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Abstract

Studies show that high IQ people practice healthier lifestyles, which result in better health status. However, do such people spend more on healthcare? We employed hierarchical multiple regression analysis to examine the impact of national average IQ on private health expenditure, especially health insurance at cross-country level. Controlling for income, the old-age dependency ratio, and government expenditure on health, we found that IQ was positively significant on out-of-pocket healthcare expenditure but negatively associated with private health insurance expenditure. We suggest that high IQ societies pay less for health insurance because they are more capable of preventing illnesses or injuries and they live in healthier and safer environments, which are less vulnerable to diseases. In addition, they are more efficient at calculating risk and making choices according to their future healthcare needs. Hence, with price dispersion and various choices of premium schemes available within the health insurance industry, high IQ people may be more efficient at obtaining lower effective prices of premiums.

Keywords: health insurance; income; intelligence; national IQ; private health expenditure; public health

JEL Classifications: H51, I13, I25, J24

1. Introduction

Intelligence (IQ) is a significant predictor of important life outcomes across domains. High IQ people learn faster, and are more efficient and innovative at problem-solving tasks, which results in enhanced job performance (Byington & Felps, 2010; Schmidt & Hunter, 2004), and consequently higher productivity at both individual and national levels (Hanushek & Kimko, 2000; Jones & Schneider, 2006, 2010; Ram, 2007; Weede & Kämpf, 2002). People with higher IQ have positive personalities, for example, they are more inclined to cooperate, more patient (i.e., less delay discounting), and more perceptive to gaining better rewards over a longer time horizon (Dohmen, Falk, Huffman, & Sunde, 2010; Jones, 2008; Shamosh & Gray, 2008). Therefore, at cross-country levels, societies with higher IQs have higher savings rates and enjoy less corruption (Jones, 2012; Potrafke, 2012).

Unlike pre-modern societies in which people with low IQs and childlike mentality are dominant, high IQ people in modern populations are more capable of understanding concepts and causal relationships, and therefore, they are able to think and act more rationally about overcoming poor health and preventing the spread of diseases (Oesterdiekhoff, 2012;

Oesterdiekhoff & Rindermann, 2007; Rindermann, Falkenhayn, & Baumeister, 2014). High IQ people are associated with a better quality of life and healthier lifestyle practices (e.g., Batty, Deary, Schoon, & Gale, 2007; Jelenkovic, Silventoinen, Tynelius, & Rasmussen, 2014). Therefore, they have better health status, such as greater longevity and less mortality risk (Batty, Deary, & Gottfredson, 2007; Gottfredson & Deary, 2004). In addition, high IQ is associated with higher socioeconomic status, which assures better healthcare as well (Gottfredson & Deary, 2004). This study attempts to examine the effect of national average IQ on private expenditure on health, especially health insurance. Naturally, health insurance is associated with uncertainty of future healthcare needs. Policyholders would lose money spent on insurance premiums if they were not sick. Conversely, if individuals became sick when they were not covered by insurance, they might not have enough savings to support their out-of-pocket expenditure on health treatment. In the latter case, health insurance would cover policyholders by more than their savings would have.

As out-of-pocket expenditure on health is the most common type of health financing in developing nations and is a major financial burden for households, private health insurance provides access to financial protection by offering households an option to avoid huge out-of-pocket expenses (Sekhri & Savedoff, 2005). Along the same line, the relationship between national IQ and private health expenditure, particularly health insurance, has not been established yet. Because high IQ people are characterized as being more perceptive, have longer time horizons, and lead healthier lifestyles, it may be assumed that high IQ people are more likely to spend on health insurance to maintain their good health continuously and in preparation for health deterioration in old age. IQ may serve as a source of advantageous selection because it improves people's knowledge about health risks. High IQ people may be healthier, but at the same time, they may be more perceptive about potential health risks

(Fang, Keane, & Silverman, 2008). For this reason, our study adds to the literature by establishing the impact of IQ on private health expenditure, particularly health insurance at a cross-country level.

2. Methods

2.1 Variables and Model

Values for private health expenditure for each country are the average of people's expenditure on their own healthcare needs. Therefore, similar to average IQ test scores within a national society, we assume that an individual's decision on health expenditure is independent of other individuals' health expenditure. To investigate the impact of national IQ on private expenditure on health insurance, we set our dependent variable as private health insurance expenditure per capita at country level, namely *Insurance*. In addition, we employ two other measures of health expenditure as comparative models for *Insurance*, namely, *Total*, which is total private health expenditure per capita, and *Pocket*, the out-of-pocket health expenditure per capita. Out-of-pocket expenditure is any direct expenditure by households, which includes gratuities and in-kind outlays paid to health practitioners and suppliers of pharmaceuticals, therapeutic appliances, and other goods and services whose main purpose is to add to the restoration or improvement of the health status of individuals or population groups (World Bank, 2014). The value of *Total* is composed of the value of *Pocket*, *Insurance*, and other unspecified variables; however, *Pocket* forms the largest proportion of *Total*, about 70% (World Bank, 2014). To investigate the impact of IQ on healthcare expenditure, we employed a linear macro-model as follows:

$$Expenditure_i = \beta_0 + \beta_1 Income_i + \beta_2 Gov_i + \beta_3 Age65_i + \beta_4 IQ_i + e_i$$

where *Expenditure* denotes expenditure for three dependent variables, that is, *Total*, *Pocket*, and *Insurance*, which were incorporated separately into the model. *Income* denotes gross domestic product (GDP) per capita for country i. People with higher income are willing to spend more on their healthcare (Chernew, Hirth, & Cutler, 2003). *Gov* is general government expenditure on health as a percentage of total health expenditure. We expect that the effect of *Gov* on health expenditure variables will control the effect of *Income* because people would spend less on healthcare if their governments were willing to subsidize healthcare more. *Age65* is the percentage of the population aged 65 years and older. It is expected that an increase in *Age65* would increase both average private health expenditure and out-of-pocket expenditure owing to more health treatment needed during old age (Yang, Norton, & Stearns, 2003). Moreover, we expect that a higher value for *Age65* would influence younger generations to spend more on insurance in preparation for their own morbidity in old age. We suggest that *Age65* is a better variable to use than the common "life expectancy at birth" variable because the latter does not represent the current old age population. Data on *Total*, *Pocket*, *Insurance*, *Income*, and *Gov* were obtained from the World Health Organization's Global Health Expenditure Database (World Health Organization, 2014), while the data on *Age65* were obtained from the World Bank's World Development Indicators (World Bank, 2014). *IQ* is the national average intelligence for a specific country *i*, obtained from Meisenberg and Lynn (2011). Except for IQ data, which are purely cross-sectional, the data for the other variables were averaged over the years 1995–2012.[1] Finally, e_i is an error term.

[1] One may be influenced to take in variables of healthcare facilities (e.g., the number of private hospitals, hospital beds, and physicians per capita) as predictors of *Insurance* because an increasing number in these facilities may indicate an improvement in private care, which may induce people to demand more for health insurance (e.g., Propper, Rees, & Green, 2001; Shin, 2012). However, there are many supportive arguments in the literature for the view that their relationship exists in an opposite direction, in which greater levels of private

Data on *Total*, *Pocket*, *Insurance*, and *Income* were log transformed because increased healthcare expenditure and wealth at lower levels would have been more essential than at higher levels (Rindermann & Thompson, 2011). Finally, all data (including the log-transformed variables) were standardized to a standard deviation of one. Data analyses were performed using EViews 8.1. Table 1 shows the list of selected countries ranked by all variables.

[Insert Table 1 here]

In this study, more than 107 countries were selected based on the availability of data. Four countries, namely, the United Arab Emirates (UAE), Luxembourg, the United States (US), and Switzerland, were excluded from our analysis as they are potentially outliers. In particular, the UAE was excluded from our analysis because its value for *Age65* was too low, that is .774%, as 80% of its population comprises working-age immigrants (DubaiFAQs, 2015). Luxembourg was excluded from the entire analysis because its value for *Income* was too high, that is, US$75,090.81. For *Total*, the US (US$3,421.98) and Switzerland (US$2,184.21) were excluded. For *Insurance*, the US (US$2,098.50) was excluded.

2.2 Spatial Autocorrelation, Race, and Health

In a cross-national study, data points are not exactingly independent because neighboring countries are likely to share similar characteristics (Meisenberg & Woodley, 2014). Therefore, *p*-values are inflated by nonindependence of data points because we are dealing with geographic data. This is caused by spatial autocorrelation, without any causal

health insurance coverage will drive further growth of healthcare industries (e.g., McClellan et al., 2002; Shin, 2012; Simoens & Hurst, 2006; Van Doorslaer, Masseria, & OECD Health Equity Research Group, 2004).

effects of the independent variables that the regression models suggest (Eff, 2004). Spatial autocorrelation is well documented in economics literature, in which three geographical regions are significant for global productivity, namely, East Asia, Latin America, and Africa. In particular, Sala-i-Martin (1997) and Sala-i-Martin, Doppelhofer, and Miller (2004) found that the inclusion of East Asian countries into cross-national growth regression is positively significant for global productivity growth. By contrast, both Latin America and Africa were found to be negatively significant. This method has been adopted by Jones and Schneider (2006) to examine whether IQ is significant on productivity growth at cross-country level.

We suggest that excluding one of the three regions (i.e., East Asia, Latin America, or Africa) at a time is important not only because of their spatial autocorrelation, but most importantly, because the populations of neighboring countries in each region are blood-related and relatively more homogenous in their biological inheritance. Each race is susceptible to the same disease, or has the same risk level of having the disease; in addition, they share similar health-related behavior (Bamshad, 2005; Batai & Kittles, 2013; LaVeist, 1994). Therefore, different races may have different levels of affinity or needs for health insurance and medical care. Moreover, differences in culture and values among races may also influence their levels of affinity for health care and services (Dressler, 1993; Hunt, Schneider, & Comer, 2004). For this reason, inequalities in health and healthcare associated with race are well recognized and have been a focus of many health-related organizations (Cheng et al., 2015).

In our cross-national study, to alleviate the effect of race and spatial autocorrelation on private health insurance expenditure, we exclude one of the three world regions (i.e., East Asia, Latin America, or Africa) at a time from our analysis. In addition, Jones and Schneider (2010) provided a useful insight that oil-rich countries in the Middle East have very modest levels of IQ relative to their exceptionally high income owing to a huge increase in the price of oil exports. In particular, we found that the national IQ of oil-rich countries of the Gulf Cooperation Council, namely, Bahrain (IQ=85.6), Kuwait (IQ=85.3), Oman (IQ=84.4), Qatar (IQ=80.1), and Saudi Arabia (IQ=79.5) are not greater than the world's average IQ, although they are listed among the world's richest countries as measured by GDP per capita (World Bank, 2014).[2,3] Persian Gulf countries differ from the global pattern because their economies are associated entirely with oil production, and therefore, there is a controversy as to whether these countries should be incorporated into a pooled model (Anagnosto & Panteladis, 2014; Bahmani-Oskooee & Kandil, 2010; García, 2013; Mankiw, Romer, & Weil, 1992; Ross, 2009; Takebe & York, 2011). The Persian Gulf produced about 28% of the world's oil supply, and about 55% of the world's crude oil reserves (Marcon International, 2015). Mankiw et al. (1992), for example, have excluded the entire Persian Gulf countries from their cross-country growth regression. We suggest that an unmeasurable qualitative factor could exist, in which excessive wealth of this oil kingdom has led its societies to extravagant expenditure and lifestyles (El Ghonemy, 1998, pp. 140–142; Kraidy & Khalil, 2008, p. 340; Moghadam & Decker, 2010, p. 81; Whetter, 2000), and which is independent of its IQ levels. Hence, in addition to the three world regions of East Asia, Latin America, and Africa, we also consider excluding this Persian Gulf region from our analysis.

[2] We averaged Meisenberg and Lynn's (2011) national IQ for 169 countries and found that the world's average IQ is equal to 85.52.
[3] Out of 222 countries listed by the World Bank (2014), these 5 countries are listed among the 17 countries with the world's highest GDP per capita, averaged for the 1995–2012 period.

3. Results

Table 2 shows the correlation matrix for all variables. All correlation values are positive and significant at p<.001. Because *IQ* and *Age65* are extremely correlated at r=.78, we suggest that our model must be simplified, and these two variables cannot be put together in the same regression model owing to multi-collinearity. Table 3 shows the correlation values between *IQ* and six variables for two country groups, which are median splits for each variable. Five out of the six variables are *Total*, *Pocket*, *Insurance*, *Income*, and *Age65*.[4] The sixth variable is *Growth*, that is, the annual growth rate (%) of real GDP per capita for 122 countries, which was averaged for the 1970–2010 period. The growth rate of real GDP per capita is often employed in studies of IQ and productivity growth at a cross-country level (e.g., Jones & Schneider, 2006; Ram, 2007; Weede & Kämpf, 2002). As shown in Table 3, we found that *IQ* was not significantly correlated with *Growth* for the country group of higher economic growth rate. On the other hand, *IQ* correlation values are more consistent (p<.001) for *Total*, *Pocket*, *Insurance*, *Income*, and *Age65* rather than for *Growth* between their two country groups. This would challenge the reliability of the *IQ–Growth* relationship that has emerged in the literature.

[Insert Table 2 here]

[Insert Table 3 here]

Tables 4, 5, and 6 show the results of our regression analyses for three dependent variables, namely *Total*, *Pocket*, and *Insurance*, respectively. For Models 1–4 throughout the

[4] It has been well-documented in the literature that IQ is significant in predicting the level of GDP per capita (Lynn & Vanhanen, 2002, 2006) and survival in old age (Murray, Pattie, Starr, & Deary, 2012; Whalley & Deary, 2001).

three tables, we found that all variables were significantly positive at $p<.001$ for *Total*, *Pocket*, and *Insurance* in their bivariate regressions. *Income* alone explains more than 85% of the variation in *Total* and *Pocket* but only 68% of the variation in *Insurance*. The coefficients of determination (R^2s) on *Insurance* for *Age65* and *IQ* were half of the R^2s on *Total* and *Pocket* (Models 3 and 4). For Tables 4–6, the coefficient values for *Gov* were significantly negative when controlled for *Income*. Although *Age65* was highly significant for *Total* and *Pocket* in their full regression models (Tables 4 and 5; Model 6), we found that it was nonsignificant for *Insurance* (Table 6; Model 6). In contrast to *Age65*, we found that *IQ* was nonsignificant for *Total* (Table 4; Model 7) but positively significant ($p<.01$) for *Pocket* (Table 5; Model 7). In addition, *IQ* was significant for *Insurance* at the $p<.05$ significance level when controlled for all other predictor variables (Table 6; Model 7). Overall, *Income* had the strongest effect on health expenditure variables, and thus, it was least affected when controlled for *Gov*, *Age65*, and *IQ*.

We found that there is only a small difference between the R^2s of *Total* and *Pocket*, with both showing adjusted R^2 values of around .92–.95 (Tables 4 and 5; Model 6 and 7). This occurs because *Pocket* contributes most to the *Total*'s share. Moreover, because the adjusted R^2 of *Insurance* (Table 6; Model 6 and 7; Adj. R^2=.70) is smaller than that of *Total* (Table 4; Model 6 and 7; adj. R^2=.95) and that of *Pocket* (Table 5; Model 6 and 7; adj. R^2=.94), we suggest that those predictor variables can better explain *Total* and *Pocket* than *Insurance*.

[Insert Table 4 here]

[Insert Table 5 here]

[Insert Table 6 here]

Table 7 shows a summary of regression analysis for *Insurance* after we excluded one of the regions at a time. We found that *IQ* retained its significance at the 5% level after excluding East Asia or Latin America, but it became nonsignificant after excluding Africa from the sample. Moreover, *IQ* became significant at the p<.01 level after we excluded the Persian Gulf from the analysis.

[Insert Table 7 here]

Because only five oil-rich countries had a large impact on our results, we performed additional regressions in which Persian Gulf and one of the three other world regions (i.e., East Asia, Latin America, or Africa) were excluded together from our analysis. As shown in Table 8, we found that *IQ* was significant at the 1% level on *Insurance* in all models. Surprisingly, the effect of *IQ* became more significant than *Gov*, which was reduced to the p<.05 significance level. This was in contrast with Table 6 (Model 7), in which *Gov* (p<.01) outshone *IQ* (p<.05) in significance level. With increased values of adjusted R^2's (.72–.76), we suggest that the exclusion of the Persian Gulf was significant to strengthen the negative relationship between *IQ* and private health insurance expenditure after controlling for *Income* and *Gov*. This provides support that economies of the Persian Gulf countries are different to those of the broader global pattern.

[Insert Table 8 here]

4. Discussion

There are two key findings of this study. First, *Age65* was significant for *Total* and *Pocket* but nonsignificant for *Insurance*. This is because growth in longevity or the proportion of a society's old population would lead to increases in both private health expenditure and out-of-pocket expenditure as, on average, a society would spend more on healthcare for individuals in old age owing to morbidity (Lakdawalla, Goldman, & Shang, 2005; Lubitz, Cai, Kramarow, & Lentzner, 2003; Yang et al., 2003). Because *Age65* was more significant than IQ in raising health expenditure (i.e., *Total* and *Pocket*), and *Age65* and IQ were highly correlated (r=.78), it could be that these three variables are more suitable to interact in the following path model: *IQ → Age65 → Total* / *Pocket*. However, *Age65* was nonsignificant on *Insurance*, thus, implying that population longevity is not a basis for society to spend more on private health insurance. Along the same vein, we consider that the risk of poor health or morbidity in old age does not influence the general community to buy health insurance. Therefore, this suggests that people spend more on private health insurance to fulfill their healthcare needs throughout all stages of life, not only during old age.

Second, IQ was positively significant for *Pocket* but negatively significant for *Insurance*. This shows that high IQ societies have experienced higher out-of-pocket expenditure to improve their health. However, we suggest that financial factors, such as personal income and government financial support, along with health deterioration and noncommunicable diseases (e.g., chronic diseases, like cancer, cardiovascular diseases, chronic respiratory diseases, diabetes, and hypertension) during old age (age>65 years) are more important factors than IQ in determining out-of-pocket expenditure on health. The exceptional significance of *Income* on all health expenditure is not surprising because healthcare involves a substantial financial commitment throughout a person's lifespan, especially during illnesses. For this reason, the effect of *Gov* on private health expenditure variables was negatively significant, implying that the size of private expenditure on health would decrease with an increasing proportion of government financial support for public healthcare.

Private health insurance is generally expensive, and thus, is undertaken mostly by people with higher income rather than the poor (Gertler & Sturm, 1997; Sekhri & Savedoff, 2005). Therefore, the significant effects of the financial variables *Income* and *Gov* on insurance expenditure should be unquestionable. However, the observation of a negatively significant effect of IQ on health insurance was surprising. When the oil-rich Persian Gulf countries were excluded from our analysis, IQ became more significant (p<.01) than *Gov* (p<.05). The fitness of the model with the adjusted R^2 value was greater than .70, which was good enough to verify that the negative effect of IQ on *Insurance* really exists. If a model were to be employed efficiently for predictive function, an R^2 greater than .70 would be ideal, given that it is difficult to obtain a high R^2 using cross-sectional data rather than time-series data (Doran, 1989, pp. 85–86). This finding refutes our earlier postulation that IQ may be associated positively with expenditure on health insurance based on the facts that high IQ individuals have healthier lifestyles and are more patient and perceptive to gaining better rewards in the future. Hence, one may question why high IQ societies have spent less on private health insurance.

In this study, we suggest three reasons that may explain our findings on IQ and private health insurance expenditure. First, high IQ individuals may have a higher level of sensation seeking, which brings about risky behavior, even on their own health (White & Batty, 2012).

Sensation seeking is the biological basis of individual differences, which involves the "seeking of varied, novel, complex, and intense sensations and experiences, and the willingness to take physical, social, legal, and financial risks for the sake of such experience" (Zuckerman, 1994, p. 27). High IQ individuals are associated with higher degrees of sensation seeking and openness to experiences (Aitken Harris, 2004; Raine, Reynolds, Venables, & Mednick, 2002; Wainwright, Wright, Luciano, Geffen, & Martin, 2008). For example, some studies have reported that people with higher IQs during childhood may increase the risk of illegal drug and alcohol dependency and excess alcohol intake in adulthood (e.g., Batty et al., 2008; Hatch et al., 2007; White & Batty, 2012). People who engage in riskier behaviors are significantly less likely to purchase insurance (Cutler, Finkelstein, & McGarry, 2008). In relation to our findings, we suggest that high IQ societies may have risked their future healthcare coverage by paying less toward health insurance schemes in the current period. In other words, high IQ people risk receiving insufficient health insurance coverage for their future healthcare needs. This is consistent with the classical model of insurance demand, in which high risk takers would demand less insurance, in contrast to risk-averse agents who would demand more (Mossin, 1968; Rothschild & Stiglitz, 1976).

Second, higher IQ individuals have a higher capacity to estimate their future returns and health outcomes than those with lower IQs. In many circumstances, high IQ is associated with less biased risk-taking behavior (Benjamin, Brown, & Shapiro, 2013). In relation to this, it should be borne in mind that high IQ people may have decided on health insurance based on their own calculated risks. Higher IQ raises an individual's capacity to integrate a broad range of choices by taking into consideration the risks and expected value of future returns (Dohmen et al., 2010). For instance, high IQ investors have been observed to have superior market timing and to be more competent at diversifying their portfolios in both mutual funds and stock markets for profits (Grinblatt, Keloharju, & Linnainmaa, 2011, 2012). Therefore, higher IQ is not only associated with a reduced number of errors in making right choices but is also linked to a greater willingness to take calculated risks (Agarwal & Mazumder, 2013; Burks, Carpenter, Goette, & Rustichini, 2009; Christelis, Jappelli, & Padula, 2010; Frederick, 2005). In the case of our findings, it is worthwhile to suggest that high IQ societies may have anticipated that it is not worthwhile for them to spend more on health insurance. A possible reason is that high IQ societies have less prevalence of diseases (e.g., HIV, heart disease, diabetes, obesity, stroke, and high blood pressure), and thus, they tend to have better health status and are less vulnerable to morbidity and mortality risk (Lynn & Vanhanen, 2012; Pesta, Bertsch, McDaniel, Mahoney, & Poznanski, 2012). This is in contrast to least-developed low-IQ societies with a proportionally higher probability of diseases and illnesses that raise the cost of insurance premiums (Chernew et al., 2003). In addition, higher IQ is associated with higher educational attainment, which, in turn, is associated with higher social rank and better occupational status, thereby promising safer and less risky living and working environments (Batty et al., 2009; Deary & Der, 2005). Furthermore, high IQ results in enhanced management of healthcare because it signifies superior learning, reasoning, and problem-solving skills that are beneficial in preventing accidental injury and chronic disease and in sticking firmly to complex treatment regimens (Batty et al., 2009; Gottfredson & Deary, 2004). Finally, we suggest that future studies may control all of these factors when examining the impact of IQ on private health expenditure, especially health insurance.

The third reason to explain our findings on IQ and private health insurance expenditure warrants serious consideration. In relation to health insurance premium, we assume that both policyholders (with a broad range of IQ levels) and insurance companies agree on buying and selling premiums, respectively, based on their own calculated risks and expected returns, which are determined independently between the two parties. However, with price dispersion and various choices of premium schemes available within the health insurance industry, IQ may serve as a source of advantageous selection through its effect on people's capacity to integrate a broad range of choices and evaluate the costs and benefits of purchasing premiums (Fang et al., 2008). Considering that high IQ is associated with greater efficiency at calculating risk and making choices, therefore, high IQ people spend less on health insurance because they are more efficient at obtaining lower effective prices of insurance premiums. Our findings provide support to Fang et al. (2008, p. 340), who hypothesized that "premiums paid by individuals with higher cognitive ability should tend to be lower than those paid by individuals with lower cognitive ability." Owing to this, it is worthwhile to consider that premiums would benefit those who had effectively predetermined their future returns or healthcare needs. However, further studies are required to examine whether the relationships between policyholders and insurance industry are associated to the theory of "homo economicus," in which human beings are rational and completely motivated by self-interest to maximize their utility as consumers and economic profit as producers, or being motivated principally by the desire to cooperate and enhance their environment, as advocated by the proponents of "homo reciprocans" (Gintis, 2000). After all, a limitation in our study is that an ecological fallacy occurs when conclusions about the personality of individuals are made based on analyses of group data to which those individuals belong (Krieger, 2014; Oleckno, 2008, p. 238). Therefore, in conclusion, we hope that further studies will scrutinize the role of IQ as a source of advantageous selection, and verify whether the prosperity of the insurance industry is associated with the IQ of their policyholders.

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Table 1

List of countries with top and bottom10 rankings for all variables.

	Total[a] (*N*=142)	*Pocket*[b] (*N*=143)	*Insurance*[c] (*N*=108)	*Income*[d] (*N*=143)	*Gov*[e] (*N*=143)	*Age65*[f] (*N*=143)	*IQ*[g] (*N*=143)
10 Countries at Highest Ranking	Norway: 978.22	Norway: 881.97	Switzerland: 527.54	Norway: 62514.04	Cuba: 91.99	Japan: 19.16	Singapore: 106.9
	Australia: 974.30	USA: 814.16	France: 462.69	Qatar: 52233.59	Seychelles: 89.05	Italy: 19.00	China: 105.9
	Canada: 973.67	Iceland: 808.33	Netherlands: 420.46	Iceland: 49901.35	Czech Rep.: 87.82	Germany: 18.16	S. Korea: 104.8
	Austria: 951.51	Cyprus: 673.71	Canada: 398.08	Denmark: 45602.19	Croatia: 84.69	Greece: 17.71	Japan: 104.1
	Netherlands: 904.77	Belgium: 648.56	Germany: 314.74	Ireland: 43059.10	Denmark: 84.10	Sweden: 17.58	Finland: 100.8
	Ireland: 866.11	Greece: 626.47	Ireland: 289.50	USA: 40273.56	Norway: 83.73	Bulgaria: 17.12	Canada: 100.4
	Iceland: 847.97	Denmark: 622.15	Australia: 244.73	Sweden: 38686.10	Sweden: 82.96	Belgium: 16.97	Netherlands: 100.4
	Belgium: 794.15	Austria: 589.13	S. Africa 182.66	Netherlands: 38251.17	Iceland: 81.85	Portugal: 16.81	Mongolia: 100
	Germany: 791.69	Finland: 583.34	Austria: 182.46	Austria: 36699.54	Oman: 81.75	Spain: 16.71	Estonia: 99.8
	France: 778.11	Singapore: 582.55	Slovenia: 173.11	U. Kingdom: 35524.18	Japan: 81.27	Latvia: 16.37	N. Zealand: 99.3
10 Countries at Lowest Ranking	Bangladesh: 8.30	Gambia: 5.50	Malawi: 0.71	Guinea: 295.40	Uganda: 26.15	Gambia: 2.62	Cameroon: 68.2
	Cent. Afr. Rep.: 7.77	Madagascar: 5.19	Egypt: 0.71	Mozambique: 293.99	Côte d'Ivoire: 26.14	P. N. Guinea: 2.60	Congo: 68
	P. N. Guinea: 7.31	Burundi: 4.85	Zambia: 0.68	Madagascar: 277.60	Pakistan: 25.87	Uganda: 2.57	Benin: 67.7
	Mozambique: 7.18	Eritrea: 4.66	Burkina Faso: 0.61	Rwanda: 269.54	India: 25.72	Rwanda: 2.55	Chad: 67.1
	Burundi: 6.95	Rwanda: 4.39	Congo: 0.58	Niger: 256.26	Cameroon: 24.18	Niger: 2.54	Guinea: 66.5
	Madagascar: 6.60	Congo: 4.00	Madagascar: 0.58	Eritrea: 228.14	Congo: 22.32	S. Leone 2.52	Cent. Afr. Rep.: 64
	Malawi: 6.00	P. N. Guinea: 3.95	Sudan: 0.54	Malawi: 225.54	Guinea: 21.04	Oman: 2.40	S. Leone: 64
	Congo: 5.53	Ethiopia: 2.67	P. N. Guinea: 0.54	Ethiopia: 168.75	Azerbaijan: 18.84	Bahrain: 2.27	Gambia: 62
	Eritrea: 4.66	Malawi: 2.63	Niger: 0.53	Congo: 152.42	Georgia: 17.33	Eritrea: 1.92	Malawi: 61.9
	Ethiopia: 3.34	Mozambique: 1.64	Yemen: 0.50	Burundi: 151.76	S. Leone: 16.00	Qatar: 1.40	Niger: 61.2
Mean	187.795 (1.859)	142.402 (1.747)	48.889 (.978)	9223.163 (3.501)	55.742	7.562	85.019
Median	82.403 (1.916)	58.474 (1.767)	7.770 (.890)	3427.812 (3.535)	57.320	5.444	85.000
Std. Dev.	260.220 (.636)	197.273 (.638)	98.860 (.836)	13264.22 (.686)	18.050	5.029	10.788
Skewness	1.741 (.090)	1.889 (-.034)	3.077 (.249)	1.853 (.035)	-.101	.784	-.184
Kurtosis	4.845 (2.066)	5.750 (2.260)	12.524 (2.023)	5.621 (2.026)	2.115	2.183	2.224
Jarque-Bera	91.877 (5.350)	130.080 (3.287)	578.600 (5.409)	122.813 (5.684)	4.906	18.643	4.400

Note: Values in parentheses denote the data after log transformation.
[a] *Total* is total private health expenditure per capita (in constant 2005 US$) (averaged 1995–2012).
[b] *Pocket* is out-of-pocket health expenditure per capita (in constant 2005 US$) (averaged 1995–2012).
[c] *Insurance* is private health insurance expenditure per capita (in constant 2005 US$) (averaged 1995–2012).
[d] *Income* is gross domestic product (GDP) per capita (in constant 2005 US$) (averaged 1995–2012).
[e] *Gov* is general government expenditure on health as a percentage of total health expenditure (averaged 1995–2012).
[f] *Age65* is the percentage (%) of the population aged 65 years and older (averaged 1995–2012).
[g] *IQ* is national average intelligence.

Table 2

Correlation matrix for all variables (N=107).

	Total	*Pocket*	*Insurance*	*Income*	*Gov*	*Age65*	*IQ*
Total[a]	-						
Pocket[b]	.966***	-					
Insurance[c]	.875***	.760***	-				
Income[d]	.929***	.905***	.819***	-			
Gov[e]	.354***	.316***	.365***	.588***	-		
Age65[f]	.679***	.693***	.471***	.638***	.459***	-	
IQ[g]	.697***	.723***	.500***	.717***	.447***	.780***	-

Note: *Total*, *Pocket*, *Insurance*, and *Income* were log transformed.
*** p<.001, ** p<.01, and * p<.05.
[a] *Total* is total private health expenditure per capita (in constant 2005 US$) (averaged 1995–2012).
[b] *Pocket* is out-of-pocket health expenditure per capita (in constant 2005 US$) (averaged 1995–2012).
[c] *Insurance* is private health insurance expenditure per capita (in constant 2005 US$) (averaged 1995–2012).
[d] *Income* is gross domestic product (GDP) per capita (in constant 2005 US$) (averaged 1995–2012).
[e] *Gov* is general government expenditure on health as a percentage of total health expenditure (averaged 1995–2012).
[f] *Age65* is the percentage (%) of the population aged 65 years and older (averaged 1995–2012).
[g] *IQ* is national average intelligence.

Table 3

Correlation between IQ and selected variables; median-splits.

Variables	Country Groups	Correlation, *r* with *IQ*
Total [a]	High *Total*	.553***
	Low *Total*	.453***
Pocket [b]	High *Pocket*	.586***
	Low *Pocket*	.436***
Insurance [c]	High *Insurance*	.411***
	Low *Insurance*	.473***
Income [d]	High *Income*	.593***
	Low *Income*	.644***
Age65 [e]	High *Age65*	.623***
	Low *Age65*	.416***
Growth [f]	High *Growth*	.132
	Low *Growth*	.550***

Note: *Total*, *Pocket*, *Insurance*, and *Income* were log transformed.
*** p<.001, ** p<.01, and * p<.05.
[a] *Total* is total private health expenditure per capita (in constant 2005 US$) (averaged 1995–2012).
[b] *Pocket* is out-of-pocket health expenditure per capita (in constant 2005 US$) (averaged 1995–2012).
[c] *Insurance* is private health insurance expenditure per capita (in constant 2005 US$) (averaged 1995–2012).
[d] *Income* is gross domestic product (GDP) per capita (in constant 2005 US$) (averaged 1995–2012).
[e] *Age65* is the percentage (%) of the population aged 65 years and older (averaged 1995–2012).
[f] *Growth* is the annual growth rate of real GDP per capita, which was averaged for the 1970–2010 period. Data on *Growth* are obtained from the Penn World Table 7.1 (Heston, Summers, & Aten, 2012).

Table 4

Summary of regression analysis where private expenditure of health acts as a dependent variable (*N*=142).

Dependent variable: total private health expenditure per capita, *Total*							
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Income	.942***				1.132***	1.035***	1.102***
Gov		.440***			-.293***	-.316***	-.297***
Age65			.710***			.162***	
IQ				.709***			.042
R^2	.887	.193	.505	.503	.937	.951	.938
Adj. R^2	.887	.188	.501	.499	.936	.949	.937

Note: Regression coefficients are standardized betas. All regressions are estimated using White's heteroskedasticity correction.
*** p<.001, ** p<.01, and * p<.05.
Reading example: As Model 6 shows, a one standard deviation increase in *Age65* would increase *Total* by a standard deviation of .162.

Table 5

Summary of regression analysis where out-of-pocket expenditure acts as a dependent variable (*N*=143).

Dependent variable: out-of-pocket health expenditure per capita, *Pocket*							
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Income	.925***				1.127***	1.001***	1.045***
Gov		.396***			-.318***	-.347***	-.327***
Age65			.722***			.208***	
IQ				.730***			.116**
R^2	.856	.157	.521	.533	.916	.938	.922
Adj. R^2	.855	.151	.517	.529	.915	.937	.921

Note: Regression coefficients are standardized betas. All regressions are estimated using White's heteroskedasticity correction.
*** p<.001, ** p<.01, and * p<.05.
Reading example: As Model 7 shows, a one standard deviation increase in *IQ* would increase *Pocket* by a standard deviation of .116.

Table 6

Summary of regression analysis where private health insurance acts as a dependent variable (*N*=108).

Dependent variable: private health insurance expenditure per capita, *Insurance*							
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Income	.824***				.931***	.961***	1.042***
Gov		.345***			-.187**	-.180**	-.177**
Age65			.486***			-.054	
IQ				.510***			-.161*
R^2	.679	.119	.236	.260	.703	.704	.715
Adj. R^2	.676	.111	.229	.253	.697	.696	.707

Note: Regression coefficients are standardized betas. All regressions are estimated using White's heteroskedasticity correction.
*** p<.001, ** p<.01, and * p<.05.
Reading example: As Model 7 shows, a one standard deviation increase in *IQ* would reduce *Insurance* by a standard deviation of .161.

Table 7

Summary of regression analysis after excluding one region at a time.

Dependent variable: private health insurance expenditure per capita, *Insurance*				
Excluded Region	Model 1: East Asia[a]	Model 2: Latin America[b]	Model 3: Africa[c]	Model 4: Persian Gulf[d]
Income	1.049***	1.093***	1.005***	1.101***
Gov	-.173*	-.174*	-.214**	-.150*
IQ	-.176*	-.195*	-.098	-.248**
N	105	90	84	103
R^2	.711	.749	.712	.730
Adj. R^2	.702	.741	.701	.721

Note: Regression coefficients are standardized betas. All regressions are estimated using White's heteroskedasticity correction.
*** p<.001, ** p<.01, and * p<.05.
Reading example: As Model 4 shows, a one standard deviation increase in *IQ* would reduce *Insurance* by a standard deviation of .248.
[a] East Asia: China, Japan, and South Korea.
[b] Latin America: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, and Venezuela.
[c] Africa: Algeria, Benin, Botswana, Burkina Faso, Congo, Egypt, Gabon, Ghana, Kenya, Madagascar, Malawi, Mauritius, Morocco, Namibia, Niger, Nigeria, Rwanda, Senegal, Seychelles, South Africa, Sudan, Swaziland, Tunisia, and Zambia.
[d] Persian Gulf: Bahrain, Kuwait, Oman, Qatar, and Saudi Arabia.

Table 8

Summary of regression analysis after excluding both the Persian Gulf and one other region at a time.

Dependent variable: private health insurance expenditure per capita, *Insurance*			
Excluded Region	Model 1: East Asia[a] + Persian Gulf[d]	Model 2: Latin America[b] + Persian Gulf[d]	Model 3: Africa[c] + Persian Gulf[d]
Income	1.122***	1.162***	1.076***
Gov	-.141*	-.152*	-.169*
IQ	-.280**	-.290**	-.214**
N	100	85	79
R^2	.728	.766	.736
Adj. R^2	.719	.757	.725

Note: Regression coefficients are standardized betas. All regressions are estimated using White's heteroskedasticity correction.
*** p<.001, ** p<.01, and * p<.05.
Reading example: As Model 3 shows, a one standard deviation increase in *IQ* would reduce *Insurance* by a standard deviation of .214.
[a] East Asia: China, Japan, and South Korea.
[b] Latin America: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, and Venezuela.
[c] Africa: Algeria, Benin, Botswana, Burkina Faso, Congo, Egypt, Gabon, Ghana, Kenya, Madagascar, Malawi, Mauritius, Morocco, Namibia, Niger, Nigeria, Rwanda, Senegal, Seychelles, South Africa, Sudan, Swaziland, Tunisia, and Zambia.
[d] Persian Gulf : Bahrain, Kuwait, Oman, Qatar, and Saudi Arabia.