Impact of Public Finances Used for Healthcare Schemes on Access to Healthcare Services and on Health Expenditures
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Abstract

For advanced countries facing the common changes to their economic environments of an aging population and fiscal deficits, controlling the expansion of healthcare costs is one of the most important domestic issues. As a reflection of this, public expenditure on health as a percentage of total health expenditures has been falling in some advanced countries. Equity in access to healthcare services is one of the roles expected of public finances used for healthcare schemes.

The first purpose of this study is to analyze the impact of public finances used for healthcare schemes on equity in access to healthcare. As indicators of equity in access to healthcare, we used (i) the ratio of out-of-pocket payments to household income, and (ii) the degree of regressivity in patients' out-of-pocket payments. We decided access to healthcare to be equitable the lower the first ratio and the lower the degree of regressivity. Next, we defined the magnitude of public intervention in healthcare cost payments as the ratio of healthcare expenditures paid through the public sector to total healthcare expenditures. We then calculated the correlation coefficients between this ratio and (i) and (ii) above. We looked at an eight-country sample of OECD members in which household expenditure data was available. Our calculations showed that when two countries where high-income groups are withdrawing from social health insurance schemes were omitted, the greater the proportion of public finances used for healthcare in total health expenditures and the more equitable the access to healthcare.

The second purpose of this study is to examine the impact that public finances used for healthcare schemes have on total healthcare expenditures per GDP. There are two hypotheses regarding the impact of public finances used for healthcare: (i) patients' copayments decline, which causes healthcare costs to rise; and (ii) the national government can act as the monopoly provider of health insurance, which facilitates the containment of health expenditures. Our panel analysis of 13 OECD member countries covering the period 1973–2000 showed that the greater the public finances used for healthcare in health expenditures, the smaller the percentage of total expenditure on health to GDP, which

supports hypothesis (ii). These results show that the cost-shifting of healthcare costs to the private sector may in fact raise healthcare costs and exacerbate inequity in access to healthcare services.

Background and objectives

For advanced countries facing the common changes to their economic environments of an aging population and fiscal deficits, controlling the expansion of healthcare costs is one of the most important domestic issues. As a reflection of this, public expenditure on health as a percentage of total health expenditures has been falling in some advanced countries. The OECD Health Data shows that the ratio of private expenditure on health to total expenditure on health has been rising in more than a few countries from 1980 through 2000 (in other words, the weighting of public finances used for healthcare schemes has been falling). These include, for example, the United Kingdom (0.106→0.191), Germany (0.213→0.250), the Netherlands (0.308→0.366), Denmark (0.122→0.178), Sweden (0.075→0.150), and New Zealand (0.120→0.220).

This trend could cause public finances used for healthcare schemes to function less effectively than expected. The first purpose of this study is to analyze equity in the access to healthcare, from among the functions that public health insurance is expected to fulfill. Specifically, we aim to clarify the impact of public intervention in healthcare cost payments on equity in the access to healthcare. Here we define public finances used for healthcare as healthcare expenditures that are funded through the compulsory collection of taxes or insurance premiums. This includes social health insurance systems such as those in Japan, France, and Germany, and also systems such as the United Kingdom's National Health Service (NHS), which is not an insurance but is run through taxes. Public intervention in healthcare cost payment functions as a risk hedge against uncertainties in the demand for healthcare. It is also designed to maintain equity in access to healthcare services by creating a situation in which "appropriate healthcare services are available to all, regardless of income level." As indicators of equity in access to healthcare

services, we use (i) the degree of regressivity in patients' out-of-pocket payments and (ii) the ratio of out-of-pocket payments to household income. Even if policies are implemented to curtail expansion of public finances used, total healthcare expenditures will not be reduced if the amount curtailed is simply shifted to private expenditures (i.e., direct payments by patients and private health insurance).

The second purpose of this study is to examine the impact that public finances used for healthcare schemes have on total healthcare expenditures per GDP. Social health insurance is thought to be a factor in increasing healthcare expenditures because it reduces patients' out-of-pocket payments. Yet there is another view that a larger presence in public health insurance is effective in curtailing the rise in healthcare expenditures because the government can act as a monopolistic provider of insurance. We will use international comparisons to clarify which of these conflicting hypotheses is correct.

1. Public finances used for healthcare schemes and equity in access to healthcare
1-1. What is equity in access to healthcare?

Equity in access to healthcare can be viewed from two perspectives: in spatial terms and in economic terms. Equity access to healthcare in spatial terms refers to situations where there are small regional differences in the per capita number of medical institutions and hospital beds. Meanwhile, equity in access to healthcare in economic terms refers to the differences in access to healthcare resulting from differences in income levels. Both perspectives are important when considering equity in access to healthcare, but in this study we analyze equity in access to healthcare in economic terms.

This study considers the degree of equity in access to healthcare from two perspectives. The first is the degree of regressivity (or progressivity) in out-of-pocket payments. If the pattern of patients' out-of-pocket payments is regressive, it means that out-of-pocket payments as a proportion of household income (henceforth the "out-of-pocket ratio") is higher for low-income groups than it is for high-income groups. Since healthcare services are necessities, one would generally anticipate a regressive pattern in out-of-pocket payments. As the degree of regressivity grows, it shows that low-income groups are bearing a relatively larger burden of healthcare expenditures than high-income groups and suggests that low-income groups are at a disadvantage to high-income groups in terms of

access to healthcare. This study uses Kakwani's index as an indicator of the regressivity of the out-of-pocket burden. Kakwani's index was developed as an indicator of the progressivity or regressivity of taxation (Kakwani 1977). Wagstaff et al (1992, 1999) have used the index as a measure of the equity in healthcare expenditures, and this study uses the same index to measure for this. We take the negative value of this index, and the larger its absolute value, the greater the degree of regressivity.

Our second indicator of the degree of access to healthcare is the out-of-pocket ratio (i.e., out-of-pocket payments/household income). Kakwani's index is an indicator showing the relationship between out-of-pocket ratios for low-income groups and high-income groups. For reasons described below, it is important to focus on the absolute level of the out-of-pocket ratio when measuring the degree of access to healthcare. High-income groups could spend more of their income on luxury goods than low-income groups, and the former also can save a larger proportion of their income. As a result, high-income groups can divert expenditures away from luxury goods or draw down their savings to pay for healthcare more easily than low-income groups can. Consequently, even if high- and low-income groups have the same out-of-pocket ratio, we believe a higher ratio indicates that low-income groups are at a disadvantage in terms of access to healthcare than a lower ratio. We have therefore used the average out-of-pocket ratio for all income levels as another measure of equity in access to healthcare. We believe the larger the average out-of-pocket ratio, the more disadvantaged low-income groups are in terms of access to healthcare compared to high-income groups.

To summarize the points mentioned above:
1) When Kakwani's index is negative, the larger it is in absolute value (i.e., the out-of-pocket ratio for low-income groups is higher than that for high-income groups, the more low-income groups are disadvantaged in access to healthcare relative to high-income groups.
2) The larger the average out-of-pocket ratio, the more low-income groups are relatively disadvantaged in access to healthcare compared to high-income groups.
In other words, (i) when Kakwani's index is negative, the larger its absolute value or (ii) the higher the average out-of-pocket ratio for all income levels, the more inequitable the access to healthcare.

1-2. Methodology

We used "private expenditure on health" and "total expenditure on health" listed in the OECD Health Data as an indicator of the impact of public finances used for healthcare. We regard low private expenditure on health as a proportion of total expenditure on health (henceforth called the "private expenditure ratio") as an upshot of the big influence of public intervention in healthcare cost payments.

Specifically, our analysis followed the following process.

1) We measured Kakwani's index and average out-of-pocket ratio in eight countries for which household expenditure data was available.

2) We calculated the correlation coefficient between the private expenditure ratio and Kakwani's index and the correlation coefficient between the private expenditure ratio and the average out-of-pocket ratio.

3) When the former correlation coefficient is negative and/or the latter coefficient is positive, we believe that access to healthcare by low-income groups is easier as the degree of influence of public intervention in healthcare cost payments rises.

1-3. Data sources and results of calculations

The subjects in this study include eight countries: the United States, the United Kingdom, the Netherlands, Canada, Sweden, Germany, Japan, and France. These countries were selected on the basis of two criteria: first, they are advanced countries, and second, they have usable data on household expenditures. Calculations of Kakwani's index and the average out-of-pocket ratio were made using the data in Table 1. The OECD Health Data (2003) was used to calculate the private expenditure ratio (private expenditure on health/total expenditure on health).

Table 1. Data Resources

Country	Statistics	Research institute
United States	Consumer Expenditure Survey	Bureau of Labor Statistics
United Kingdom	Family Expenditure Survey	Office for National Statistics
The Netherlands	Budgetonderzoek (Family Budget Survey)	Centraal Bureau voor de Statistiek (Central Bureau of Statistics)
Canada	Family Expenditure in Canada	Statistics Canada
Sweden	Hushållens utigifter(Utigiftsbarometern) (Family Expenditure Survey)	Statistiska Centralbyrån Statistics Sweden)
Germany	Einkommens- und Verbrauchsstichproben (Income and Expenditure Survey)	Statistisches Bundesamt (Federal Statistical Office)
Japan,	National Survey of Family Income and Expenditure	Statistics Bureau
France	Budget des Ménages (Family Budget Survey)	Institut National de la Statistique et des Études Économiques (National Institute of Statistics and Economics Studies)

We used the average of calculated values for Kakwani's index, the average out-of-pocket ratio, and the private expenditure ratio from data observed in each country. Results of our calculations are shown in Table 2. In France's healthcare cost payment system, patients pay the full amount for healthcare services received to the medical institution and are reimbursed later for a set portion of these payments. We did not calculate an average out-of-pocket ratio for France because under this system, out-of-pocket payments shown in household expenditure surveys are higher than those actually paid by households. In addition, household income in the household expenditure surveys for each income

level of the seven countries excepting Sweden is shown before income tax, but for Sweden we are only able to obtain disposable income data. Since this would lead to an upward bias in the average out-of-pocket ratio for Sweden compared with other countries, we did not calculate it for Sweden.

Figure 1 shows each country's position plotting the average out-of-pocket ratio on the x-axis and Kakwani's index on the y-axis. As we move to the right and down, the average out-of-pocket ratio gets larger and Kakwani's index becomes negative and increases in absolute value. This shows that low-income groups are comparatively disadvantaged in access to

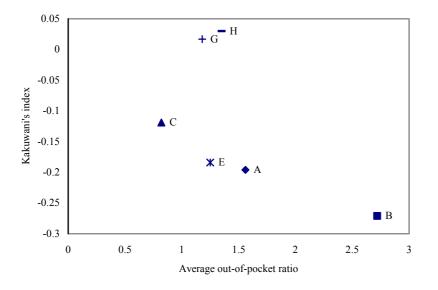healthcare. In the United States, healthcare is very expensive and compulsory social health insurance applies only to the elderly, resulting in a large average out-of-pocket ratio.

Table 2.   Average of private expenditure ratio, kakuwani's index, average out-of-pocket ratio

	Country	private expenditure ratio	kakuwani's index	average out-of-pocket ratio(%)	year
A	Japan	0.269	-0.196	1.56	79,84,89,94,99
B	United States	0.576	-0.271	2.72	84-99
C	United Kingdom	0.152	-0.119	0.82	80,84-99
D	France	0.230	-0.171	-	78,84,89,95
E	Canada	0.254	-0.184	1.25	86,92
F	Sweden	0.129	-0.199	-	88,92,96
G	The Netherlands	0.293	0.017	1.18	80,84,95
H	Germany	0.227	0.030	1.35	78,83,88,93,98

Private expenditure ratio=private expenditure on health/total expenditure on health
average out-of-pocket ratio=out-of-pocket payments for healthcare/household income

Figure 1.   Average out-of-pocket ratio and Kakuwani's index

Further Kakwani's index is large in absolute value and indicates a high degree of regressivity in out-of-pocket expenditures on health, which we attribute to the following. First, those other than the elderly must enter private health insurance programs or be uninsured. Therefore, low-income earners who are unable to purchase private health insurance are forced to bear substantial out-of-pocket expenditures. Second, employees of large companies typically have private health insurance coverage paid for by their employers as a benefit of employment; as a result, such employees—who can be included among high-income groups—have a very low out-of-pocket ratio. In contrast, under the NHS scheme in the United Kingdom, all citizens have out-of-pocket payments set very low, which results in a low average out-of-pocket ratio. In addition, the well-off are known to pay their own

way by using "pay beds" or private hospitals to cut waiting times, which is reducing the regressivity in out-of-pocket payments. Consequently, it is reasonable to say that access to healthcare is comparatively fairer in the United Kingdom than in the United States.

In Germany and the Netherlands, the pattern of out-of-pocket expenditures on health is progressive, which we attribute to the following. In Germany, company employees whose income exceeds a certain level, the self-employed, and civil servants are not required to join the social health insurance scheme. In the Netherlands, high-income earners are not permitted to join the social health insurance scheme. In Germany and the Netherlands, high-income earners are pulling out from forming part of the insured of public health insurance schemes, which has caused the out-of-pocket ratio for high-income groups to

rise and has led to progressivity in out-of-pocket payments for these countries as a whole.

1-4. Results of correlation analysis
(1) Correlation coefficient between the private expenditure ratio and Kakwani's index
Figure 2 shows the distribution for the eight countries with Kakwani's index on the y-axis and the private expenditure ratio on the x-axis. The correlation coefficient for the eight countries

was negative but not statistically significant (Table 3, col. a). In Germany and the Netherlands, compulsory participation in social health insurance has income restrictions, which resulted in a positive value for Kakwani's index. However, in the six countries in which there were no income restrictions on participation in public finances used for healthcare schemes, the correlation coefficient was negative and significant at the 5% level (Table 3, col. b).

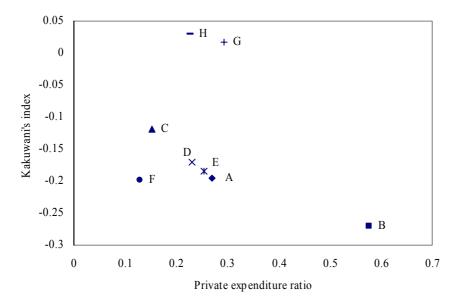**Figure 2. Private expenditure ratio and Kakuwani's index**

Table 3. Correlation Coefficient

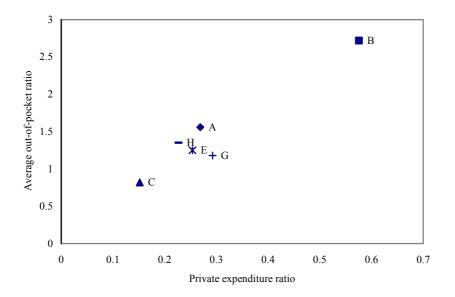|	a	b	Figure3
pearson's correlation coefficient	-0.348	-0.827	0.963
significant level	0.398	0.042	0.002
N	8	6	6

(2) Correlation coefficient between private expenditure ratio and average out-of-pocket ratio
Figure 3 shows a six-country distribution with the average out-of-pocket ratio on the y-axis and the private expenditure ratio on the x-axis. The correlation coefficient was positive and significant at the 1% level (Table 3).

(3) Relationship between equity in the access to healthcare and public finances used for healthcare schemes
In an eight-country sample comprising Japan, the United States, the United Kingdom, France, Canada, Sweden, the Netherlands, and Germany, we found that the larger the public finances used for healthcare schemes as a proportion of total health expenditures, the smaller the regressivity

in out-of-pocket payments. However, this result was not statistically significant. Yet, in a six-country sample omitting Germany and the Netherlands where high-income groups are withdrawing from social health insurance schemes, we found with statistical significance that the larger the public finances used for healthcare schemes, the smaller the regressivity in out-of-pocket payments.

Also, in a sample of six countries (Japan, United States, United Kingdom, Canada, Netherlands, and Germany) where we could obtain accurate data on pretax income, we found with statistical significance that the average out-of-pocket ratio was low in countries where public finances used for healthcare comprises a large proportion of total health expenditures. These findings indicate that in those countries

where public health insurance comprises a large proportion of total health expenditures, the

access to healthcare was generally fair.

Figure3. Private expenditure ratio and Average out-of-pocket ratio

2. Impact of public finances used for healthcare schemes on health expenditures

2-1. Two effects on the level of health expenditures

Public health insurance is said to have the two contradictory effects on health expenditures described below.

[Effect 1]: Public health insurance leads to rising health expenditures.

When public health insurance is the main part of healthcare cost payments, the relation between demand for healthcare and out-of-pocket expenditures on health becomes diluted. This situation creates a moral hazard that contributes to rising demand for healthcare.

[Effect 2]: Public health insurance leads to falling health expenditures.

The national government or an organization of nearly equivalent authority runs the healthcare system with public health insurance. This monopoly status has the effect of facilitating the containment of health expenditures.

2-2. Methodology

Since we are unable to determine which of the aforementioned effects exerts more influence without empirical testing, we carried out the analysis described below. We performed a panel analysis using total expenditure on health/GDP as the dependent variable and private expenditure on health/total expenditure on health, the proportion of aged in the population, and

total population as independent variables. We used the ratio of total expenditure on health to GDP instead of total expenditure on health, because recent studies have shown that analysis results differ depending on the foreign exchange rate used (e.g. exchange rates and purchasing power parity) when making international comparisons of healthcare expenditures in different currencies.

(1)Data sources

    OECD Health Data 1999, 2001, 2003

(2)Variables

  [Dependent variable]

    Total expenditure on health/GDP

  [Independent variables]

    1)Private expenditure ratio (private expenditure on health/total expenditure on health)

      This variable is used as a proxy variable to show the magnitude of public finances used for healthcare relative to total healthcare expenditures. The smaller this value, the larger the presence of public intervention for healthcare cost payments.

    2)Proportion of aged in the population

      Percentage of people in the population aged 65 and over

    3)Total population

(3) Countries surveyed

Thirteen countries: United States, United Kingdom, France, Germany, Japan, Canada, Denmark, Netherlands, Sweden, Switzerland, Australia, New Zealand, and Italy

(4) Estimation period

1973-2000

(5) Estimation model

$\ln ((\text{Total Expenditure on Health/GDP})_{it}) = \alpha + \beta 1 \ln ((\text{Private expenditure ratio})_{it}) + \beta 2 \ln ((\text{Population: 65 years old and over/Total population})_{it}) + \beta 3 \ln ((\text{Total population}))_{it})$

(i = country, t = year)

Table 4. The average values of each variable(1970-2000)

	Total expenditure on health GDP	private expenditure ratio	(Population:65years old and over) Total population
United States	0.1061	0.5832	0.1173
United Kingdom	0.0611	0.1376	0.1517
France	0.0822	0.2282	0.1412
Germany	0.0927	0.2245	0.1532
Japan	0.0648	0.2480	0.1144
Canada	0.0832	0.2580	0.1051
Denmark	0.0862	0.1537	0.1475
The Netherlands	0.0821	0.3111	0.1224
Sweden	0.0843	0.1128	0.1683
Switzerland	0.0833	0.3139	0.1409
Australia	0.0763	0.3333	0.1055
New Zealand	0.0668	0.1877	0.1043
Italy	0.0725	0.2203	0.1439

private expenditure ratio=private expenditure on health/total expenditure on health

2-3. Estimation method and results

The average values of each variable by country are shown in Table 4. We performed a Hausman test on the model above, which resulted in a fixed effect model being selected. We therefore used a fixed effect model for estimation. Estimation results are: $\beta 1 = 0.0722$, $\beta 2 = 0.4117$, $\beta 3 = 0.7700$, adjusted $R^2 = 0.822$, and all coefficients are statistically significant at the 1 percent level.

In our model, $\beta 1$ was a positive value, which shows that the larger the degree of public involvement in health expenditures, the smaller the value of total expenditure on health/GDP. These results show of the two effects that public health insurance is believed to exert on health expenditures, in fact, Effect 2 was more pronounced. However, this effect was smaller than the impact on health expenditures of the proportion of aged in the population and the total population.

Conclusions

The first purpose of this study is to examine the relationship between the degree of public intervention in healthcare cost payments and the equity in citizens' access to healthcare. We are assuming that (i) the larger the Kakwani's index and (ii) the smaller the average out-of-pocket ratio for all income levels, the more equitable the access to healthcare. We formulated and tested the hypothesis that the greater the degree of public intervention in healthcare cost payments, the more equitable the access to healthcare. Specifically, our methodology involved using the private expenditure ratio (private expenditure on health as a proportion of total expenditure on health) as an indicator of the degree of public intervention in healthcare cost payments, and then calculated the correlation coefficient between this indicator and Kakwani's index and the average out-of-pocket ratio. Our hypothesis is correct if the correlation coefficient between the private expenditure ratio and Kakwani's index is negative or if the correlation coefficient between the private expenditure ratio and the average out-of-pocket ratio is positive.

The results of our calculations are as follows. (1) The correlation coefficient between the private expenditure ratio and Kakwani's index was negative in a sample of eight OECD member countries (Japan, United States, United Kingdom, France, Canada, Sweden, Germany,

and Netherlands), but the result was not statistically significant. Having said that, the degree of regressivity in out-of-pocket expenditures on health is exceptionally small in Germany and the Netherlands, where joining the social health insurance scheme is not compulsory for those in high-income groups. In a six-country sample excluding Germany and the Netherlands, countries where there are income restrictions on participation in the social health insurance, the correlation coefficient was negative and also statistically significant. This shows that when the degree of public intervention in healthcare cost payments is large, there is a declining trend in the regressivity in out-of-pocket payments. (2) In a six-country sample from which France and Sweden have been omitted from the eight OECD member countries (Japan, United States, United Kingdom, France, Canada, Sweden, Germany, and Netherlands), we found with statistical significance a positive correlation coefficient between the private expenditure ratio and the average out-of-pocket ratio. This shows that when degree of public intervention in healthcare cost payments is large, the average out-of-pocket ratio is small. The results of these two correlation analyses show that there is an inclination that the greater the degree of public intervention in healthcare cost payments, the greater the equity in access to healthcare is.

The second purpose of this study is to examine the impact of the degree of public intervention in healthcare cost payments on total healthcare expenditures per GDP. There are two contradictory hypotheses. The first states that when the degree of public intervention in healthcare cost payments is high, patients' out-of-pocket payments decline, which results in increasing healthcare expenditures. The second states that when the degree of public intervention in healthcare cost payments is high, it is easier to control the price of healthcare services and the amount demanded, which is effective in curtailing the rise in healthcare expenditures. To test these hypotheses, we used a fixed effects model, as shown below, using a sample of 13 OECD member countries and the years 1973 through 2000 as our estimation period.

ln ((Total Expenditure on Health/GDP) $_{it}$) = α + $\beta 1$ ln ((Private expenditure ratio) it) + $\beta 2$ ln ((Population: 65 years old and over/Total population) $_{it}$) + $\beta 3$ ln ((Total population) $_{it}$) (i = country, t = year)

The results of our analysis show that the coefficient $\beta 1$ of the private expenditure ratio was positive and statistically significant. This

shows that the larger the degree of public intervention in healthcare cost payments, the smaller the total healthcare expenditures per GDP. Below we summarize the results of the aforementioned empirical analysis.

In observations of six to eight OECD member countries, we found that the greater the proportion of public finances used for healthcare in total health expenditures, the more equitable the access to healthcare. In addition, our panel analysis of 13 countries shows that the greater public finances used for healthcare in health expenditures, the smaller the percentage of total expenditure on health to GDP is. These results show that in changing public health insurance schemes with the aim of curtailing the rise in health expenditures, simply shifting health expenditures to private payments will not contain health expenditures as a whole. Moreover, the results indicate that this type of cost-shifting can also exacerbate inequity in access to healthcare services.

This study contains many issues that need to be addressed; for example, (i) it does not consider the individual characteristics of healthcare cost payment schemes in each country, (ii) there is no discussion about the quality of healthcare, and (iii) there is a need to analyze changes in each country over time. We intend to improve on these issues through further research. Furthermore, the following points must be taken into consideration when making the interpretation that the smaller the regressivity in healthcare expenditures, the more equitable the access to healthcare in economic terms. Healthcare services include services that are highly considered as necessities (e.g. emergency surgery, etc.) and those considered less essential (e.g. hospitalization in luxurious hospital rooms, etc.). Interpreting this to mean that the smaller the regressivity in healthcare expenditures, the more equitable the access to healthcare is assumes that the healthcare service paid for is highly essential. Yet the observed healthcare expenditures include both highly essential and less essential healthcare services, and it is impossible to distinguish the two kinds of services. In general, higher-income groups are more likely to demand less essential healthcare services than lower-income groups. Therefore, regressivity calculated based on healthcare expenditures compiled from observable data is likely to be smaller than the regressivity calculated based on healthcare expenditures for highly essential healthcare services. If the inclination of demand for less essential healthcare services by high-income groups varies

by country, it will mean that there are some problems inherent in using the regressivity in healthcare expenditures as an indicator of the equity in access to healthcare in economic terms. Having said that, we believe that the results of our empirical analysis are important to the consideration of healthcare policymaking.

Notes
Much of the empirical analysis in this study uses calculation results from "The Distribution of Patient's Direct Payments and the Equity in the Access of Health Care" (Endo and Shinozaki) and "Public Expenditure on Health and Equity in Health Care" (Endo et al).

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