does not find any clear improvements in mortality after the change to the SHI. As mentioned, due to the problems with implementation in Poland, one should not dismiss the findings from Chapter 5 based on this case. The introductory question, however, is to what extent the different health care systems affects cardiovascular mortality in OECD countries. This will be discussed in this chapter.

8.1 Comparing Mortality Rates

If the mortality statistic is translated to differences in percent instead of viewed as numbers per 100,000, the extent to which the NHS, SHI and PHI explain cardiovascular mortality in OECD countries are very limited. The estimated effects do, as mentioned, constitute less than 1% of cardiovascular deaths in a typical OECD country, when moving from the NHS to the SHI or PHI. This is supported, to some extent at least, by the two case studies, where no major change, directly accounted to the change of model, can be found. Additionally, this is supported by a previous study conducted by the OECD aimed at explaining the decrease in mortality from ischaemic heart disease. The study found that the decline in tobacco use in OECD countries was the major factor behind the reduction since the 1980s (OECD 2011 p. 28).

Statistical explanations are incomplete by themselves, however, since they ultimately have to rely on intuitions, or other types of evidence, about possible causal mechanisms (Elster 2007 p. 8). Theoretically, the models have different characteristics that should make the causal implication solid. Despite the causal chain between health care financing model and outcome, the reason why the percentage differences between the models is so limited, is probably due to another, stronger, causal chain – the one between human behavior and health. Even though it is argued that one of the features of the health care systems is their ability to treat many of the behavioral

risk factors linked to cardiovascular mortality, none of the systems would be able to outweigh the positive benefits of, for instance, a healthy diet. This does also go the other way around. If an extremely unhealthy individual has access to quality medical treatment, there is no reason for the medical treatment to outweigh the negative impact the person's behavior have on health. Due to the amount of behavioral factors that affect cardiovascular mortality, the extent of explanatory power left to the source of financing must therefore, logically, not be very high. This is also supported by the limited explanatory power of the risk factors included in the regressions[21].

At the same time, the coefficients from the regressions should be viewed in light of the absolute numbers of deaths in the countries. For instance, according to the regression of diseases of the circulatory system in Chapter 5, the PHI accounted for 152.455 deaths per 100,000 compared to the NHS. This number was significant at a 0,01 level. In the U.S., however, 2,468,435 people died in 2010 (CDC 2014). When comparing this to Norway, for instance, a total of 41,442 people died in 2010 (SSB undated). In Germany, this number was 858,768 in 2010 (BPB 2012). 2010 is a random choice of year, but over the entire time period, there have been large difference is absolute numbers of deaths between the countries in the sample. This shows, however, that the coefficients in Chapter 5 have very different implications for the different OECD members in regards of how many people these coefficients actually represents. There are variations between all systems, and the coefficients would represent very different amounts of death in different countries. A difference of less than 1% could therefore explain very many numbers of deaths in a populous country.

Given this premise of the limited explanatory power outside of behavioral risk factors, and differences in absolute numbers of mortality in the different countries, the thesis will now discuss the extent of explanatory power through three different approaches. Firstly, there will be a discussion of the limits of life, before the chapter moves on to discussing the slow moving effects of health care systems. Finally, there will be a brief section about the importance of every extent of improvement in topics regarding life and death.

[21] Democracy did, however, have significant negative impact on cardiovascular mortality. As mentioned, this explanation is probably due to lifestyle changes that democracy brings in regards of personal freedom. This thesis does not conclude on the democracy variable, but further research should focus on the causal chain between democracy and cardiovascular mortality.

8.2 The Limits of Life

This thesis supposes that the health care systems ability to treat risk factors are part of the overall assumption of whether or not they are good at lowering cardiovascular mortality. Given the small differences between the systems, one should suppose that the systems face these risk factors in similar ways, giving similar outcomes. The low explanatory power of the models can therefore be viewed as a consequence of the limits of a life. One cannot prevent the occurrence of death, and this would have impact on the extent of explanatory power the models possibly could have.

The average life expectancy in OECD-countries was approximately 80 years in 2011 (OECD undated). Compared to the average of approximately 68 years in 1960, this is a large improvement. The country with the highest life expectancy in 2011 was Switzerland with 82.8 years of age. With such high life expectancy rates, measures aimed at lowering average mortality in OECD countries is very difficult. Health care is not the main reason behind this increase, but still important, as it is closely linked to quality and availability of education, food and other socioeconomic factors. These factors are difficult to separate from each other, and are often shown through the contribution to health (Hart 2010 p. 14). The limits of life approach therefore supports an argument of the explanatory power of the models being high, taken into consideration the already high life expectancy in the countries of study.

8.3 Slow Moving Effects

Another way of viewing the behavioral risk factors is by discussing to what extent one could expect immediate changes following a change of health care model; i.e., some of these factors through which the overall impact of health care system on CVD mortality is transmitted. The behavioral factors are established, but as mentioned in the debate about the relevance of controlling for country-fixed effects, there could be country specific factors that impact cardiovascular mortality. This is particularly important when considering the liberties individuals in OECD countries have.[22]

[22] A study from last year (Sekikawa et al. 2013) suggests, for instance, that if white American men consumed as much fish as Japanese men, the mortality from coronary heart disease among white American men would be lower. If American men adopted the eating habits of Japanese men, coronary heart disease would thereby probably be reduced in time in the U.S.

In regards of effects after model change it is, on the other hand, not the possible cultural differences that are the challenge. In Norway, for instance, there was implemented a law against smoking inside eateries to shield people from second hand smoking. When the law was implemented in 2004, 54% of the population supported it. In 2011, this number had risen to 90% (Helsedirektoratet undated). This illustrates that it is possible to change cultural attitudes rather rapidly. It is the effect of the changes that move slow. In regards of health care models there are several cultural attitudes that could be affected. For instance, private hospitals would profit more if the patients were healthier when admitted to treatment. The PHI could therefore have initiatives to promote public health campaigns in order to save money on surgeries or other forms of comprehensive treatment. This could for instance be campaigns about diabetes[23] awareness, and propositions about how to control the disease with exercise and diet. This could then again lead to a cultural change in attitude towards diabetes as something one should try to fight, while the physical process for the patients towards recovery could last a long time. In weigh loss, for instance, it is not enough to exercise and live healthy, one must actually use more energy than consumed, leading to a negative daily intake, which a healthy diet and exercise routine would not necessarily do. At the same time, since the NHS is a public system, there might be strong initiatives for politicians to implement laws that would benefit public health, such as the smoking prohibition in Norway. The theories developed on this area are limited, but even if the models have the ability to change attitudes, the physical changes for the population would not happen overnight.

The effect of change between models does therefore not have to present immediate improvements to be an improvement. In Poland there is nothing that suggests that the mortality should decrease immediately following the implementation of the SHI in 1999. There is not even a guarantee that every person with risk of developing cardiovascular disease visited a health care service that year. When studying health care systems one should therefore expect the effects of the models to use some time before the positive, or negative, impacts are noticeable.

[23] By diabetes the thesis referes to diabetes type 2.

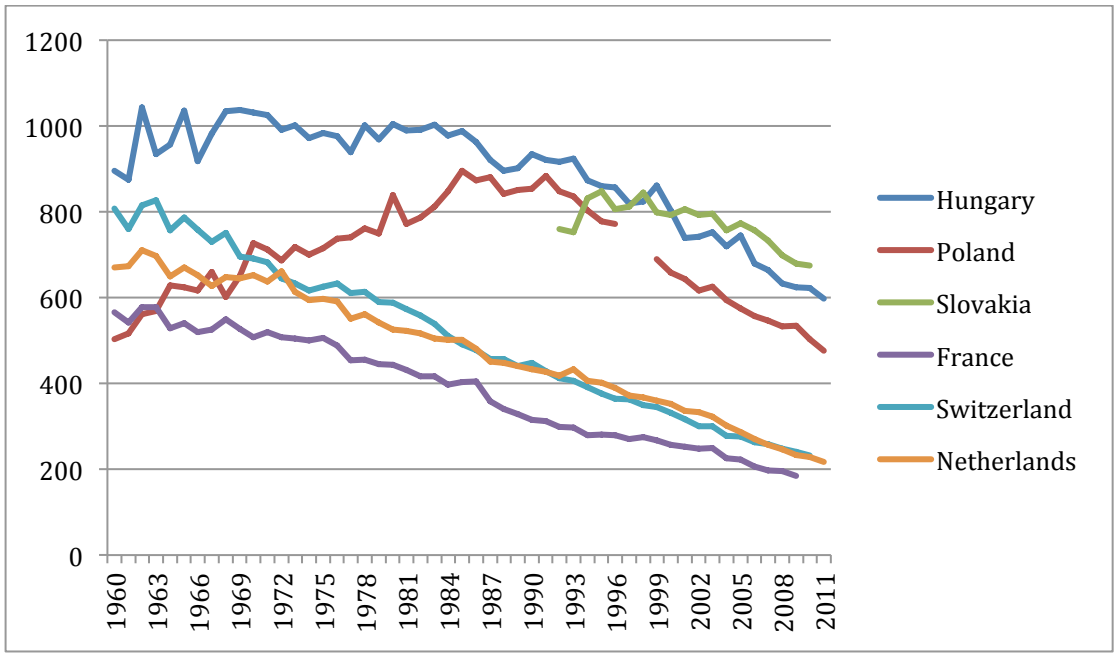

Figure 8.1: Diseases of the circulatory system in six countries using the SHI in 2011.

Figure 8.1 illustrates this by showing the development of diseases of the circulatory system in six countries classified as SHI in 2011. It is clear that the three former communist countries have distinctively higher mortality rates than the Western European countries do, but the gap seems to be somewhat closing. Since the systems are slow moving, it should be expected that this gap would take time to narrow. Additionally, the lack of government structures needed for implementation of the SHI, as illustrated in the case of Poland, should be stressed even further when viewing the Eastern European countries. Lacking structure would imply that the effects of a health care system would use an even longer time period to fully settle, and the effects would consequently be delayed in time.

The slow moving effects of health care systems, on the other hand, can not be stressed to far, since it after all is over a decade since the change of model, and the cardiovascular mortality rate in Poland is similar to what it was in 1960.[24]

[24] This is as previously discussed, not the case for acute myocardial infarction, were Poland has seen an improvement in later years.

8.4 The Choice of Health Care Financing Model

8.4.1 An Analogy to Traffic Accidents

Before discussing the choice of health care financing model, the thesis will view the issue from another perspective.

In 2010, 5.4 per 100,000 people in Spain died in a traffic accident. When applying the logic from the debate of to what extent the health care financing systems can affect cardiovascular mortality, 5.4 per 100,000 is not a very large share of deaths. Comparably, 214.9 people per every 100,000 died from diseases of the circulatory system in Spain in 2010. However, in March this year Spain implemented a set of new traffic laws, which for instance increase the fines for drunk-driving and all cyclists under 16 is obliged to wear protective helmets. Children are neither allowed to travel in the front seats of motor vehicles. The reason behind these changes is to reduce traffic deaths in Spain (Spanish News Today 2014).

Changes in policy assumed to improve the mortality rate would be comparable for the two topics. The policies prior to the March implementation were changed due to theoretical assumptions about the new laws lowering the death rate, and create a better traffic system. Seeing such political will to change policy over a 5.4 per 100,000 death rate, would therefore tell us something about the importance of individual lives, and the political will to implement policies that should affect the mortality statistics positively.

At the same time, it is also important to acknowledge that there is granted enormous resources on health care, and health is a political subject. The traffic analogy is therefore an illustration of the importance of every life saved, and not an undermining of the political resources used on health care.

8.4.2 The Politics of Health Care Financing Models

When every improvement in the mortality statistics is valued, the debate additionally touches upon the politics behind the models. Universalism, for instance, is based on the view of health care as a right. This is both because such a policy would view life as valuable in itself, but also, as argued in Chapter 2, because of the economic value of having a healthy population.

Universalism is perhaps the biggest causal impact the health care financing models have on cardiovascular mortality. This is the main reason why the SHI and NHS were expected to perform better than the PHI. In the U.S., one of the challenges of universalism is, as mentioned, linked to attitudes about social groups. Even though taking responsibility for personal choices are very important, this cannot overlap with the discussion of universality. Firstly, it would be difficult to determine what a personal choice with negative impact on cardiovascular mortality would be, and secondly, there would be problems related to the personal choices one make that have a positive impact on mortality. Could a patient have done more to keep her health? It is therefore central to stress the importance of universal health care, and this would have impact on how good a model is, despite the low extent of explanatory power it would have on cardiovascular mortality.

When looking at the political fundamental of the models, it is clear that the meaning of every policy improvement assumed to save lives is of very high political importance. Since every life saved would be important, the extent of explanatory power of the health care financing systems should therefore be viewed as very high. The choice of health care financing model does therefore matter, even though the differences in deaths per 100,000 are low.

9 Conclusion

This thesis has aimed at answering the question of to what extent the National Health Service model, the Social Health Insurance model and the Private Health Insurance model affect cardiovascular mortality in OECD countries. Further, based on the theories presented in Chapter 2, two hypotheses were created. These were that the NHS and SHI was expected to have lower cardiovascular mortality rates than the PHI, and the SHI was additionally expected to perform somewhat better than the NHS. By running OLS with PCSE regressions, and illustrating the findings through two case studies, the answer provided is solid.

From the regressions in Chapter 5 it is clear that when moving from the NHS to the SHI or PHI, the change in cardiovascular mortality is less than 1%. In absolute numbers, however, this would account for very different amounts of lives in the different countries. The correlation shows that the PHI accounts for a higher mortality rate than the NHS and SHI, and the first hypothesis is therefore true. These results were significant at a 0,001 level. In regards of the second hypothesis, the robustness is not as strong, but the overall trend is that the SHI seem to perform somewhat better than the SHI. Even though the correlation is present, and supported by the theoretical assumptions, the main conclusion is therefore that the models affect cardiovascular mortality in OECD countries to a low extent.

The discussion in Chapter 8, however, showed that the overall conclusion must be somewhat modified. This is primarily based on the high average life expectancy in the OECD countries, which indicates that there is a limit on how much the models can affect mortality, since it is not possible to postpone death forever. It is also argued that a change of financing model should not be expected to give immediate effects, due to the slow moving effects of health care systems. The high extent of behavioral impact on developing CVDs additionally limits the models room of maneuver. Lastly, the discussion that politically, it is important to implement policies that These are all ways of creating a premise about the health care systems having limited ways of controlling cardiovascular mortality, which implies that the differences that exist between the models should be emphasized.

It seems clear from the discussion in the thesis that for the PHI model, the lack of universal coverage is a crucial policy adaption, which would improve the cardiovascular mortality in the model as a whole. The NHS struggles with financial burdens linked to the limits of how far one

can raise taxes, while the SHI mainly struggle with the separation between health care funds and providers of services, which should lead to higher competition, does not operate as planned in all countries. Additionally the NHS and SHI model share the problem with waiting lists for services. Given the low overall explanatory power of the models, further policy implementations should therefore aim to improve the weaknesses within the distinct models.

The thesis does not, however, fully touch upon how *good* the models are. With an implication of every life saved being valuable, one should develop a throughout framework of how the different models could be improved. Small differences are important when developing actual health care policies, and this research is therefore very useful. At the same time, this thesis shows that given the high life expectancy estimates, viewing average numbers is probably not the most useful way of studying the effects of health care financing models on cardiovascular mortality. Future studies should therefore concentrate on certain socioeconomic groups to see if the different models include bias towards, for instance, the rich or the poor. The finding on equity in the case of Spain also supports this.

As mentioned introductory, this thesis does not say anything about how much resources it takes to change model. One could therefore not conclude that the systems that accounts for the lowest mortality statistics in this sample should be used in all countries. Additionally, as seen in Poland, the implementation of a system in itself is not enough. There could be problems in the implementation process that would lead to the model to not operating at its full effect. The findings are still important for further discussion, and a broader framework should be developed, given the increases in public funding of health care across all borders. The source of funding does not matter to a very high extent. It is rather the choice of funding that seems to matter, given the ideological difference between the models and the impacts this have on what treatment a country's citizens can receive.

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Appendix 1: Regressions

Dataset and do.-file can be obtained on request per email: tmwhaugen@gmail.com

1 Model 1: Mortality from Diseases of the Circulatory System Switzerland categorized as PHI until 1996						
	Coef.	**Std. Err.**	**z**	**P>|z|**	**95% conf intervall**	
SHI	-24.191	18.661	-1.30	0.195	-60.766	12.385
PHI	145.107	19.161	7.57	0.000	107.552	182.662
Age	2.719	3.511	0.77	0.439	-4.163	9.601
Alcohol	18.490	3.762	4.92	0.000	11.116	25.863
Tobacco use	8.650	1.124	7.70	0.000	6.447	10.853
GDP	-.008	.001	-10.01	0.000	-.010	-.007
Democracy	221.258	55.263	4	0.000	112.945	329.570
rhos =	0	0	0	.601	0	0

2 Model 1: Mortality from Ischaemic heart disease Switzerland categorized as PHI until 1996						
	Coef.	**Std. Err.**	**z**	**P>|z|**	**95% conf intervall**	
SHI	-19.503	19.373	-1.01	0.314	-57.473	18.467
PHI	144.832	18.406	7.87	0.000	108.757	180.907
Age	1.393	2,548	0.55	0.585	-3.602	6.388
Alcohol	5.415	2.939	1.84	0.065	-.345	11.175
Tobacco use	4.995	.942	5.30	0.000	3.149	6.842
GDP	-.004	.001	-5.73	0.000	-.005	-.003
Democracy	81.744	33.520	2.44	0.015	16.045	147.442
rhos =	0	0	0	.840	0	0

3 Model 1: Mortality from Acute myocardial infarction Switzerland categorized as PHI until 1996						
	Coef.	**Std. Err.**	**z**	**P>|z|**	**95% conf intervall**	
SHI	-45.178	7.761	-5.82	0.000	-60.389	-29.968
PHI	17.507	6.203	2.82	0.005	5.350	29.665
Age	-3.880	1.167	-3.32	0.001	-6.168	-1.583
Alcohol	6.633	1.214	5.46	0.000	4.253	9.013
Tobacco use	2.372	.631	3.76	0.000	1.135	3.609
GDP	-.002	.000	-0.85	0.396	-.001	.000
Democracy	34.591	19.873	1.74	0.082	-4.360	73.541
rhos =	0	0	0	.257	0	0

4 Model 1: Mortality from Cerebrovascular disease Switzerland categorized as PHI until 1996						
	Coef.	**Std. Err.**	**z**	**P>|z|**	**95% conf intervall**	
SHI	-13.550	6.825	-1.99	0.047	-26.926	-.173
PHI	-.146	5.343	-0.03	0.978	-10.617	10.326
Age	.199	1.012	0.20	0.844	-1.784	2.182
Alcohol	6.074	.954	6.37	0.000	4.204	7.944
Tobacco use	2.292	.514	4.46	0.000	1.284	3.299
GDP	-.003	.000	-7.79	0.000	-.004	-.002
Democracy	81.678	24.093	3.39	0.001	34.357	128.899
rhos =	0	0	0	.481	0	0

5 Model 1: Mortality from Diseases of the Circulatory system Interpolated Values					
	b/t	b/t	b/t	b/t	b/t
SHI	-3.803	-0.895	-0.352	-0.732	-0.809
	(-1.26)	(-.98)	(-0.49)	(-1.46)	(-1.58)
PHI	-1.887	-0.444	-0.175	-0.362	-0.648^
	(-1.28)	(-0.98)	(-0.49)	(-1.46)	(-1.90)
Age	-71.062***	-72.643***	-82.137***	-62.020***	-62.121***
	(-14.15)	(-31.22)	(-17.68)	(-6.05)	(-6.07)
Alcohol		25.150***	28.731***	31.360***	31.430***
		(5.90)	(7.19)	(8.99)	(9.01)
Tobacco use			-2.121*	-2.877**	-2.875**
			(-2.26)	(-3.05)	(-3.05)
GDP				-0.007*	-0.007*
				(-2.25)	(-2.25)
Democracy					1.367
					(1.39)
Constant	1432.557***	1192.620***	1341.795***	1247.947***	1247.228***
	(23.38)	(21.83)	(16.24)	(13.83)	(13.83)
N	1716.000	1716.000	1716.000	1716.000	1716.000

6 Model 1: Mortality from Ischaemic heart disease Interpolated Values					
	b/t	b/t	b/t	b/t	b/t
SHI	1.054	1.254^	1.302^	0.774	0.731
	(1.23)	(1.65)	(1.78)	(1.49)	(1.40)
PHI	0.525	0.625^	0.649^	0.385	0.214
	(1.23)	(1.65)	(1.77)	(1.48)	(0.69)
Age	-33.085***	-33.065***	-34.447***	-20.189**	-20.242**
	(-20.51)	(-20.58)	(-13.43)	(-3.15)	(-3.16)
Alcohol		1.423	2.011	3.029	3.066
		(0.50)	(0.69)	(1.20)	(1.21)
Tobacco use			-0.314	-0.484	-0.483
			(-0.67)	(-1.05)	(-1.04)
GDP				-0.004*	-0.004*
				(-2.38)	(-2.38)
Democracy					0.835
					(0.98)
Constant	635.669***	620.658***	641.857***	562.823***	562.344***
	(32.34)	(17.49)	(13.81)	(10.27)	(10.26)
N	1716.000	1716.000	1716.000	1716.000	1716.000

7 Model 1: Mortality from Acute Myocardial Infarction Interpolated Values					
	b/t	b/t	b/t	b/t	b/t
SHI	0.238	0.276	0.142	0.028	0.024
	(0.89)	(1.08)	(0.79)	(0.24)	(0.21)
PHI	0.114	0.132	0.068	0.013	-0.038
	(0.90)	(1.09)	(0.79)	(0.24)	(-0.63)
Age	-26.454***	-23.765***	-16.652***	-8.469*	-8.503*
	(-19.99)	(-11.36)	(-3.85)	(-2.14)	(-2.15)
Alcohol		5.149	2.632	4.947^	4.998^
		(1.61)	(0.83)	(1.92)	(1.94)
Tobacco Use			2.018^	0.797	0.795
			(1.78)	(0.78)	(0.78)
GDP					-0.004***
					(-3.95)
Democracy					0.505
					(1.04)
Constant	450.454***	361.657***	236.883**	238.611***	238.006***
	(25.73)	(6.28)	(2.77)	(3.47)	(3.46)
N	1089.000	1089.000	1089.000	1089.000	1089.000

8 Model 1: Mortality from Cerebrovascular disease Interpolated Values					
	b/t	b/t	b/t	b/t	b/t
SHI	-0.627	0.229	0.354	0.160	0.148
	(-0.72)	(0.53)	(1.20)	(0.82)	(0.75)
PHI	-0.312	0.114	0.176	0.079	0.036
	(-0.73)	(0.53)	(1.20)	(0.82)	(0.30)
Age	-23.446***	-24.301***	-25.379***	-14.846***	-14.858***
	(-16.37)	(-27.73)	(-20.02)	(-5.04)	(-5.05)
Alcohol		6.659***	7.421***	8.487***	8.506***
		(4.39)	(5.60)	(7.80)	(7.81)
Tobacco use			-0.212	-0.322	-0.322
			(-0.88)	(-1.40)	(-1.40)
GDP				-0.003***	-0.003***
				(-3.76)	(-3.76)
Democracy					0.205
					(0.60)
Constant	440.489***	382.563***	394.864***	331.467***	331.342***
	(25.13)	(20.11)	(17.26)	(13.15)	(13.15)
N	1716.000	1716.000	1716.000	1716.000	1716.000

9 Model 2: Mortality from Diseases of the Circulatory System Interpolated Values					
	b/t	b/t	b/t	b/t	b/t
SHI	-0.882	-0.574	-0.187	-0.630	-0.222
	(-0.34)	(-0.71)	(-0.29)	(-1.40)	(-0.51)
PHI	0.853	-0.131	-0.013	-0.261	-0.295
	(0.61)	(-0.32)	(-0.04)	(-1.12)	(-1.22)
CHS	9.851*	1.297	0.675	0.427	2.840^
	(2.10)	(0.97)	(0.63)	(0.54)	(1.78)
Age	-70.692***	-72.597***	-72.597***	-62.001***	-62.109***
	(-31.19)	(-31.19)	(-31.19)	(-6.05)	(-6.07)
Alcohol		25.125***	25.125***	31.351***	31.423***
		(5.89)	(5.89)	(8.99)	(9.02)
Tobacco use				-2.876***	-2.869**
				(-3.05)	(-3.04)
GDP				-0.007*	-0.007*
				(-2.25)	(-2.25)
Democracy					2.908^
					(1.78)
Constant	1425.352***	1192.010***	1192.010***	1247.713***	1244.819***
	(23.19)	(21.82)	(21.82)	(13.83)	(13.81)
N	1716.000	1716.000	1716.000	1716.000	1716.000

10 Model 2: Mortality from Ischaemic Heart Disease Interpolated Values					
	b/t	b/t	b/t	b/t	b/t
SHI	1.029	1.138^	1.160^	0.617	0.738
	(1.45)	(1.69)	(1.80)	(1.36)	(1.58)
PHI	0.502	0.517	0.525	0.236	0.219
	(1.39)	(1.45)	(1.52)	(1.00)	(0.92)
CHS	-0.091	-0.426	-0.490	-0.606	0.032
	(-0.07)	(-0.35)	(-0.42)	(-0.73)	(0.02)
Age	-33.088***	-33.080***	-34.465***	-20.210**	-20.242**
	(-20.51)	(-20.58)	(-13.43)	(-3.16)	(-3.16)
Alcohol		1.429	2.019	3.041	3.066
		(0.51)	(0.69)	(1.20)	(1.21)
Tobacco use			-0.314	-0.484	-0.483
			(-0.68)	(-1.05)	(-1.04)
GDP				-0.004*	-0,004*
				(-2.38)	(-2.38)
Democracy					0.849
					(0.68)
Constant	635.734***	620.879***	642.118***	563.126***	562.321***
	(32.34)	(17.49)	(13.81)	(10.28)	(10.26)
N	1716.000	1716.000	1716.000	1716.000	1716.000

11 Model 2: Mortality from Acute Myocardial Infarction Interpolated Values					
	b/t	b/t	b/t	b/t	b/t
SHI	0.315^	0.215	0.115	0.017	0.081
	(1.71)	(1.33)	(1.05)	(0.25)	(0.79)
PHI	0.186^	0.072	0.041	0.002	-0.001
	(1.95)	(1.27)	(1.11)	(0.11)	(-0.04)
CHS	0.459	-0.411	-0.180	-0.074	0.399
	(0.51)	(-0.58)	(-0.33)	(-0.20)	(0.62)
Age	-26.431***	-23.779***	-16.660***	-8.473*	-8.495*
	(19.97)	(-11.37)	(-3.86)	(-2.14)	(-2.15)
Alcohol		5.165	2.640	4.951^	5.001^
		(1.62)	(0.84)	(1.92)	(1.94)
Tobacco use			2.017^	0.796	0.797
			(1.77)	(0.78)	(0.78)
GDP				-0.004***	-0.004***
				(-3.95)	(3.95)
Democracy					0.726
					(1.99)
Constant	450.082***	361.729***	236.965**	238.649***	237.504***
	(25.70)	(6.30)	(2.77)	(3.47)	(3.46)
N	1089.000	1089.000	1089.000	1089.000	1089.000

12 Model 2: Mortality from Cerebrovascular Disease Interpolated Values					
	b/t	b/t	b/t	b/t	b/t
SHI	0.078	0.322	0.343	0.103	0.125
	(0.10)	(0.85)	(1.31)	(0.60)	(0.72)
PHI	0.305	0.199	0.165	0.024	0.022
	(0.68)	(0.98)	(1.21)	(0.28)	(0.24)
CHS	2.182	0.335	-0.044	-0.224	-0.105
	(1.55)	(0.49)	(-0.10)	(-0.72)	(0.19)
Age	-23.370***	-24.290***	-25.380***	-14.853***	-14.858***
	(-16.30)	(-27.72)	(-20.02)	(-5.04)	(-5.05)
Alcohol		6.656***	7.422***	8.502***	8.506***
		(4.39)	(5.60)	(7.81)	(7.81)
Tobacco use			-0.212	-0.323	-0.322
			(-0.88)	(-1.40)	(1.40)
GDP				-0.003***	-0.003***
				(-3.76)	(-3.76)
Democracy					0.151
					(0.29)
Constant	438.936***	382.378***	394.876***	331.571***	331.424***
	(24.96)	(20.12)	(17.26)	(13.15)	(13.15)
N	1716.000	1716.000	1716.000	1716.000	1716.000

13 Model 1: Mortality from Diseases of the circulatory system without control for age						
	Coef.	**Std. Err.**	**z**	**P > |z|**	**[95% Conf.**	**Interval]**
SHI	-18.657	17.791	-1.05	0.294	-53.526	16.212
PHI	157.299	16.461	9.56	0.000	125.037	189.562
Alcohol	20.758	3.417	6.07	0.000	14.060	27.455
Tobacco use	8.409	1.137	7.40	0.000	6.181	10.637
GDP	-.009	.001	-9.86	0.000	-.010	-.007
Democracy	236.981	52.387	4.52	0.000	134.305	339.657
rhos =	0	0	0	.645	0 …	0

14 Model 1: Mortality from Ischaemic heart disease without control for age						
	Coef.	**Std. Err.**	**z**	**P > |z|**	**[95% Conf. Interval]**	
SHI	-18.307	18.152	-1.01	0.313	-53.884	17.270
PHI	152.272	15.930	9.56	0.000	121.049	183.495
Alcohol	6.043	2.771	2.18	0.029	.612	11.474
Tobacco use	4.950	.935	5.29	0.000	3.117	6.784
GDP	-.004	.001	-5.72	0.000	-.005	-.002
Democracy	87.534	28.824	3.04	0.002	31.039	144.028
rhos =	0	0	0	.842	0 …	0

15 Model 1: Mortality from Acute Myocardial Infarction without control for age						
	Coef.	**Std. Err.**	**z**	**P > |z|**	**[95% Conf. Interval]**	
SHI	-45.072	8.265	-5.45	0.000	-61.271	-28.873
PHI	23.732	6.561	3.62	0.000	10.872	36.592
Alcohol	5.132	1.125	4.56	0.000	2.927	7.337
Tobacco use	2.447	.695	3.52	0.000	1.085	3.810
GDP	-.000	.000	-1.96	0.050	-.001	-3.18
Democracy	1.835	19.402	0.09	0.924	-36.193	39-862
rhos =	0	0	0	-.210	0 …	0

16 Model 1: Mortality from Cerebrovascular disease without control for age						
	Coef.	**Std. Err.**	**z**	**P > |z|**	**[95% Conf. Interval]**	
SHI	-12.920	6.727	-1.92	0.055	-26.104	.265
PHI	-2.272	4.315	-0.53	0.598	-10.729	6.185
Alcohol	5.855	.969	6.04	0.000	3.956	7.754
Tobacco use	2.296	.519	4.43	0.000	1.280	3.313
GDP	-.003	.000	-8.75	0.000	-.004	-.002
Democracy	83.404	24.210	3.45	0.002	35.954	130.954
rhos =	0	0	0	.446	0 …	0

Appendix 2: ICD Revisions and Codes

17 Overview of Revisions of ICD Used

Country	ICD-7	ICD-8	ICD-9	ICD-10
Australia	1960-1967	1968-1978	1979-1997	1998-2004, 2006-
Austria	1960-1968	1969-1979	1980-2001	2002-2011
Belgium	1960-1967	1968-1978	1979-1997	1998-1999, 2003-
Canada	1960-1968	1969-1978	1979-1999	2000-2009
Chile	1960-1967	1968-1979	1980-1982, 1984-1996	1997-2009
Czech	-	-	1986-1993	1994-2011
Denmark	1960-1968	1969-1993	-	1994-2011
Estonia	-	-	1981-1982, 1985-1996	1997-2011
Finland	1960-1968	1969-1986	1987-1995	1996-2011
France	1960-1967	1968-1978	1979-1999	2000-2009
Germany	-	-	1990-1997	1998-2011
Greece	1961-1967	1968-1978	1979-2010	-
Hungary	1960-1968	1969-1978	1979-1995	1996-2011
Iceland	1960-1970	1971-1980	1981-1995	1996-2009
Ireland	1960-1967	1968-1978	1979-1995	1996-2009
Israel	-	1975-1978	1979-1997	1998-2010
Italy	1960-1967	1968-1978	1979-2002	2003, 2006-2010
Japan	1960-1967	1968-1978	1979-1994	1995-2011
Korea	-	-	1985-1994	1995-2011
Luxembourg	1967-1970	1971-1978	1979-1997	1998-2011
Mexico	-	1969-1973	1981-1983, 1985-1997	1998-2010
Netherlands	1960-1968	1969-1978	1979-1995	1996-2011
New Zealand	1960-1967	1968-1978	1979-1999	2000-2009
Norway	1960-1968	1969-1985	1986-1995	1996-2011
Poland	1960-1968	1969-1979	1980-1996	1999-2011
Portugal	1960-1970	1971-1979	1980-2001	2002-2003, 2007-
Slovak	-	-	1992-1993	1994-2010
Slovenia	-	-	1985-1996	1997-2010
Spain	1960-1967	1968-1969,	1980-1998	1999-2011
Sweden	1960-1968	1960-1986	1987-1996	1997-2010
Switzerland	1960-1968	1969-1994	-	1995-2010
Turkey	Data not	Data not	Data not available	Data not available
United	1960-1967	1968-1978	1979-1999	2001-2010
United States	1960-1967	1968-1978	1979-1998	1999-2010

18 ICD Coding of the Dependent Variable

	ICD-7	ICD-8	ICD-9	ICD-10
Diseases of the Circulatorys System	330-334, 400-468	390-4358	390-459	I00-I99
Iscaemic Heart Disease	420-422	410-414	410-414	I20-I25
Acute Myocardial Infarction	-	410	410	I21-I22
Cerebrovascular Disease	330-334	430-438	430-438	I60-I69

Appendix 3: OECD-variables

19 Break in Series on Variables from OECD	
Australia	1968, 1979, 1998
Austria	1969, 1980, 2002
Belgium	1968, 1979, 1998
Canada	1969, 1980, 2000
Chile	1969, 1980, 1997,
Czech Republic	1994,
Denmark	1969, 1994
Estonia	1997
Finland	1969, 1987, 1996,
France	1968, 1979, 2000
Germany	1998
Greece	1968, 1979,
Hungary	1969, 1979, 1996,
Iceland	1971, 1981, 1996,
Ireland	1968, 1979, 2007,
Israel	1979, 1998,
Italy	1968, 1979, 2003
Japan	1968, 1979, 1995
Korea	1995
Luxembourg	1971, 1979, 1998,
Mexico	1998
Netherlands	1969, 1979, 1996
New Zealand	1968, 1979, 2000
Norway	1969, 1986, 1996,
Poland	1969, 1980, 1999
Portugal	1971, 1980, 2002,
Slovak Republic	1994
Slovenia	1997
Spain	1968, 1980, 1999
Sweden	1969, 1987, 1997
Switzerland	1969, 1995,
United Kingdom	1968, 1979, 2001,
United States	1968, 1979, 1999,

20 Age structure of population (2010) used to compute age-standardized death rates	
Age (years)	**Population**
0	**1.28**
1-4	**5.04**
5-9	**6.16**
10-14	**6.20**
15-19	**6.62**
20-24	**6.77**
25-29	**7.01**
30-34	**6.94**
35-39	**7.17**
40-44	**7.10**
45-49	**7.11**
50-54	**6.60**
55-59	**5.98**
60-64	**5.40**
65-69	**4.21**
70-74	**3.58**
75-76	**2.88**
80-84	**2.13**
85+	**1.82**
Total	**100.00**