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KEEPING AN EYE ON IRIS:
RISK AND INCOME SOLIDARITY IN
OECD HEALTHCARE SYSTEMS

ACHIM SCHMID
PASCAL SIEMSEN
RALF GÖTZE

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Jacobs Universität Bremen • Jacobs University Bremen
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*Achim Schmid
Pascal Siemsen
Ralf Götze*

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Achim Schmid, Pascal Siemsen, Ralf Götze

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Universität Bremen

Sonderforschungsbereich 597 / Collaborative Research Center 597

Staatlichkeit im Wandel / Transformations of the State

Postfach 33 04 40

D - 28334 Bremen

Tel.:+ 49 421 218-56644

Fax:+ 49 421 218-56633

Homepage: <http://www.staatlichkeit.uni-bremen.de>

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ABSTRACT

In most wealthy democracies as represented by long-term OECD-members, healthcare systems have been established which guarantee access to a broad package of health services. However, healthcare financing involves varying distributive effects and builds on different concepts of solidarity. Healthcare researchers have examined these equity issues in healthcare financing measuring the progressivity of healthcare financing using micro-level data. Most notably, the ECuity-project published progressivity indices in some European countries and the US for the late 1980s and early 1990s. Not least due to the rather complex procedure involved with the evaluation of income and expenditure surveys, such indices have been rarely calculated since.

From these studies on redistributive effects, we know that the main modes of financing quite consistently correspond to different levels of progressivity. Moreover, financing modes reflect different concepts of solidarity. Therefore, we suggest an alternative indicator to explore equity issues in healthcare financing using aggregate spending and revenue data. The Index of Risk and Income Solidarity (IRIS) is based on the respective share of distinct modes of financing. We distinguish modes of financing which involve ex-ante redistribution of health risks from those which entail only ex-post redistribution or none at all. Further, we differentiate financing modes which are related to personal or household income from those which involve no income redistribution.

We assume an increase of risk solidarity as well as a decline of income solidarity in the OECD-world. First of all, new and costly medical technologies drive the demand for ex-ante redistribution of health risks. At the same time, hopes to increase efficiency of healthcare provision through forms of co-payments have been disappointed. The decline of income solidarity is expected as a result of global competition. In order to reduce labour costs, OECD countries substitute social security contributions by flat-rate premiums or general taxes. In the light of global competition, governments also tend to strengthen indirect taxes since it is far more difficult to shift consumption abroad. Finally, we assume that it is easier to legitimize rising tobacco or alcohol taxes if they are ear-marked for healthcare financing.

We examine these assumptions presenting time series of risk and income solidarity based on OECD health data, OECD revenue statistics and national aggregate data on healthcare financing. We cover eleven OECD countries: Australia, Belgium, Canada, Denmark, France, Germany, Japan, the Netherlands, Switzerland, the UK and the US. These countries reflect a broad spectrum of healthcare system types in the OECD-world. The observation period starts at the eve of the first oil crisis in the 1970s and ends at the onset of the Great Recession in 2009.

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INTRODUCTION

In most wealthy democracies as represented by long-term OECD-members, healthcare systems have been established which guarantee access to a broad package of health services. The sole major exception is the healthcare system of the US where a considerable minority of the population remains uninsured and for whom access is only guaranteed to emergency care. Thus, while cross-national differences in basic coverage have declined early, countries still use distinct financing mixes for healthcare. The main financing schemes include taxes, social insurance contributions, private insurance premiums, and out-of-pocket spending. Thereby, the financing schemes and, correspondingly, the resulting financing mix vary with respect to concepts of solidarity and the implied distributive effects.

During the post-war-era, well into the 1970s, OECD healthcare systems had experienced an expansion of public schemes.¹ An illuminating indicator is the increase of the public financing share in health up to roughly 1980. However, the challenges welfare states had to face with the economic turmoil triggered by the oil crises of the 1970s did not stop short of the health system. Cost containment strategies began to dominate health policy as a response to tax cuts and general efforts to downsize government spending (Marmor et al. 2005). Insurance contributions were increasingly perceived as a burden to the economy in times of growing international competition. Many countries raised co-payments in order to control expenditure growth due to consumer moral hazard and thereby hoping to increase the efficiency of healthcare provision (Abel-Smith and Mossialos 1994; Mossialos and Le Grand 1999). Until the late 1990s privatization of healthcare financing is observed in many OECD-countries. Since about 2000, this trend reversed and on average the public financing share increases again (Rothgang et al. 2008). At the same time, over the whole observation period convergence in terms of a declining variability of public financing share can be measured (Rothgang et al. 2010). These trends affect equity in health financing and redistributive efforts through health financing.

The literature has examined equity issues in healthcare financing measuring the progressivity of healthcare financing with survey data. Most notably, the ECuity-project published progressivity indices for some European countries and the US for the late 1980s and early 1990s (Wagstaff et al. 1999; Wagstaff et al. 1992). Not least due to the

¹ This includes, for example, the introduction of public Medicare and Medicaid schemes in the US in the 1960s, the inclusion of public coverage for outpatient care through Medibank/Medicare in Australia, the establishment of National Health Service (NHS) systems in the Nordic countries by the early 1970s and later in southern Europe as well as the expansion of social health insurance in Germany (early 1970s) and the Netherlands (late 1960s).

rather complex procedure involved with the evaluation of income and expenditure surveys, such indices have been rarely calculated since (De Graeve and Van Ourti 2003). Thus only snap shots of the redistributive effects involved with health financing are available while time series over several healthcare systems would provide insights into the ways the restructuring of welfare states has translated into the financing dimension of the healthcare system.

In this chapter, we argue that the different modes of healthcare financing can be distinguished according to the way the health risk is born collectively or individually. Further, health financing differs with respect to the way income groups are burdened, hence, the income redistribution implied by health financing schemes. Thus, conceptually, we look at risk solidarity – the way the healthy stand in for the sick *across* different risk groups – and income solidarity – the way the wealthy stand in for the poor. We use aggregate spending data from the OECD as well as national sources in order to determine the share of the financing sources which are related to distinct effects in terms of risk redistribution and income redistribution. This is the basis for constructing an index of risk and income solidarity: IRIS.

The organization of healthcare financing in terms of risk and income solidarity may be interpreted as a result of political struggle and the institutional conditions shaping the power of relevant actors in the healthcare field. Shifts in risk and income solidarity are issues of constant debate. General developments of healthcare systems and the welfare state give rise to the assumption that solidarity may have declined in the OECD-world. Costs increases and growing demand have met limited resources, thereby intensifying conflicts about who has to pay the rising costs and who will be affected by benefit cuts. Under conditions of permanent austerity, there has been an emphasis on individual responsibility, while secular trends of individualization may further compromise solidarity in favor of private healthcare for those who can afford it (Houtepen and ter Meulen 2000). At the same time, new and costly medical technologies drive the demand for ex-ante redistribution of health risks (Weisbrod 1991), while there is still strong public support for shared risks in case of illness. Further, hopes to increase efficiency of healthcare provision through forms of private co-payments have been disappointed more recently (Marmor and Wendt 2011). On balance these developments may still support risk solidarity, but not necessarily income solidarity. Additionally, the decline of income solidarity can be expected as a result of global competition. In order to reduce labour costs, OECD countries substitute social security contributions by flat-rate premiums or general taxes. In the light of global competition, governments also tend to strengthen indirect taxes since it is far more difficult to shift consumption abroad. Moreover, it is easier to legitimize rising tobacco or alcohol taxes if they are ear-marked for healthcare financing.

The chapter is structured as follows: In the next section we apply the concept of solidarity to health financing. Therefore we distinguish risk solidarity from income solidarity and explain the general idea of our Index of Risk and Income Solidarity (IRIS). The subsequent section sets out the methods and data used to construct IRIS in greater detail. Next, we present the results for eleven OECD countries: Australia, Belgium, Canada, Denmark, Germany, Japan, France, the Netherlands, Switzerland, the UK and the US. The observation period starts at the eve of the first oil crisis in the 1970s and ends at the onset of the financial crisis in 2009. This sample is a result of data availability. However, the countries reflect a broad spectrum of healthcare system types in the OECD-world. Moreover, we have calculated Kakwani indices for two countries and some years as a validation check of our income solidarity concept. The final section will discuss the results and conclude.

RISK AND INCOME SOLIDARITY

The concept of solidarity is not clearly defined and hence used differently. In a basic manner, we can understand solidarity “as a mutual attachment between individuals, encompassing two levels: a factual level of actual common ground between the individuals and a normative level of mutual obligations to aid each other, as and when should be necessary”(Bayertz 1999: 3). Thus, an important aspect is a mutual responsibility between the individual and the community, both standing in for each other (Jaeggi 2001: 288). In modern society, “voluntary solidarity in reciprocal arrangements of support and care within well-defined groups and communities has given way to comprehensive systems of organised and enforced solidarity” (Houtepen and ter Meulen 2000: 329). In healthcare financing solidarity is institutionalized in distinct financing schemes. Here, we argue, solidarity can be divided in two dimensions, namely risk solidarity and income solidarity.

Generally, any health insurance includes an element of solidarity as the healthy stand in for the sick. As insurance companies seek to adjust premiums to the individual health risk, solidarity only refers to specific risk groups. By contrast, risk solidarity describes the ex-ante redistribution of health risks. It means that regardless of the individual risk of becoming sick, everybody pays the same contribution for the health insurance. As the risk of becoming sick increases with age, the principle is often referred to solidarity with the elderly. Even within the same age group, risk profiles of individuals differ tremendously due to pre-existing conditions, occupational hazards, or differences in lifestyle. Hence, risk solidarity involves the redistribution of health risks and addresses inequalities that are often perceived as fixed through age or genetic predisposition. Nevertheless, there are class differences involved as people of the lower classes are more likely to carry the higher health risk. This is related to typical occupations, risk of unem-

ployment as well as influences of education and life-style. Mostly, people will assent that discriminations in health financing due to adverse health conditions should be avoided.

Income solidarity means that health spending of higher income groups supports those less well-off. The wealthy stand in for the poor. In political economy, a substantial redistribution from the top to the bottom of the income structure requires that higher income groups contribute a larger share to healthcare relative to their income. In this case the financing distribution is progressive. There is still some redistribution from top to bottom, if health financing is proportional to income. Here, the relative amount of income spent is fixed for every breadwinner. In absolute terms, the high incomes contribute more. A lack of income solidarity will have to be asserted where the poor pay more than the wealthy relative to their income to finance healthcare and we therefore observe a regressive financing structure.

The two dimensions of solidarity described and a dichotomous classification as either adhering to the solidarity principle or not lead to four possible combinations of how healthcare can be financed. Looking at the major financing schemes in healthcare, we find government financing, social health insurance (SHI), private health insurance (PHI) and out-of-pocket payments. They broadly correspond to different revenues, respectively direct and indirect tax, an income related premium, a nominal premium and direct payments but often the financing schemes also rely on separate sources of income. The revenues of respective financing schemes have to be assigned of being risk solidary and/or income solidary to evaluate the share of risk and income solidarity in healthcare financing.

In order to qualify for risk solidarity health payments may not depend on the individual risk of becoming sick or increase due to sickness. Hence, we have to judge financing sources whether they are related to the individual health risk. This is the case for any out-of-pocket payments, including over-the-counter drugs, prescription fees or cost-sharing. These payments are only made by those who are actually sick. There is no risk redistribution involved. Considering third party payers, risk redistribution means that premiums are not calculated on the basis of health risk assessment. Premiums increasing with the potential risk of getting sick or schemes which can either decline patients due to their health risk or preclude treatments are considered as non-risk-redistributive.

For the classification of income solidarity, one needs to know the redistributive effect of a financing scheme. This effect has been estimated by the ECuity project (Wagstaff et al. 1992). This project has analysed several countries presenting Kakwani indices for different forms of healthcare financing (Wagstaff et al. 1999; De Graeve and Van Ourti 2003). The Kakwani index is a measure of progressivity of financing, where zero is defined as proportional financing. Negative values indicate regressive financing and there-

fore a disproportionate burden for lower income groups. A positive Kakwani means progressive financing. Since, both, progressive financing and to a smaller degree also proportional financing involve redistribution from the rich to the poor, a non-negative Kakwani indicates income solidarity.

Consistently, over the observed countries direct taxes can be classified as progressive while indirect taxes are clearly regressive. This research also finds regressive values for private out-of-pocket spending. The results for health insurance premiums are more complex. Social health insurance contributions include elements with proportional as well as regressive and progressive effects. Generally, these contributions are income-related as a fixed percentage of wages is devoted to health insurance, and therefore income-proportional. However, contribution ceilings and in some cases opt-out-clauses for high earners limit the amount to which income is redistributed from rich to poor. By contrast, co-insurance of family members is a progressive element. The empirical results support progressive effects. For Germany and the Netherlands until the reform of 2006, social insurance contributions show a negative Kakwani-index, since the insurant may or must choose a private alternative above a certain income ceiling. Corrected for this bias, the contributions are at least proportional (De Graeve and Van Ourti 2003; Härpfer et al. 2009). The inverse effect applies to private health insurance premiums when take-up is limited to upper income groups. In general, the effect of nominal and risk-related premiums turns out to be regressive. This leads to the following classification scheme (Table 1).

Table 1: Classification of financing sources

	<i>Risk Solidarity</i>	<i>No Risk Solidarity</i>
<i>Income Solidarity</i>	Direct tax Income related contributions/ premiums	Charity Income-related service fees
<i>No Income Solidarity</i>	Indirect tax Flat rate contributions/ nominal premiums	Risk-related premiums Out-of-pocket spending

The redistributive effect of charitable spending on health has not been measured. Generally we may assume that revenues come from higher incomes while the beneficiaries are selected from lower income groups. Therefore, charity involves income solidarity. However, risk solidarity does not apply since spending decisions are taken ex post (after the risk is exposed due to illness/health needs). Income-related fees paid by individuals for the same medical services also represent a financing source combining income solidarity without risk-solidarity. Both examples do not play a crucial role anymore in most long-term OECD countries. Therefore, in the empirical section, we focus on the main financing schemes and do not report this cell.

DATA AND METHOD

The Index of Risk and Income Solidarity (IRIS) builds on OECD Health Statistics 2014 (OECD 2014b), OECD Revenue Statistics 2014 (OECD 2014a) and health data from national statistics. The analysis includes eleven OECD countries for the period 1970 to 2009. Most important for our purposes is the identification of financing sources as defined in the previous section (Table 1). The OECD health financing statistics focuses on the financing agent, which is defined as the institution which accrues moneys and is in charge of allocating resources to providers. Next to the financing agent, the OECD concept as published in the System of Health Accounts (SHA) also defines financing sources (OECD et al. 2011). The latter include government, corporations and households. However, only for some countries and a few years, it is possible to merge this information in order to ascertain the financing components of the respective agent. The main database only indicates the financing agent as the unit who pays for healthcare. Here, the OECD lists general government, social security funds, private insurance, private out-of-pocket payments, and non-profit institutions serving households (NPISH). Since financing agents at times rely on separate sources of income with varying redistributive impact, OECD statistics can only serve as the basis and will have to be complemented by national health statistics.

Looking at government revenues, money from indirect and direct taxes involves distinct distributive effects for households. Proportional earmarked taxes may have to be considered as well as the mix of revenues of the specific administrative unit (state, regional or local governments) responsible for health financing. Social security funds derive their income from contributions, which may be income-related or defined as a nominal premium, while often revenues are complemented by state subsidies, i.e. taxes. Private insurance and out-of-pocket payments are borne directly by individuals and do not impose problems of cross-financing with respect to classifying them into risk and/or income solidarity at the aggregate level. Hence, the main task for operationalizing IRIS is to quantify the different revenue shares of the government and insurance funds and to classify it according to the redistributive effect of the financing source. In the remainder of this section, we exemplify the procedures and data involved to construct IRIS.

In general, we start with the financing shares of the respective financing agent as provided by OECD Health Statistics (OECD 2014b). Then we scrutinize whether spending by financing agent is in line with the income sources defined in Table 1. For those financing agents that use different income sources, we have to consult national revenue statistics. Therefore, we will take a look at the two most important financing agents in this respect: general government and social insurance funds.

General government spending on health is divided into direct taxes and indirect taxes using OECD Revenue Statistics (OECD 2014a). However, some countries use ear-

marked taxes for health. Often this is merely political rhetoric. For example, in Germany tobacco tax raises were justified with health insurance costs perceived as a national responsibility such as expenditures for co-insured children. However, there is no legal basis for hypothecated taxes. Similarly, the Australian Medicare-levy, currently a 1.5 percent top-up on the income tax rate covering 18 percent of health expenditure, is not hypothecated and therefore not considered further in the calculation of IRIS (AIHW 2010). Denmark introduced a proportional health contribution, dedicated to health and covering a large part of health spending (SUM 2008: 11). That said, some authors highlight that revenue from the health contribution as well as other taxes are collected by the treasury and therefore they dissent with the idea of a hypothecated health tax (Olejaz et al. 2012: 65). By contrast, we have decided to account for the Danish health contribution in the tax-mix since it replaces financing by regional authorities. Regions and municipalities are responsible for healthcare. This means, before 2007, health financing reflects the revenues of regions and municipalities. The latter were funded by a proportional income tax and through national government grants (DSK 1973-2011). Consequently, regional and local financing is classified as risk and income solidarity while government grants are divided into a direct and an indirect tax share, of which the latter is risk solidary but does not involve income redistribution (OECD 2014a). Since 2007 the national government levies a proportional earmarked health contribution. At the same time the local government reform abolished the taxing authority of the regions. In order to classify the financing sources the healthcare contribution, as provided by Statistics Denmark, is subtracted from general government spending on health and classified as risk and income redistributive (DSK 2009-2011). For the remainder municipal revenues and subsidies from the central state have to be considered. In order to estimate the respective financing shares, the local government accounts as provided in the Statistical Yearbook of Denmark are used (DSK 1973-2011). Local taxes and grants from the municipalities to the regions refer to direct taxes, central government subsidies refer to general taxes, which are again divided into direct and indirect tax as reported by OECD Revenue Statistics (OECD 2014a).

With respect to social insurance funds, we have to distinguish nominal contributions, income-related contributions and government subsidies depending on the regulation of the specific insurance system. In France², for example, social insurance funds accounted for about three quarters of total health spending. The revenue of insurance funds includes income-related contributions, earmarked taxes and subsidies from general government revenue. We estimated the income-mix analyzing the revenue of the three most

² There is a break in series in 1995. We corrected the data for the years before 1995 using the growth rates of the data in the period 1980-1994 and calculated the new data on the basis of the year 1995.

important schemes that together represent 98 percent of the French population (Chevreul et al. 2010: 28): The general scheme (*caisse nationale d'assurance maladie des travailleurs salaries*, CNAMTS), the agricultural scheme (*mutualité sociale agricole*, MSA) and the scheme for self-employed people (*régime social des indépendents*, RSI). Data comes from the *commission des comptes de la sécurité sociale* (CCSS 1979-2013) Thus, in 2007 the funds received 42 percent from contributions, 30 percent from the general social contribution (CSG), 10 percent from general government, 10 percent are transfers from other social insurance and 8 percent are other revenues. Contributions classify as income solidary proportional financing. The same is true for the CSG representing a proportional earmarked tax. General government spending includes direct and indirect tax. Further, we assume that other social insurance revenue reflects the general revenue structure of SHI.

Similar procedures have been applied to US Medicare revenue, social insurance in Japan, Switzerland and the Netherlands. Concerning the US, Medicare revenue includes income-related contributions, a nominal premium³ and federal state subsidies (Medicare Board of Trustees 2014). In Japan, considerable revenue of insurance funds comes from general government. The revenue structure is estimated from national data⁴ (MHLW 2014). We also use national statistics to separate National Insurance contributions from general tax in the UK (Hawe and Cockcroft 2013).

Switzerland switched during our observation period from a PHI to a SHI system. The new social health insurance is financed by nominal premiums. To guarantee that everybody can afford healthcare, the state subsidizes the health insurance with tax financed allocations. Besides the basic health insurance, there are four other social insurances in Switzerland financing healthcare: The old age and survivors' insurance (*Alters- und Hinterbliebenenversicherung*, AHV), the disability insurance (*Invalidenversicherung*, IV), the accident insurance (*Unfallversicherung*, UVG) and the military insurance. AHV and IV are financed by the state and income related contributions. The UVG is completely financed by income related contributions and the military insurance is completely financed by the state. National data from the *Bundesamt für Statistik* (BFS) is used to get the revenue shares of the different sources (BFS 2014a, 2014b, 2014c, 2014d). The expenditure data is also taken from the BFS as it is displayed in more detail

³ Since 2007, there is a lower nominal premium for low incomes and a higher nominal premium above a certain income threshold (Rice et al. 2013: 116 ; Davis 2013: 5). We reclassified the nominal premium income-redistributive accordingly

⁴ The national definition of health care expenditure covers only about three quarters of OECD-defined health expenditure. Hence, our estimate assumes that the revenue structure observed in national data applies to the extended definition of social health insurance expenditure in OECD Health Statistics

indicating different social insurances for example. The figures are reallocated according to the financing shares.

The Netherlands represent a very complex SHI system. There are two compulsory health insurance schemes: the *Ziekenfondswet* (ZFW) which turned into the *Zorgverzekeringswet* (Zvw) in 2006 and the universal *Algemene Wet Bijzondere Ziektekosten* (AWBZ). The ZFW was financed by flat-rate premiums, income-related contributions and the state. The ZVW has the same financing sources. The AWBZ is financed by the state and income-related contributions. Data of the revenue of the two schemes comes from various national sources (CBS 1979, 1986; CVZ 2007, 2009, 2010; Staten-Generaal 1987-1988, 1989-1996, 2000-2001). The OECD only lists a general private category including different private insurances, OOP, non-profits and corporations before 1998. We use national data provided by the information office of private health insurers (KISG various years) to get the amount for PHI expenditure. The Dutch PHI included three groups of insured with different funding principles: civil servants (income-related contributions), members of the standard tariff WTZ (flat-rate premiums) and traditional PHI insured (risk-related premiums). Therefore, we divided the PHI expenditure according to the amount of insured persons of the three different schemes. Data for insured persons comes from Götze (2010). Finally, we take a state subsidy in account reducing the financial burden of the nominal ZVW premium for low-income households since 2006 (Agasi 2008). Therefore, we partially substitute nominal ZVW premiums by tax revenues.

In order to enhance the validity of IRIS we add weights to the concept of income solidarity. Next to the unweighted data, we apply the factor two on direct taxes. This is a simple adjustment accounting for the fact that the degree of progressivity varies among income-redistributive financing sources. Generally, direct taxes behave considerably progressive, while income related contributions to social insurance are often close to proportional financing. The latter is also true for proportional earmarked taxes. Income-redistributive sources are weighted with two, if they are levied on different income sources (e.g. wages and capital income), there are no income ceilings above which income is no longer liable to taxes or premiums, and there is a progressive tariff. As a consequence the maximum value of the concept of weighted concept of income solidarity is 200 percent indicating that the healthcare system is exclusively funded by progressive financing sources.

In an attempt to validate IRIS, we present Kakwani-indices for two countries and some years for which it has been possible to calculate redistributive effects from household surveys. In our calculation of Kakwani-indices we follow closely the methods set out in O'Donnell et al. (2008). For England, we have used the Benefits and Taxes Survey (ONS various years-a), which provides household income as well as their expendi-

tures on taxes and insurance contributions as the major sources of health financing. The distributive effects of out-of-pocket spending have been estimated with the Family Expenditure Database (ONS various years-b). Health expenditure includes medicine outside the NHS, NHS prescription charges, spectacles, NHS payments, dentists and services and private medical fees. For Germany, we have used the Income and Consumption Survey (EVS) (Destatis various years). This survey provides data on household income as well as direct taxes, social health insurance contributions and private premiums. The survey also lists health-related items purchased by households, prescription costs and fees paid by households. Household burden due to consumption tax had to be estimated. Therefore, we have grouped products according to the respective consumption tax rate. For some product categories we had to use an implicit tax rate. The rate is calculated by government revenue raised through these products divided by total household spending on these products. The implicit tax rate is used similarly in Härpfer et al. (2009). The time frame is limited to the years 1993, 1998, 2003 and 2008 since the German survey is only conducted every five years. Surveys before 1993 are not comparable since they provide a much less detailed consumption pattern for German households. The English surveys have been selected accordingly.

RESULTS

In this section we present IRIS for eleven countries for up to four decades. For some countries like France, the Netherlands, Switzerland and the UK, data availability has constrained the time series. In Tables 2 and 3, risk and income solidarity refer to the aggregated financing shares classified as either risk redistributive or income redistributive, respectively. Income solidarity in Table 4 weights revenue from highly progressive sources by multiplying this financing share with two. Finally, we will have a look at trends for income solidarity in Germany and the UK and compare these to results of income redistribution found in survey data.

Most countries show an increase in risk solidarity at the beginning of our observation period, except for Belgium and those countries where data lacks for the early years. This is related to the increase in public financing which largely corresponds to the definition of risk solidarity. The implementation of cost containment strategies following the economic crises of the 1970s and early 1980s as well as the widespread ideological turn to conservative policies involves a decline of risk solidarity in several countries during the 1980s and 1990s. However, the average is still rising slowly since 1985. This is related to Japan, Switzerland and the US, where risk solidarity increases constantly. In case of Japan, public coverage has increased in several reform steps until the mid-1980s. While there has been retrenchment since, further increases in risk solidarity can be related to demographic ageing and the exemption of the old-aged from co-payments (Tatara and

Okamoto 2009). In Switzerland the healthcare reform of 1996 introduced an obligatory basic social health insurance raising risk solidarity. However, the index also shows a general positive trend indicating secular trends towards more risk redistribution. The same is true for the PHI system of the US where risk solidary forms of financing slowly gain ground through increased coverage for children but also as the share of elderly qualifying for Medicare increases. While in Australia, Belgium, Denmark and the UK the negative trend of risk solidarity has been reversed since about 2000, this is not true for France and Germany. We attribute this to major retrenchment reforms again. In France, benefit cuts translated into the growth of voluntary private health insurance as well as mounting copayments (Chevreul et al. 2010). Similarly, in Germany several copayments were raised and a fee for physician visits was introduced in 2004 (Rothgang et al. 2010). In the Netherlands, the initial increase of risk solidarity between 1980 and 1985 was ironically related to an accumulation of bad risks under public insurance. The strong growth between 1990 and 1995 can be traced back to an expansion of benefits covered by the AWBZ. This measure was reversed in the late 1990s. In addition to that, cuts in the benefit package and deductibles shifted costs towards the patient. However, major changes took place with the reform of 2006 merging private and public schemes to a social health insurance under private law which tremendously enhanced risk solidarity of the Dutch financing system (Götze 2010).

Table 2: Risk solidarity

	1970	1975	1980	1985	1990	1995	2000	2005	2009	Change ⁺
Australia*	62.1	73.6	62.6	70.6	66.2	65.8	66.8	66.9	68.5	6.4
Belgium	79.3	78.2	76.2	74.8	81.3	76.8	74.6	76.1	76.0	-3.3
Canada	69.9	76.2	75.6	75.5	74.5	71.2	70.4	70.2	70.9	1.0
Denmark*	83.7	85.4	87.8	85.6	82.7	82.5	83.9	84.5	85.0	1.4
France			85.6	84.2	81.1	80.3	80.0	79.5	78.7	-7.0
Germany	77.5	83.4	83.1	81.6	80.9	81.7	79.8	76.6	76.9	-0.6
Japan	69.8	72.0	71.3	70.7	77.6	82.3	80.8	81.6	81.5	11.7
Netherlands			75.7	76.4	77.2	80.6	76.6	76.4	86.4	10.7
Switzerland**				32.8	34.9	32.9	58.8	63.2	63.5	30.7
United Kingdom		90.1	89.2	86.5	84.3	84.5	83.0	85.1	86.5	-3.6
United States	37.9	42.4	43.6	42.2	42.1	48.3	46.2	47.1	50.1	12.2
Average				71.0	71.2	71.5	72.8	73.4	74.9	3.9
Coeff.Var.				24.8	23.8	23.2	16.0	15.2	14.8	-10.0

* Unit: percent, first year 1971, ** Unit: percent, first year 1987, ⁺ 2009-first year

An important observation is the declining variance in risk solidarity. The development can be described as upward convergence. While the coefficient of variation for the full sample dropped by ten percentage points to 14.8 percent from 1985 to 2009, the average ascended to almost 75 percent. In particular the US and Switzerland, where risk-rated

premiums and out-of-pocket spending made or still make up a large part of health financing, have caught up in terms of risk solidarity.

Concerning the concept of income solidarity we depict the results for the unweighted and the weighted indicator. We start with the unweighted measure which has the same maximum value as the concept of risk solidarity: 100 percent. First of all, we observe that the average level of income solidarity is significantly lower compared to risk solidarity. While risk solidarity increases 3.9 percentage points between 1985 and 2009, income solidarity gained just 0.6 points. The trends also differ. Risk solidarity steadily increases during our observation period whereas income solidarity peaked in 1995 and nearly regressed to 1985 levels at the end of our observation period.

Table 3: Income solidarity (unweighted)

	1970	1975	1980	1985	1990	1995	2000	2005	2009	Change ⁺
Australia*	42.8	52.0	43.2	47.4	47.8	46.7	47.6	48.3	48.6	5.8
Belgium	63.3	64.6	60.9	61.1	65.3	67.9	64.6	63.3	63.7	0.4
Canada	45.4	49.1	48.1	47.8	52.6	50.2	50.6	49.3	50.9	5.5
Denmark*	59.4	62.5	61.2	77.5	74.5	82.5	77.6	77.2	79.0	19.6
France			80.1	78.7	77.2	76.2	76.1	74.3	72.8	-7.3
Germany	68.7	76.6	76.5	75.4	74.3	74.9	75.0	71.3	71.2	2.5
Japan	62.9	65.3	64.7	65.3	72.4	75.2	71.6	70.9	70.1	7.2
Netherlands			63.7	65.4	66.4	68.8	64.0	61.0	57.8	-5.9
Switzerland**				25.0	26.8	24.8	24.3	25.3	26.0	1.0
United Kingdom		65.2	60.9	57.4	57.7	52.8	55.0	59.9	61.0	-4.3
United States	29.4	33.2	35.3	33.7	33.6	37.8	37.5	36.7	40.4	11.0
Average				57.7	59.0	59.8	58.6	57.9	58.3	0.6
Coeff.Var				30.7	29.1	30.9	29.5	28.4	27.1	-3.6

* Unit: percent, first year 1971, ** Unit: percent, first year 1987, ⁺ 2009-first year

Having a closer look at single countries we can see that in countries such as Australia, France, or the US, income solidarity marches in line with risk solidarity but in others there are striking differences. In Switzerland the index nearly stagnates over time despite the introduction of the statutory health insurance in 1996. The latter boosted risk solidarity but not income solidarity. The same story applies to the Netherlands. The major health insurance reform of 2006 led to a strong increase of risk solidarity while income solidarity declined significantly. We also identify some catch-up effects as the United States, a traditional welfare policy laggard, shows strong increases in terms of income solidarity. On the other hand, this does not apply to Switzerland, and furthermore, we observe welfare state frontrunners such as Denmark extending income solidarity of its healthcare system by nearly 20 percentage points. As a consequence convergence of income solidarity is at most modest. The coefficient of variance only declines

by 3.6 percentage points between 1985 and 2009 and indicates a much more heterogeneous sample.

Table 4: Income solidarity (weighted)

	1970	1975	1980	1985	1990	1995	2000	2005	2009	Change ⁺
Australia*	85.6	104.1	86.3	94.8	95.5	93.4	95.3	96.6	97.1	11.5
Belgium	79.1	85.7	85.7	84.3	89.8	82.3	81.7	85.7	84.0	4.9
Canada	90.8	98.2	96.1	95.6	105.2	100.4	101.3	98.6	101.9	11.1
Denmark*	84.9	86.9	83.6	85.4	83.0	82.5	83.7	84.5	86.7	1.8
France			85.0	83.7	81.0	80.6	81.9	81.9	81.1	-3.9
Germany	79.2	86.5	86.0	84.6	83.2	82.9	80.6	77.0	77.3	-1.9
Japan	80.0	86.3	86.7	86.8	95.0	97.8	93.4	95.0	94.1	14.1
Netherlands			73.2	71.4	72.8	76.1	70.2	71.4	67.9	-5.3
Switzerland**				44.5	48.1	43.6	42.6	44.6	47.2	2.7
United Kingdom		122.3	113.4	104.2	102.2	95.0	99.8	102.3	106.2	-16.1
United States	51.4	56.7	59.0	54.9	56.2	63.1	63.9	63.6	69.0	17.6
Average				80.9	82.9	81.6	81.3	81.9	83.0	2.1
Coeff.Var				21.9	21.8	20.3	21.3	21.0	20.8	-1.1

* Unit: percent, first year 1971, ** Unit: percent, first year 1987, + 2009-first year

With regard to the weighted concept for income solidarity we observe a crucial re-ranking. Australia, Canada, and the UK belonging only to the (lower) middle field of the unweighted concept jump now to the top of the sample, caused by a large share of direct taxes in their financing mix. Moreover, the coefficient of variation of the weighted measure is significantly lower than the unweighted one. Again, the level of variance remains relatively stable over time. Changes over time largely remain in line with the observations made for the unweighted indicator. The exception is Denmark where unweighted income solidarity increased mainly due to proportional regional income tax replacing the government rebates for regional health authorities. Hence, direct and indirect tax shares dwindle. However, if we account for the different redistributive effects of proportional and progressive sources by respective weights, income solidarity remains fairly stable over time.

Finally, we compare the concept of income solidarity with the Kakwani index. As the calculation of the Kakwani index needs detailed household data, we are only able to address two healthcare systems: the English NHS and German SHI. In terms of the level, we observe that the Kakwani index of the English NHS is positive between 1993 and 2008 indicating progressive financing. In contrast to this, Germany's negative values depict regressive financing. This finding supports the validity of the weighted concept of income solidarity as the measure for UK strongly exceeds the German level.

Table 5: Kakwani indices and weights for England and Germany

England	1993		1998		2003		2008	
	Weight	Index	Weight	Index	Weight	Index	Weight	Index
Direct taxes	41.5	0.139	43.5	0.141	39.9	0.166	44.7	0.149
Indirect taxes	31.7	-0.136	28.6	-0.138	26.6	-0.168	24.7	-0.172
National insurance	11.0	0.068	10.8	0.052	17.4	0.061	16.6	0.072
Out-of-pocket	15.8	-0.129	17.0	-0.147	16.0	-0.124	13.9	-0.102
Total	100	0.002	100	0.002	100	0.012	100	0.022
IRIS unweighted		52.5		54.3		57.3		61.4
IRIS weighted		94.0		97.8		97.3		106.1

Germany	1993		1998		2003		2008	
	Weight	Index	Weight	Index	Weight	Index	Weight	Index
Direct taxes	8.9	0.267	6.4	0.283	5.7	0.282	6.4	0.281
Indirect taxes	7.4	-0.139	5.4	-0.113	5.5	-0.149	5.4	-0.176
Social insurance	64.4	-0.093	66.5	-0.105	65.3	-0.110	62.7	-0.092
Private insurance	8.2	0.221	9.1	0.273	9.8	0.264	10.6	0.217
Out-of-pocket	11.0	-0.085*	12.5	-0.188	13.6	-0.166	14.9	-0.195
Total	100	-0.038*	100	-0.056	100	-0.061	100	-0.055
IRIS unweighted		73.4		75.2		73.3		71.6
IRIS weighted		82.1		81.1		78.6		77.4

Weight = percentage share of financing source in total health care financing

Index = Kakwani-indices for the respective financing scheme and all financing schemes

*Regressivity underestimated due to survey design, yet, estimated trends maintain

Having a closer look at the development of the Kakwani index of the English NHS, we observe stability between 1993 and 1998 and then two strong increases of progressivity until 2008. This trend fits quite well to the development of the unweighted IRIS – but not the weighted one. With regard to Germany, the Kakwani indicates a strong increase of regressivity between 1993 and 2003 as well as slight decrease of regressivity until 2008. This time, the development of the weighted IRIS matches this overall trend better. Hence, the comparison of the Kakwani index and both measures for income solidarity does not lead to a clear result. This can be explained by the fact that IRIS assumes constant redistributive effects of the separate financing sources. It captures changes with respect to the financing share, but not in the degree of progressivity. Thus, IRIS maps the German trends fairly well since the redistributive effects of social insurance as the major financing source remains all but stable and the influence of direct tax is marginal. IRIS represents developments in the UK less appropriately due to the specific patterns of progressivity changes. Overall, this exercise supports the validity of the weighted concept but we identify some drawbacks especially in terms of the English trend between 1993 and 2003.

DISCUSSION AND CONCLUSION

This contribution has addressed developments of equity in healthcare financing in OECD-countries. We have done so using the concept of risk and income solidarity which allows us to present long-term trends for eleven countries. The turn to austerity policies including the emphasis on individual responsibility as well as individualization trends in recent decades suggested a decline of risk and income solidarity. By contrast, risk solidarity increases on average and the pattern can best be described as upward convergence. Only during the 1980s and early 1990s some countries show the expected downward trend. Over the whole observation period, it rather seems, common needs to share health risks within a strong community become increasingly accepted and perhaps increasingly necessary in the OECD-world. We attribute the latter to medical progress enhancing the range and costs of treatments. Also demographic ageing has a share in augmenting risk solidarity as pensioners are mostly covered by risk redistributive schemes. Moreover, the temporally increase of copayments in various OECD member states did mostly not fulfill the promises regarding cost containment.

In terms of “supply side oriented social policy” (Obinger and Starke 2015) risk solidarity avoids labour market problems due to a lack of healthcare coverage. A high level of risk solidarity indicates universal access to healthcare services maintaining volume and quality of the domestic labour force. Moreover, low levels of risk solidarity do not necessarily indicate less financial burden for companies. Private health insurances in Germany, the Netherlands (until 2006) and the United States reflect a significant amount of ancillary labour costs, yet, they barely contribute anything to the concept of risk solidarity.

A general decline of redistributive efforts with respect to income solidarity is not confirmed. Reduced income solidarity had been suggested as a response to globalization adjusting healthcare financing to economic requirements. On average, income solidarity remains fairly stable over time, while variance declines only marginally. Hence, we do not observe a race-to-the-bottom. Quite contrary, cross-national differences in terms of income redistribution persisted by and large.

Developments in Switzerland and the Netherlands strike out. Increases in risk solidarity in combination with low or reduced income solidarity can actually be interpreted as a functional requirement of open economies in global competition. Other social health insurance countries with initially high levels of income solidarity such as Belgium, France, and Germany, also relieved companies by shifting parts of the employers' contribution over to the employees. Although this measure affects the purchasing power of individual households it has no effect on IRIS. Moreover, Germany toyed with the introduction of flat-rate contributions, compromising income solidarity. In the end those plans were abandoned, and it is still an open question whether Swiss and Dutch reforms

will have to be seen as economic imperative and therefore serve as a blueprint for other SHI countries. In the absence of reforms, IRIS has changed through drift (Hacker 2004). The increase of IRIS in the US and Japan can only partly explained by new regulations. Next to risk solidarity also income solidarity is powered by demographic change, most notably in the US, where ageing steadily increases the population covered by Medicare. In terms of methodology, we have used the results of survey-based research on inequality in health financing to construct an index based on aggregated financing statistics. The risk and income solidarity approach gives insights into health financing equity over long time periods and a larger sample compared to the more detailed survey approach. Juxtaposing income solidarity results and Kakwani-indices for two countries has suggested that rank-positions and trends of redistributive effects are mapped fairly well. However, also drawbacks become apparent. The validity of IRIS is dependent upon the stability of the redistributive effects attributed to the respective financing sources. While shifts between direct and indirect taxes are accounted for, changes in progressivity through reforms of tax tariffs as well as the base for taxes or contributions remain unobserved as long as they do not lead to a reclassification of the respective financing source. In terms of theory, IRIS shows that risk solidarity and income solidarity do not necessarily march to the same tune, rather countries develop their specific mix of solidarity in health financing. Also, risk solidarity seems to be driven by common needs across OECD countries, while income solidarity may rather follow country-specific preferences and power relations. These tentative interpretations will have to be further scrutinized extending IRIS to a larger sample of countries.

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BIOGRAPHICAL NOTE

Achim Schmid is Visiting Fellow at the Department „Health Economics, Health Policy and Outcome Research“, Zentrum für Sozialpolitik (now SOCIUM) at the University of Bremen.

Telephone: +49 421 218-58553

E-Mail: achim_schmid@gmx.de

Address: Universität Bremen, Zentrum für Sozialpolitik, Unicom-Gebäude,
Mary-Somerville-Straße 5, 28359 Bremen

Pascal Siemsen is master student in political science at the University of Bremen and student assistant at the department „Gender Policy in the Welfare State“ (now SOCIUM) at the University of Bremen.

Telephone: +49 421 218-58519

E-Mail: psiemsen@uni-bremen.de

Address: Universität Bremen, Zentrum für Sozialpolitik, Unicom-Gebäude,
Mary-Somerville-Straße 5, 28359 Bremen

Ralf Götze is Associated Fellow at the Department „Health Economics, Health Policy and Outcome Research“, Zentrum für Sozialpolitik (now SOCIUM) at the University of Bremen.

Telephone: +49 421 218-58556

E-Mail: ralf.goetze@uni-bremen.de

Address: Universität Bremen, Zentrum für Sozialpolitik, Unicom-Gebäude,
Mary-Somerville-Straße 5, 28359 Bremen