Inequality Aversion and Government Health Expenditure

Abstract

This paper explores a behavioural mechanism through which income inequality may be associated with population health. We consider a model with heterogeneous agents in which agents' preferences are characterized by income inequality aversion. Our analysis shows that spending on health-producing goods is inversely related to the agents' degree of inequality aversion. A *Veblenesque* mechanism drives this relation: inequality averse poor agents wish to enjoy consumption levels closer to the average consumption levels in the economy but can only do so by reducing their expenditures on health. This leads to adverse outcomes for individuals and adverse political economy implications for health. In the political economy context, agents characterized by high inequality aversion vote for lower levels of government health spending. To specifically test this mechanism, we construct empirical measures of inequality aversion. Then, using these measures for a panel of 147 countries spanning 2008-2019, we find a significant negative impact of inequality aversion on allocations of public spending for healthcare. These results remain robust to different model specifications.

Keywords: Income inequality, Inequality aversion; Health expenditure; Democracy

JEL Classifications: I14, I18, I31, O10

1. Introduction

The Covid-19 pandemic has highlighted the need for revisiting the role of governments in healthcare systems of economies (Stiglitz, 2021). To overcome the pandemic, many governments had to increase the share of their expenditure on healthcare, while many had to prepare for the long-term effects due to the backlog of medical treatments (Dudine, Hellwig, Jahan, & Coady, 2020). In either case, the emphasis on public health expenditure to tide over health crises is clearly visible. Some earlier studies have also considered the role of public health expenditure in controlling and preventing the spread of communicable diseases such as the studies by Posner (1993) for AIDS policies, Barrett (2007) for smallpox eradication and Ryan (2014) for H1N1 vaccines. The role of public health expenditure in improving population health beyond prevention of communicable diseases, is also well-established (Singh, 2014, Bradley, et al., 2016). While the existing literature provides insights on different issues concerning public choice in healthcare, the need for a greater emphasis on it in the post-Covid world is only likely to become more crucial than ever in the past. In this backdrop, our paper deals with a specific dimension of public health expenditure, contributing to the growing debate on the relation between inequality, health expenditure and the role of the government.

As pointed out by Deaton (2003), while there is evidence concerning a negative link between income inequality and health, only a few papers (see Bhattacharjee et. al. 2017 and references therein) outline the specific mechanism through which it may manifest. Although rising inequality is a widespread concern, to our knowledge, the literature so far has not addressed the issue that inequality can impact consumption and public health expenditure through the behavioural mechanism of *inequality aversion*. The focus of this paper is essentially on this mechanism and its political economy implications.

Among the studies germane to this issue, there are two specific strands of literature that are of interest. The first strand relates to the political foundations of health and health expenditure

(see Lake and Baum, 2001; Acemoglu and Robinson, 2006; Klomp and Haan, 2009; Justesen, 2012; Borissov and Hashimzade, 2022 and others). Besley and Kudamatsu (2006) mention that democracies demand accountability to a broader set of citizens at regular intervals, thereby resulting in a greater emphasis on health-related issues. Kaufman and Segura-Ubiergo (2001) and Avelino et al. (2005) suggest that democratic governments such as in Latin America, allocate high shares of government spending to healthcare. Using data on 159 countries, Gregorio and Gregorio (2013) report that for every unit increase in a nation's regime towards democracy, there are significant increments in the percent of general government expenditures as well as per capita general government expenditures targeted towards healthcare. On the other hand, autocracies usually catering to the rich have lower allocations for public health, as the rich are less bothered about public spending on social sectors (Klomp and Haan, 2013). In this regard, the median voter hypothesis re-emphasises the likelihood of allocating more resources to health, especially when the median voter is from the middle or poorer sections of the populace. Particularly, Milanovic (2000) confirms the median voter hypothesis by finding that higher inequality is associated with greater social transfers in health. Leeson & Thompson (2021), while taking stock of how scholars have considered public health, find that the allocation of public health resources often reflects private rather than public interests.

The second strand, pertaining to the relative income hypothesis in relation to health, states that individuals who *feel* more economically disadvantaged than their peers are likely to have poor health (Duesenberry 1949; Wilkinson, 1997). In other words, if health is lower for those whose income is relatively low, then higher inequality makes the poor even poorer in relative terms (Deaton, 2003). This corresponds to the behavioural mechanism of inequality aversion that we refer to above, and underpins our theoretical framework, which is based on the Fehr and Schmidt (1999) construct of inequity aversion. The feeling of economic disadvantage can

lead to excessive spending on consumption as suggested by Veblen (1973) [1899] and with a given budget constraint, result in lower income available for expenditure on health.

It has long been argued that people may consume goods beyond their financial capacities to defend against exclusion from their perceived socio-economic peers or to gain membership in a prized economic group (see, e.g. Adorno and Horkheimer, 2002; Pugh, 2009; Khamis et al., 2012; Jinkins, 2016). A popular belief in the literature is that exposure to high-income people (i.e., living in a high-income community) raises the cost of socially acceptable living for people. Many studies try to seek the mechanism through which economic context may influence decisions on consumption. Furthermore, "bandwagon effects" ensure that people's preference for a commodity increases as the number of people buying that commodity increases (Leibenstein, 1950). Consequently, lavish spending by the rich may cause consumption by the poor that is too high relative to what it might have been in the absence of such effects. Several studies find evidence to support the idea that spending patterns of the poor change as their income increases, and this change, while reflecting an increase in overall consumption of food may not be commensurate with consumption of food in a nutritional sense. See, for example, Deaton and Dreze (2009) who look at food and nutrition of the poor in India. Similarly, Charles and Lundy (2013) find in the context of the U.S. that higher inequality leads to lower investment in healthcare and a higher level of conspicuous consumption. Additionally, some studies use experiments to examine the relationship between conspicuous consumption and health. For example, Zhu et al. (2021) show that conspicuous consumption has positive impact on mental health in the context of northern China.

As suggested in Deaton (2003), inequality may weaken the power of the poor in determining the allocation of local health-related resources. A greater percentage of the population that is poor and unhealthy may impact richer segments through contagion or health externalities (see, e.g. Montgomery and Hewett, 2005). All agents in an economy, regardless

of wealth levels can thus be adversely affected by inequality. This could occur given that inequality leads to conflict, adversely affecting social capital, along with adversely affecting psychological wellbeing due to poor social interaction between agents of different socio-economic status (see, among others, Kawachi and Kennedy, 1999; McBride, 2001; Thorbecke and Charumilind, 2002).

To explore the theoretical mechanism at play, we construct a simple framework incorporating inequality averse heterogeneous agents making decisions regarding consumption and health expenditure. We further examine the political economy implications of this construct and address the issue of how the presence of inequality and inequality aversion impacts government's focus on health spending. We find that regardless of the nature of inequality aversion (i.e. whether it increases, decreases or remains constant with increases in inequality), poor agents' health expenditure is decreasing with the degree of inequality aversion while consumption expenditure is, in contrast, increasing with the degree of inequality aversion. In the political economy outcome, we also find that public health expenditure is decreasing as the agent's degree of inequality aversion increases.[1]

It is this latter hypothesis, i.e. the inverse relationship of inequality aversion and public health spending, that informs our empirical analysis. In particular, we construct country-level estimates of inequality aversion based on the theoretical specifications of our model. We use the health demand function that arises from our model for this purpose, which is expressed as a function of income and other parameters, including the parameter of inequality aversion. We can then back-out the estimates of the inequality aversion parameter using the health demand equation by substituting for proxies of income (such as GDP) and other parameters (such as

[1] Note that the key mechanism here relates *income* inequality aversion leading to conspicuous consumption among the poor and adverse outcomes for health through the presence of a trade-off between health and consumption expenditures. We do not consider *health* inequality aversion as examined in Costa Font and Cowell (2019). While that may be an important issue to consider, the focus of this paper on the effects of income inequality aversion on health.

the Legatum Prosperity Index as a measure of returns to health). We then use the constructed measures to test the implications of our model based on a panel of 147 countries spanning 2008-2019. Our empirical estimates show that inequality aversion, as captured in our theory-based measure has negative implications for the proportion of public expenditure spent on health. Furthermore, empirical evidence for the political economy outcome of the model is reinforced when we look at democratic nations. Specifically, we find that inequality aversion has a quantitatively larger negative impact on the share of public health expenditures in economies which are relatively more democratic. A key contribution of our paper is the theoretical framework that explores this channel. Another contribution is the construction of inequality aversion estimates informed by using the model to demonstrate the impact of inequality aversion on public health expenditure.

The rest of the paper is structured as follows: Section 2 sets up the theoretical model. Sections 3 and 4 present the empirical analysis and the results. Section 5 provides the concluding remarks.

2. The Theoretical Framework

We consider a static economy in which agents are heterogeneous in their income levels, with income endowments determined by a probability distribution $f(.)$. There is inequality in this economy since the income endowments vary across agents. There are N agents, indexed by i=1, 2,…, N. Preferences of agent i, who has income y_i are described as follows:

$$U\left(c_i, h_i\right) = \ln(c_i) - \alpha\left(\phi\right)\ln\left(\frac{\overline{c}}{c_i}\right) + \ln\left(h_i\right) \tag{1}$$

In Eq. (1) c_i represents agent (or individual) consumption expenditures and h_i represents the agent's "health" which is created by spending resources on health and well-being. The second

term is a multiple of two elements, and its interpretation varies depending on the agent's position in the income distribution.[2]

First consider, the "poor" agents in an economy. Higher the average level of consumption $\bar{c}$ relative to the agent's consumption c_i, the worse this agent feels. For these agents we assume there is *inequality aversion*, reflected in the negative sign and the assumption that the parameter α weighting this ratio is positive. Note that the parameter α is a function of the extent of inequality ϕ in the economy. At this stage we do not make any a priori assumption regarding $\alpha'(\phi)$ and only require that $\alpha(\phi) > 0$ and be *perceived* exogenous given that the agents cannot unilaterally change the income distribution by their actions. Further, it is assumed to be the same across agents within an economy.

However, assuming $\alpha(\phi) > 0$ implies that "rich" agents prefer inequality. This is because $\ln(\bar{c} / c_i)$ is negative for such agents so that the assumption $\alpha(\phi) > 0$ amounts to inequality preference. In what follows, we therefore refer to agents characterized by inequality aversion or inequality preference depending on their position in the income distribution. Also note that while we could have made a different assumption regarding $\alpha(\phi)$ for the rich agents, our focus is on poor agents. This is because it is the poor agents, with income $y_i < \bar{y} = \int yf(dy)$, who drive the aggregate results of the economy in the presence of inequality.[3]

Furthermore, it is possible to make the argument that $\alpha(\phi) > 0$ is a reasonable assumption to make in the context of rich agents. In contrast to poor agents, rich agents are likely to believe

[2] We develop the utility function represented in Eq. (1) following the ideas captured in the Fehr and Schmidt (1999) postulate of "inequity aversion". However, our functional form is different, designed for tractability in a heterogeneous agent setting, while also deviating from standard utility functions in an intuitive and easily identifiable manner. See Fehr and Schmidt (2010) for a further discussion of inequity aversion and Appendix A.1 for how our framework relates to Fehr and Schmidt (1999) construct.

[3] An economy characterized by inequality has majority of the individuals below the mean. In this model the mean or average level of income demarcates the rich and poor agents. We assume the presence of inequality, which also implies that the poor form the majority, since the median of an unequal distribution falls below the mean. As Knell and Stix (2020) state, low and high-income individuals have different perceptions about the skewness of the income distribution. People with low income predominantly view societies to be right-skewed. Perceptions of inequality can affect one's aversion or preference of inequality.

in the beneficial incentive effects of inequality (Alesina and Giuliano, 2011). Inequality can influence economic growth in a positive way by providing incentives for entrepreneurship and innovation (Lazear and Rosen, 1981).[4] Furthermore, inequality is especially useful in the context of developing countries, in the sense that it allows a few individuals to accumulate the minimum wealth to get a good education and start businesses (Barro, 2000). Therefore, for the "rich" agents in the economy, who are less likely to feel the adverse effects of inequality and more likely to enjoy the above-mentioned incentives, it may not be too unreasonable to assume $\alpha(\phi) > 0$.

We now turn to a discussion of how the agents spend their income. In this simple economy there are only two types of goods: goods that constitute consumption and goods that lead to health production. Let m_i represent an agent's expenditure on health goods and g_i represent government health expenditures. We may interpret these expenditures as relating to tangible goods that contribute to health, in addition to the imputed value of time spent on the creation of health.[5] As a result of these expenditures, health is produced according to the following health production function:

$$h_i = m_i^{\gamma} g_i^{\delta} \tag{2}$$

The parameter γ in Eq. (2) represents the return to expenditure on health goods; this return may depend on institutional factors as well as behavioural characteristics such as time preference.[6]

[4] There may be evidence to suggest the opposite is true. For example, Grigoli et al. (2019), Halter et al. (2014) and Banerjee and Duflo (2003) suggest that inequality may reduce economic growth. However, our main rationale behind the use of this assumption is tractability, ease of analysis and the fact that our focus is on majority of the individuals. An analysis based on different types of assumptions for the rich agents finds that key outcomes of the model prevail in all cases. We do not present this analysis here in the interest of brevity; it is however available upon request.

[5] We allude to the notion of intrinsic good health, where an individual is born with it, and has to maintain it. The expenditure on health in our model could be the consumption of a different sort – like buying healthy food which when consumed produces health, or exercise-related expenditures such as gym membership and the imputed value of time spent exercising. It could be the imputed value of time searching for information about optimal nutrition and diet, or any transactional costs of getting vaccinated (assuming the health system provides it for free, but there are queues, etc, which could count as transaction costs).

[6] While we do not explicitly model time preference, the parameter γ can be interpreted in a way that includes the idea of time preference. See Appendix A.2 for a discussion.

The parameter δ represents the returns to government expenditure on health. In line with some of the literature, we assume $0<\gamma<1$ and $0<\delta<1$, reflecting diminishing returns to health investment, as suggested in Ehrlich and Chuma (1990).

Furthermore, we add government intervention in our model by assuming that government spends on government transfer and health expenditure according to following equations:

$$t = (1-\beta)\tau\bar{y} \tag{3}$$

$$g = \beta\tau\bar{y} \tag{4}$$

where τ is the tax rate, β is the proportion that government spends on health and

$$0 \ll \tau < 1, 0 \ll \beta < 1$$

The agent's budget constraint is described as:

$$c_i + m_i = (1-\tau)y_i + t_i \tag{5}$$

The agent maximizes utility subject to its budget constraint and the health production function. The solution to this problem yields the following consumption and health demand functions:

$$c_i = \frac{1+\alpha(\phi)}{1+\alpha(\phi)+\gamma}\left[(1-\tau)y_i + (1-\beta)\tau\bar{y}\right] \tag{6}$$

$$m_i = \frac{\gamma}{1+\alpha(\phi)+\gamma}\left[(1-\tau)y_i + (1-\beta)\tau\bar{y}\right] \tag{7}$$

We now consider three different assumptions regarding $\alpha(\phi)$:

Case 1: $\alpha'(\phi) > 0$; Increasing Marginal Inequality Aversion (Preference)

Case 2: $\alpha'(\phi) < 0$; Decreasing Marginal Inequality Aversion (Preference)

Case 3: $\alpha'(\phi) = 0$; Constant Inequality Aversion (Preference).

Based on the above, we have the following proposition:

Proposition 1: For all agents in the economy,

(i) Consumption is increasing with the degree of inequality aversion (preference);

(ii) Private health expenditures are decreasing with the degree of inequality aversion (preference);

(iii) If Case 1 (Increasing Marginal Inequality Aversion) holds, then consumption increases with inequality while private health expenditures decrease with inequality;

(iv) If Case 2 (Decreasing Marginal Inequality Aversion) holds, then consumption decreases with inequality while private health expenditures increase with inequality;

(v) If Case 3 (Constant Inequality Aversion) holds, then consumption and private health expenditures are invariant to changes in inequality.

Proof: Part (i) and (ii) of Proposition 1 can be confirmed by assuming ϕ as given and taking the derivatives of Eq. (6) and (7) with respect to α. In Part (iii), (iv) and (v), we consider inequality aversion changing with inequality and apply the chain rule to obtain the following derivatives of the two equations with respect to ϕ:

$$\frac{\partial c_i}{\partial \phi} = \frac{\gamma \alpha'(\phi)}{\left(1+\alpha(\phi)+\gamma\right)^2}\left[(1-\tau)y_i + (1-\beta)\tau\bar{y}\right] \tag{8}$$

$$\frac{\partial m_i}{\partial \phi} = \frac{-\gamma \alpha'(\phi)}{\left(1+\alpha(\phi)+\gamma\right)^2}\left[(1-\tau)y_i + (1-\beta)\tau\bar{y}\right] \tag{9}$$

By applying different assumptions regarding $\alpha'(\phi)$, Parts (iii), (iv) and (v) follow. Using Equation (2) we can further show that $\frac{\partial h_i}{\partial \phi} = \gamma g_i^{\delta} m_i^{\gamma-1} \frac{\partial m_i}{\partial \phi}$, indicating that health outcomes change with inequality in the same way as private health expenditures do.

Note that it is our assumption $\alpha(\phi) > 0$ which makes Proposition 1 apply to all agents in the economy, the only difference being that inequality-aversion gets replaced by inequality-preference for rich agents. Had we made alternative assumptions for $\alpha(\phi)$, the broad outcomes

of the model would still go through; however, the analysis becomes somewhat intractable.[7] In what follows, however, we discuss the implications of Proposition 1 with a focus on poor agents.

For poor agents, the mechanism through which adverse health outcomes occur is somewhat Veblenesque when we look at Case 1. Recall that in this case the assumption we make with reference to inequality aversion is strong, in that α is assumed to increase in inequality. The presence of inequality increases consumption as agents try to improve their welfare by choosing consumption levels closer to the average level of consumption. One may interpret this outcome as akin to situations in which agents undertake conspicuous consumption at the cost of spending less on health. The desire of poor agents in our model to be "closer to the average" is in line with the literature which identifies the spending on non-health products as motivated by efforts to either gain status distinction or to be fit for the broader communities in which they live (Ordabayeva and Chandon, 2010).

Furthermore, the "bandwagon effects" referred to in Section 1 apply in the interpretation of these results. Lavish spending by the poor may cause consumption by the rich that is even higher relative to what it might have been in the absence of such effects. This is simply because, in our model, the rich prefer inequality and want to stay away from the average. This may, in turn, lead to a higher consumption by the poor through the Veblenesque mechanism. This "vicious circle" is supported by several studies. See, for example, Charles and Lundy (2013) who find in the context of the U.S. that higher inequality leads to lower investment in healthcare and a higher level of conspicuous consumption for both high and low-income households.

In Cases 2 and 3, which use alternative assumptions for $\alpha'(\phi)$,the results show that consumption increases with inequality aversion while health expenditures decrease with it still

[7] Assuming that richer agents have a negative α complicates the analysis given one has to impose additional assumptions to ensure interior solutions. However, the political economy result of Proposition 2 follows in exact form given that the median agent is characterized by positive α. This analysis is available upon request.

stands but the above interpretation does not apply as neatly as in Case 1. So, Veblen effects do not emerge in these cases.

From an empirical point of view, however, a high level of inequality implies that a large proportion of the population falls below the average level of income, which should lead to a negative correlation between aggregate inequality and health outcomes. Therefore, our theoretical model can help to explain the findings of many previous studies (see, e.g., Waldmann, 1992; McIsaac and Wilkinson, 1997; Dabla-Norris, 2015).

Another point to note relates to the parameter γ, which represents the returns to individual health expenditure. We interpret returns to health expenditure as a measure which combines different aspects of healthcare systems as well as health outcomes of countries. We rely on scores assigned to each country every year, based on their performance in each of these metrics. Higher values of γ may be reflective of better sanitation and environmental conditions, which would lead to greater returns on the agent's health expenditures, thereby encouraging higher levels of health expenditures for all agents. Likewise, higher δ could also reflect a higher level of development and access to better quality public health system, which could lead to higher health investment by agents.[8]

We now turn to the political economy outcomes of our model. To investigate how the government distributes the revenue between health expenditure and government transfer, we assume that agents vote on the proportion β of the government revenue to be allocated to public health expenditures.[9] To find the political economy value of β, we consider the median agent's

[8] δ is representative of broader measures of health infrastructure, as affected by public health spending while γ is representative of sanitation and environmental conditions. An example is the case where someone chooses to exercise - by walking in areas that are polluted. These are private health investment decisions but their return is lower if health infrastructure conditions are poor. Similarly, marginal return to public health investment would be dependent on the private health investment decisions by individuals.

[9] Recall that, as per Eq. (3) and (4) above, government revenue in this model is used for expenditures on transfers and public health. It is standard practice in the political economy literature to capture aggregate political economy outcomes as preferences that emerge through a voting process. See for example Alesina and Rodrik (1994) who consider voting on a capital tax and Dolmas et. al. (2000) who consider voting on an "inflation tax.

indirect utility function and maximize this utility function subject to the agent's budget constraint and the health production function. The solution to this problem yields:[10]

$$\beta_i = \min\left[\left(\frac{\delta\left(\left((1-\tau)y_i/\tau\bar{y}\right)+1\right)}{1+\alpha\left(\phi\right)+\gamma+\delta}\right), \quad 1\right] \tag{10}$$

Note however, that the median agent's income lies below the mean in the presence of inequality, so that the median agent's preference is interior in [0,1] and given by

$$\beta_m = \left(\frac{\delta\left(\left((1-\tau)y_m/\tau\bar{y}\right)+1\right)}{1+\alpha\left(\phi\right)+\gamma+\delta}\right) \tag{11}$$

Based on Eq. (10), and invoking the median voter theorem from Black (1948), we have the following proposition:

Proposition 2:

(i) Government expenditure on health decreases as inequality aversion (preference) increases.

(ii) Government expenditure on health decreases as returns to investment in health increase.

For a proof of the above proposition see Appendix A. In our model, the government implements the median voter's preferred proportion of government revenues allocated to the public health system. In economies characterized by high levels of inequality aversion we would therefore expect a smaller proportion of revenues to be allocated to public health. The intuition is simple - all agents in the economy have consumption levels positively related to inequality aversion. In particular, the median agents would prefer higher levels of consumption

[10] The median voter theorem applies as preferences are single peaked as shown in Appendix A.3 which provides derivations for this result.

due to their desire to be closer to the average, and this is made possible if the government spends more on transfers rather than on public health system.

Regarding the impact of the returns to investment in health, as captured by the parameter γ the intuition is as follows: if returns to public health investment are high then smaller health expenditures by the government will yield the same outcome. In other words, the efficiency of the health system does not necessitate large investments in the health sector.

Some caveats apply to our characterization of health in this model. In more complex (and consequently less tractable) specifications agents can "opt out" of the public health system. Additionally, investments in health can impact mortality risk, especially in the context of a dynamic model, where this influence also brings in the idea of endogenous time preference. We admit that these features would impact the agents' outcomes for health and consumption in ways that are significant and important. However, our focus is on how the inequality aversion mechanism influences health choices. As such, we choose to abstract from the above features.

Another caveat that applies to our model is that a direct mechanism of redistribution (lump sum transfer) is competing with an indirect mechanism of redistribution (government health expenditures). The former is preferred by the agents partly because it is a perfect substitute for consumption. However, it would generally be the case that direct mechanisms are preferred relative to indirect ones, especially if government spending is viewed as inefficient, or if there is a perception of corruption.

In what follows we empirically test the implications of our model. Our focus is primarily on inequality aversion and its political economy implications, i.e. whether countries characterized by high levels of inequality aversion exhibit lower government spending on health.

3. Empirical analysis

3.1 Estimation Strategy

This section examines the key implication of our theoretical model i.e. the impact of inequality aversion on public health expenditure (as illustrated in Proposition 2.1).[11] Equation (11) represents the median agent's preference regarding the proportion of government revenues to be allocated for public health provisioning in an economy. Our theoretical model shows a negative effect of inequality aversion on the stated proportion. As testing for this causal effect requires information on measures of inequality aversion, which are otherwise not readily available, we make certain approximations through the following steps.

To our knowledge, there are no country level panel estimates of inequality aversion.[12] So we exploit our theoretical setup from Section 2 to obtain an indirect measure of inequality aversion. Specifically, we consider Eq. (7) which we present below for ease of reference:

$$m_i = \frac{\gamma}{1+\alpha(\phi)+\gamma}\left[(1-\tau)y_i + (1-\beta)\tau\bar{y}\right]$$

We may interpret the above equation as representing a country's per capita private health expenditure.[13] The term $[(1-\tau)y_i + (1-\beta)\tau\bar{y}]$ may be proxied by a measure of per capita income and the term $\gamma/(1+\alpha(\phi)+\gamma)$ may be interpreted as the share of private health expenditure in income. Once γ is known, one can "back out" an indirect measure of the

[11] As discussed above, income of the median voter lies below the mean in the presence of a right-skewed distribution. In this context, a positive α of the median agent implies inequality aversion. Thus, we use the term inequality aversion, rather than inequality preference. When we look at the public health spending of various countries, we assume them to reflect preferences of the median agent of those countries. This may not be the case given that real world may not be characterized by perfectly functioning democracies in which the median voter's preference is reflected in government policy. We do accept this as a caveat of the study.

[12] Most empirical estimates of inequality aversion rely on experimental evidence or survey-based data. There are studies based on microeconomic data looking at inequality aversion at the individual level (see Luce et al., 2006). There are some notable exceptions, in which cross-country estimates are inferred using a utility-based Atkinson index. See for example, Lambert et. al (2003) and references therein. Our measure is distinct in that it derives from consumer demand relationships based on a decision-theoretic framework.

[13] If we were to account for time preferences in this context, we would have to add another parameter to be estimated, thereby requiring the construction of another indicator. So, without any loss of generality, we do not model time preferences in this section.

inequality aversion parameter α from the above equation. For example, suppose a country i with per capita income y, private health expenditure m, has the returns to health spending γ, then α for that country can be computed as: [14]

$$\left\{\frac{y}{m}\gamma - 1 - \gamma\right\}. \tag{12}$$

Health being multifaceted makes it difficult to identify the returns to health investment. Returns can be best understood by a measure which combines different dimensions of healthcare systems as well as health outcomes. For this purpose, we rely on an index, the Legatum Prosperity Index, which ranks countries on different pillars of prosperity, including health.[15] The health pillar ranks countries annually based on the extent to which people are healthy and have access to the necessary services for maintaining good health, mitigating illnesses and mortality rates. Scores are assigned to each country every year, based on their performance in each of these metrics. The higher the score assigned to a country, the stronger is the performance of the country in that metric. We use the health-related scores to proxy for γ of a country in a specific year. This helps us consider a holistic measure on returns to health, rather than any pecuniary return.

With the approximations for γ and α as specified above, our empirical specifications follow Ke, Saksena, and Holly, (2011), with an additional control for inequality aversion. The first model takes the following form,

$$g_{it} = \delta_1 \alpha_{it} + \delta_2 X_{it} + T + \varepsilon_{it} \tag{13}$$

Where g_{it} is the proxy for public health expenditure, as a share of government expenditure; α_{it} denotes our measure of inequality aversion in country i and year t respectively. As the

[14] Henceforth, we refer to α(ϕ) as α. Note that from an empirical point of view we do not make any assumption regarding how α varies with income inequality. This is because our focus is on the aggregate results of Proposition 2 which refers to political economy outcomes at a point in time for a given distribution of income. Given the time span of the data, inequality being a relatively sticky variable, is unlikely to vary much over time.

[15] Source: Legatum Prosperity Index, available at https://www.prosperity.com/, accessed on 3rd October 2020.

extent of inequality varies across countries and over time within countries, we obtain variations in α across both countries and over time. Equation (13) presents the Pooled OLS model, where the coefficient δ_1 is of our interest. It captures the effect of inequality aversion on the share of government expenditure spent on public health. *X* represents the vector of control variables. *T* represents the time trend to control for rising focus on health and healthcare. $'\varepsilon_{it}'$ is the idiosyncratic error term, clustered at the country level.

As cross-sectional analysis does not account for unobserved factors that could be correlated with the variables, the methodology remains susceptible to yielding inconsistent estimates. So, we apply panel data techniques to assess the relationship. We fit the following model for this purpose:

$$g_{it} = \eta + \delta_3 \alpha_{it} + \delta_4 X_{it} + \nu_i + u_{it} \quad (14)$$

Where $(\nu_i + u_{it})$ is the error term; ν_i is the component of the error term that varies across panel units. The coefficient δ_3 is of interest in equation (14) as it estimates the effect of inequality aversion on the share of public expenditure on healthcare. u_{it} is the error term with mean 0, uncorrelated with x, uncorrelated with ν and is homoscedastic.

We check for both fixed (FE) and random effects (RE) models based on assumptions regarding the relation between ν_i and $\bar{x}_i$. Hausman specification test is applied to identify the appropriate model to be used. The FE model is suitable when we want to analyse the impact of time-varying factors while the RE model is suitable when the variation across entities is assumed to be uncorrelated with the predictors or independent variables. The time invariant country-specific variables are the historical, institutional, or geographical background factors. Using both the within and the between information, the RE estimator produces more efficient results.

We follow Ke, Saksena, and Holly, (2011) in our choice of control variables. We control for income, hypothesized to have a positive impact on public health expenditure (Musgrove,

Zeramdini, and Carrin, 2002; Schieber and Maeda, 1999); demographic structure by controlling for old age dependency ratio while hypothesising that the elderly population require more health services (Newhouse, 1992; Rich and Barry, 2017). To allow for limited availability of public resources for health, we control for the substitution effects between sources of health spending such as the out-of-pocket health expenditure (as %current health expenditure) as another regressor and hypothesise an inverse relation with public health expenditure. The greater the amount of out-of-pocket health expenditure, the lesser will be the public share of health expenditure. Following Farag et al. (2009) reporting a negative effect of increasing health ODA on public health expenditure, we control for the share of health expenditure funded by external sources.

3.2 Data and Variables

We use a panel of 147 countries spanning 2008-2019, for which proxies of returns to health expenditure are available (see Appendix B.1). We use two such proxies - the Legatum Prosperity Index and Healthcare Access and Quality Index (HAQI), the latter is to check the robustness of our key results.

The dependent variable is public health expenditure as a share of general government expenditure, obtained from the World Bank Database. The key variable of concern is the inequality aversion measure which we compute as outlined in Section 3.1 using Equation (7) to "back out" this indirect measure of inequality aversion. Further, we control for income by GDP per capita (constant 2010 US$) from the World Bank Database. Data on old age dependency ratio, as the ratio of population aged above 64 years, to the working age population, is obtained from the World Bank Database. Other regressors include the share of out-of-pocket expenditure in current health expenditure and the share of current health expenditure funded from external sources, both from the World Bank Database. We check our results under

different democracy regimes as democracies are shown to have positive relation with the health of individuals (Klomp & Haan, 2009) and can work through the amount of expenditure allocated for healthcare in an economy. We use the Democracy Index by the Economist Intelligence Unit (EIU, 2019) which takes values between 0 and 10 with the lower end of the scale representing authoritarian regimes while the higher end representing democracies (See Table B1 in Appendix B). Based on this scale, 47 countries from our sample are authoritarian, 33 are hybrid democracies, 44 are flawed democracies and 20 are full democracies.[16]

4. Empirical results

4.1 Summary Statistics

Table 1 provides the summary statistics of variables used in our analysis. In our sample, the highest shares of public health spending were reported by countries like Costa Rica, Japan and the United States. The lowest returns on health investment, measured by Legatum Prosperity (2019) scores were reported by certain African countries while the highest were reported by Japan, Singapore and Norway. Summary statistics for our estimates of α are reported in Table B2 of the Appendix B. Highest values of per capita Real GDP were reported by Luxembourg, Switzerland and Norway while the lowest were reported by certain African countries. Highest levels of out-of-pocket health expenditure were reported by Armenia and Comoros while the highest levels of external health financing were reported by Malawi, Gambia and Mozambique. The highest old age dependency ratios were reported in Japan and Italy.

[16] The country lists for different democracy groups comprise information on 144 countries in our sample as we do not have democracy related data on Belize, Sao Tome and Principe and Seychelles. The classification of democracy is based on five dimensions: electoral process and pluralism, functioning of government, political participation, political culture, civil liberties, as reported by the EIU. See details on https://www.eiu.com/topic/democracy-index.

Table 1: Descriptive Statistics

Variables	Definition	Mean	Std. dev.	Min	Max
g_{it}	Public health expenditure (%total government expenditure)	9.578	5.075	0.633	33.097
α_{it}	Inequality aversion	33.571	29.547	2.728	299.860
γ_{it}	Return on health investment	0.656	0.122	0.265	0.865
$Ln(y)$	Logarithm of GDP per capita (2010 const US$)	8.410	1.453	5.628	11.595
oop	Out of pocket health expenditure (%current health spending)	36.100	19.228	2.993	84.794
$Exthe$	External health spending (%current health spending)	9.257	14.536	0	70.788
$prop$	Percentage of population 65 or above	12.084	8.663	0.795	47.121

The above has been calculated for our sample of 147 countries, spanning 2008-2019.

$Ln(y)$, $oop, Ext, prop$ have been obtained from the World Bank Database, https://data.worldbank.org/indicator, accessed on 5th October 2022. γ has been proxied by country scores from the Legatum Prosperity Index, https://www.prosperity.com/, accessed on 5th October 2022 and α has been computed by using the above-mentioned data, as per the steps outlined in Section 3.1.

4.2 Pooled OLS and panel results

Table 2 presents the Pooled OLS estimation results. Column (1) reports the significant negative effect of inequality aversion on public health expenditure (as a share of government expenditure). This significant negative effect remains robust to controlling for the type of democracy in Column (2), with full democracy as the reference. Pooled OLS results show that compared to democratic nations, lower shares of public expenditure get allocated to healthcare in flawed/hybrid democracies or authoritarian regimes. This supports the evidence on greater focus of governments on healthcare in democracies.

Table 2:Pooled OLS estimation results

	Public health spending (%government expenditure) (1)	Public health spending (%government expenditure) (2)
α	-0.045***	-0.038***
	(0.014)	(0.011)
$Ln(y)$	-0.081	-0.522
	(0.310)	(0.372)
$prop$	0.116**	0.067
	(0.045)	(0.056)
oop	-0.168***	-0.160***
	(0.017)	(0.018)
$Exthe$	-0.128***	-0.146***
	(0.020)	(0.025)
Democracy types		
Flawed democracy		-2.794*
		(1.465)
Hybrid Democracy		-2.999*
		(1.697)
Authoritarian		-4.197**
		(1.794)
Year Trend	0.036*	0.052**
	(0.021)	(0.021)
Constant	-54.899	-79.711*
	(43.522)	(41.737)
Observations	1,661	1625
R-squared	0.621	0.653

The table presents the Pooled OLS results when using public health spending (%government expenditure) as the dependent variable. α is computed as $\left\{\frac{y}{m}\gamma - 1 - \gamma\right\}$. Column (1) presents the Pooled OLS results when using the entire sample; Column (2) presents the Pooled OLS results when controlling for the democracy type of the countries (as per the EIU 2019 classification). The control variables used in each specification are – log income, old age dependence ratio, out of pocket health expenditure and the share of health funding from external sources. We also check the results when controlling for business cycles and present the results in Appendix C. The key negative relation, as hypothesised in our proposition, holds true even for this set of regressions. Clustered standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 3 reports the FE and RE results. As shown in the table, and consistent with Proposition 2 of our model, inequality aversion has a significant negative effect on public health expenditure (as a share of government expenditure). Column (1) reports the FE estimates for the entire sample. Column (2) reports the RE results for the entire sample. In both cases, we observe negative significant effect of inequality aversion on public share of health expenditure. As the Hausman test supports the use of RE, we use it for further estimation.

Column (3) reports the RE estimates for the sample of fully democratic nations.[17] It suggests that a unit increase in our measure of inequality aversion can lower public share of health expenditure in total government expenditure by around 0.02 percentage points. It is worth noting that the effect is larger in magnitude than that obtained for the relatively less democratic nations in Column (4), thereby signifying a larger impact of inequality aversion on the proportion of government spending that is devoted to public healthcare in such political systems. The key finding from these estimates is the negative effect that inequality aversion has on the share of public health spending in total government spending.

Regarding the control variables, income has negative effect, though mostly insignificant, implying that as GDP rises, the government is likely to allocate lower shares of total expenditure on health. This could be probably because higher income leads to better health outcomes, thereby creating lesser need for government action. The proportion of aged population has positive effect except in the case of fully democratic nations. Out of pocket health expenditure has negative significant effects. External health spending reduces government's share of expenditure on health; the effect is statistically significant except in case of fully democratic nations.

[17] Column (3) reports the estimation for fully democratic nations. We base our categorisation of democracies on the list provided by the Economist Intelligence Unit (EIU, 2019). The EIU (2019) classifies countries into Full democracy, Flawed democracy, Hybrid regime and Authoritarian. For our estimation purposes, we use full democracies as fully democratic nations and combine the remaining three categories as less democratic nations. The list of countries categorised by the EIU (2019) is provided in Table B1 (see Appendix B). Column (4) reports the results for less democratic nations (including flawed, hybrid democracies and authoritarian regimes.

Table 3: Fixed Effects (FE) and Random Effect (RE) results

	Public health spending (%government expenditure)	Public health spending (%government expenditure)	Public health spending (%government expenditure)	Public health spending (%government expenditure)
	(1) FE	(2) RE	(3) RE fully democratic	(4) RE less democratic
α	-0.020**	-0.024***	-0.064	-0.022***
	(0.008)	(0.008)	(0.039)	(0.008)
$Ln(y)$	-0.937	-0.411	-0.707	-0.649*
	(0.731)	(0.334)	(1.944)	(0.336)
$prop$	0.174**	0.168***	-0.149**	0.169***
	(0.069)	(0.051)	(0.074)	(0.058)
oop	-0.143***	-0.147***	-0.157*	-0.146***
	(0.018)	(0.016)	(0.092)	(0.016)
$Exthe$	-0.125***	-0.127***	-0.192	-0.127***
	(0.018)	(0.017)	(0.202)	(0.017)
Year effects	Yes	Yes	Yes	Yes
Constant	22.137***	18.003***	31.201	19.547***
	(6.127)	(2.970)	(20.908)	(2.965)
Observations	1,661	1,661	225	1,436
Number of countries	147	147	20	127

The table presents the FE and RE panel data results when using public health spending (as %government expenditure) as the dependent variable. α is computed as $\left\{\frac{y}{m}\gamma - 1 - \gamma\right\}$. Column (1) presents the FE results when using the entire sample. However, the Hausman test (Prob>chi2 =0.410) fails to reject the null and suggests the use of RE model. Column (2) presents the RE results when using the entire sample. Column (3) reports the RE results for sub-sample of democratic countries, as per EIU 2019 classification. Column (4) reports the RE results when using a sample of less democratic nations. The control variables used in each specification are - income, old age dependence ratio, out of pocket health expenditure and the share of health funding from external sources. We also check the results when controlling for business cycles. The key negative relation, as hypothesised in our proposition holds true even for this set of regressions. Clustered standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

These results confirm the implications of our model that in democracies the outcomes as indicated in Proposition 2 prevail. Interestingly, the results in the context of inequality aversion are applicable even in case of the entire sample consisting of democratic and less democratic economies; may be because even in these countries democratic processes are in place in some form.[18]

[18] To provide an anecdotal example, elections to determine local government bodies in China, which falls into the second group of countries, are based on direct elections, so that people's preferences may have an indirect impact on central government policies.

4.3 Robustness Checks

To perform robustness checks, we use the same sample of 147 countries and a different measure of the returns to health investment. Data availability on this measure of health returns restricts our sample to a period of 2000-2015.[19] In this section, we measure returns to health expenditures using the Healthcare Access and Quality Index (HAQI) reported by the Global Burden of Disease Study 2015 (GBD 2015). This index is reported by the Institute of Health Metrics and Evaluation in the USA.[20] It has a narrower focus relative to the index we used in the previous section, in that it measures the quality of health systems by looking at health outcomes such as the incidence of disease, mortality, life expectancy of population etc. but does not include broader dimensions of health systems such as preventive interventions, mental health and so on. Using HAQI, we find the return to health expenditure and obtain the corresponding inequality aversion parameter following the process outlined in Section 3.1.[21]

Column (1) in Table 4 reports the Pooled OLS results for the entire sample and Column (2) reports the Pooled OLS while controlling for democracy types. The negative significant coefficient remains robust to controlling for democracy type. Columns (3) and (4) report the FE and RE results for the entire sample. A unit increase in our measure of inequality aversion, when using HAQI which is a narrower measure of returns to health expenditure, can lower the share of health expenditure in government expenditure by around 0.07 percentage points. The Hausman test supports the use of FE in this context and so we use FE models for further analysis. Columns (5) and (6) report the FE results for fully democratic nations and nations

[19] We also check for robustness using per capita public health expenditures (in real terms) and Health System Performance Index presented in the World Health Organization study of Tandon et al. (2000), as a measure of returns to health spending. The Index is an overall composite measure with the following weights: health (25%), health inequality (25%), the level of responsiveness (12.5%), the distribution of responsiveness (12.5%), and fairness in financing (25%). We obtain significant negative effect of inequality aversion on per capita public health expenditures (results available on request).

[20] Healthcare Access and Quality Index are available in 2000, 2005, 2010 and 2016. Source: Global Burden of Disease Collaborative Network. Global Burden of Disease Study 2015 (GBD 2015) Healthcare Access and Quality Index Based on Amenable Mortality 1990–2015. Seattle, United States: Institute for Health Metrics and Evaluation (IHME), 2017.

[21] The values of alpha, as computed using HAQI range between 0.428 to 150.20.

which are not fully democratic, respectively. As in the earlier section, the democratic nations report higher negative impact of inequality aversion on public health expenditure than the less democratic nations.

Table 4: Results using Alternative Measure for γ

	Public health spending (%government expenditure)	Public health spending (%government expenditure)	Public health spending (%government expenditure)	Public health spending (%government expenditure)	Public health spending (%government expenditure)	Public health spending (%government expenditure)
	(1) POLS	(2) POLS	(3) FE	(4) RE	(5) FE	(6) FE
α	-0.064***	-0.056***	-0.076***	-0.069***	-0.135*	-0.076***
	(0.012)	(0.011)	(0.014)	(0.010)	(0.066)	(0.015)
$Ln(y)$	0.054	-0.265	0.648	-0.096	6.256***	0.603
	(0.253)	(0.282)	(0.579)	(0.216)	(1.837)	(0.603)
$prop$	0.107**	0.054	0.283***	0.138***	-0.022	0.287***
	(0.042)	(0.055)	(0.065)	(0.040)	(0.134)	(0.077)
oop	-0.164***	-0.159***	-0.166***	-0.163***	-0.336***	-0.163***
	(0.016)	(0.016)	(0.018)	(0.013)	(0.098)	(0.018)
$Exthe$	-0.116***	-0.131***	-0.145***	-0.140***	-0.629*	-0.142***
	(0.019)	(0.022)	(0.020)	(0.018)	(0.331)	(0.020)
Democracy types	No	Yes	No	No		
Year Trend	0.002	0.019				
	(0.018)	(0.021)				
Year Effects			Yes	Yes	Yes	Yes
Constant	13.420	-15.463	10.615**	17.680***	-37.317*	11.125**
	(36.536)	(40.375)	(4.653)	(2.000)	(20.960)	(4.528)
Observations	539	528	539	539	69	470
R-squared	0.568	0.597	0.395		0.726	0.387
Number of countries			147	147	20	127

The table presents the Pooled OLS and FE results when using Public health expenditure (%government expenditure) as the outcome variable. The proxy for γ is the Health Access and Quality Index, HAQI (GBD, 2015). α is computed as $\left\{\frac{y}{m}\gamma - 1 - \gamma\right\}$. The sample for this analysis comprises 147 countries for 2000, 2005, 2010 and 2015. Column (1) presents the Pooled OLS results when using the entire sample. Column (2) presents the POLS results when controlling for democracy types (as per EIU 2019 classification). Columns (3) and (4) report the FE and RE results when using the entire sample of countries. The Hausman test (Prob>chi2 =0.034) suggests the use of FE model. Columns (5) and (6) present the FE results for fully democratic and less democratic nations. The control variables used in each specification are - income, old age dependence ratio, out of pocket health expenditure and share of health funding from external sources. We also check the results when controlling for business cycles. The key negative relation, as hypothesised in our proposition holds true even for this set of regressions. Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

As in the earlier set of regression results, out-of-pocket health expenditure and the share of external health spending have negative significant effects. The effect of income is mixed, though statistically insignificant in most cases. The proportion of aged population has significant positive effect except in the case of fully democratic nations, though statistically insignificant.

As shown in Table 4, our key results remain robust to alternative measure of γ. Furthermore, the magnitude of the impact of inequality aversion is larger in the economies with a high democracy level compared to that in the group of less democratic nations. This reinforces the empirical relevance of our theoretical framework.

5. Conclusion

Existing literature indicates that many health outcomes can be linked to the effects of inequality in an economy. In this context, fewer papers investigate the effect on health spending and even fewer papers explore the exact mechanism through which it works. Our paper seeks to examine the link both theoretically and empirically, using a behavioural mechanism effect that inequality aversion can have on health spending. Theoretically, we investigate the impact of income inequality by considering the inequality aversion of agents and the corresponding effect on decisions regarding public investments in health. This is especially relevant in a democratic setup where the government, to be in power, is responsive to the demand of the citizens and thus to their behavioural aspects. Political economy implications of our theoretical model suggest that, in the aggregate, inequality aversion leads to a lower focus of the government on public health.

Based on our theoretical specifications, using a panel of 147 countries between 2008 and 2019, we construct estimates of inequality aversion. We find that the share of public health expenditure in total government expenditure is negatively affected by inequality aversion in an economy. Furthermore, we divide countries into two groups - low-democracy and fully democratic nations. Consistent with our theoretical framework we find that, in the case of democratic nations, the impact of inequality aversion on the public health expenditure share is negative and significant, in addition to having a larger magnitude.

A central contribution of our analysis is that it provides a theoretical framework that helps identify the effect of inequality working through the channel of aversion towards inequality, and how it may impact public health spending. This approach could be generalized and applied to other contexts. For example, inequality aversion could affect other redistributive expenditures such as education, infrastructure and environment. Considering these issues and extending this analysis to a more general equilibrium framework by grafting in production decision by firms and labour supply decision by households, suggesting fruitful directions of future research.

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Appendix

Appendix A

Appendix A.1 Discussion of Inequality Aversion & Fehr & Schmidt (1999) framework

As noted in Section 2, the specification of preferences in our paper draws on the concept of inequality aversion proposed in Fehr and Schmidt (1999). In that paper there are j = 1,2,…n agents and utility of an agent i is described as follows:

$$U_i(\{x_i, x_j\}) = x_i - \frac{\alpha_i}{n-1}\sum max(x_j - x_i, 0) - \frac{\beta_i}{n-1}\sum max(x_i - x_j, 0)$$

In the above 'x' represents pecuniary outcomes and the individuals' own pecuniary outcomes appear linearly in their utility function. The second term represents their distaste for being disadvantaged relative to others while the second term represents their distaste for relative advantage over others. The distance is calculated based on an "average" difference from others. In this framework, either the second or the third term will be zero, depending on how an individual is positioned relative to the average.

In our formulation there are a few differences, but preferences are very close in spirit to the Fehr and Schmidt formulation (henceforth FS). For ease of reference, we present the utility function below:

$$U\left(c_i, h_i\right) = \ln(c_i) - \alpha\left(\phi\right)\ln\left(\frac{\overline{c}}{c_i}\right) + \ln\left(h_i\right) \tag{1}$$

The above utility function is logarithmic rather than linear. This deviation is motivated in the interest of producing interior solutions and keeping the framework similar to "standard" models of discrete choice in the extant literature.

Secondly our formulation of distaste for difference relative to others is also similar to the FS formulation. The term $ln\left(\frac{\overline{c}}{c}\right) = ln(\overline{c}) - \ln(c)$ also reflects difference from the average, expressed in logarithmic rather than linear terms. If the average of the economy's consumption level is above an individual's level of consumption, our second term reflects the distaste for disadvantage, as in the FS formulation, although in the sense of consumption inequality, which suggests a narrower interpretation of disadvantage, hence the use of "inequality" rather than "inequity" throughout the paper. However, when the agent's consumption is above the average we have a negative term, which given the negative sign before the parameter α means that the agent prefers advantage relative to others.

As discussed in section 2 this difference is not particularly critical for our model, given that we assume an income distribution characterized by inequality. This means that the median agent (and hence the majority) have incomes and consumption below the mean and are disadvantaged. Another difference is that in equation (1) above the parameter α does not vary across agents, as in the FS formulation. In the empirical formulation the variation in this parameter reflects underlying assumption that every country's median agent has a different α, although by assumption, there is no within-country variation in α.

We view our framework as a benchmark for inequality aversion to be grafted in richer frameworks explored in the macroeconomics literature. In macroeconomic modeling, where log utility (or something close to log utility) is often assumed due to its ability to address certain stylized facts of economic growth. Briefly, in models where the labor supply decision is considered, the assumption of log utility implies that income and substitution effects of wage changes cancel out. This works well to capture what has been observed in developed economies since the post World War II period, namely that per-capita leisure has remained approximately constant even though wages have steadily increased since the post war period (Cooley and Prescott, 1995). Another reason to use log utility is that such frameworks are stochastic, and employ the expected utility framework, which is cardinal rather than ordinal in nature, so that concavity (which also implies risk aversion) becomes

It is worth noting that logarithmic transformations are not symmetric for deviations which are above or below the mean. This is true for all utility functions that exhibit diminishing marginal utility (i.e. concave utility functions). While diminishing marginal utility is not needed in this framework, it is a friendly and tractable specification that is easy to analyze and it provides closed-form solutions.

Appendix A.2 Time preference included in the model

The simplest way to incorporate the idea of time preference is to view health as a good that is enjoyed in the "future". In that case a simple reformulation of our model would entail changing preferences as follows:

$$U\left(c_i, h_i\right) = \ln(c_i) - \alpha\left(\phi\right)\ln\left(\frac{\overline{c}}{c_i}\right) + \theta\ln\left(h_i'\right) \qquad (1)$$

The above equation differs from (1) in that we have labelled the health good to h' to indicate that it is enjoyed in the future, and incorporated an additional parameter θ to reflect the rate of time preference, with $0 < \theta < 1$. Likewise, equation (2) gets modified to

$$h_i' = m_i^{\gamma} g_i^{\delta} \tag{2}$$

This reformulation, however, does not substantively change any of the outcomes of the model. This is because consumption and health demands are now given by:

$$c_i = \frac{1+\alpha(\phi)}{1+\alpha(\phi)+\gamma\theta}\left[(1-\tau)y_i + (1-\beta)\tau\bar{y}\right] \tag{6}$$

$$m_i = \frac{\gamma\theta}{1+\alpha(\phi)+\gamma\theta}\left[(1-\tau)y_i + (1-\beta)\tau\bar{y}\right] \tag{7}$$

The only difference relative to the earlier versions of these equations is that the parameter γ gets replaced by γθ. Likewise, all our theoretical results go through with similar changes. Empirically, however, we would find it hard to find separate estimates of both θ and γ, with estimates of the former being even more controversial. Given that they always appear together, one could in fact keep the original formulation and interpret the parameter γ a composite parameter that includes a time preference component. We choose to take the latter route, by reinterpreting our parameter γ rather than introducing an additional parameter and an additional source of bias in the empirical results.

Appendix A.3

To investigate how the government distributes the revenue between health expenditure and government transfer, we maximize utility function subject to the agent's budget constraint and the health production function. The utility function shown in Eq. (1) is:

$$U(c_i, h_i) = \ln(c_i) - \alpha(\phi)\ln\left(\frac{\bar{c}}{c_i}\right) + \ln(h_i) \tag{1}$$

The agent's budget constraint described in Eq. (5) is:

$$c_i + m_i = (1-\tau)y_i + t_i \tag{5}$$

We replace t_i using Eq. (3) as shown below

$$t = (1-\beta)\tau\bar{y} \tag{3}$$

Then we have:

$$m_i = (1-\tau)y_i + (1-\beta)\tau\bar{y} - c_i$$

Substituting the above equation for m_i into Eq. (2), we have

$$h_i = m_i^{\gamma} g_i^{\delta} \tag{2}$$

Then we can rewrite Eq. (2) as follows:

$$h_i = \left[(1-\tau) y_i + (1-\beta)\tau\bar{y} - c_i\right]^{\gamma} (\beta\tau\bar{y})^{\delta}$$

Substituting the above equation for h_i into Eq. (1), we can rewrite the utility function as:

$$U(c_i, h_i) = \ln(c_i) - \alpha(\phi)\ln(\bar{c}) + \alpha(\phi)\ln(c_i) + \gamma \ln\left[(1-\tau) y_i + (1-\beta)\tau\bar{y} - c_i\right] + \delta \ln(\beta\tau\bar{y})$$

Recall Eq. (6)

$$c_i = \frac{1+\alpha(\phi)}{1+\alpha(\phi)+\gamma}\left[(1-\tau) y_i + (1-\beta)\tau\bar{y}\right] \tag{6}$$

Substituting c_i in the utility function using Eq. (6), we have the indirect utility function

$$V(\beta) = \ln\left\{\frac{1+\alpha(\phi)}{1+\alpha(\phi)+\gamma}\left[(1-\tau) y_i + (1-\beta)\tau\bar{y}\right]\right\} - \alpha(\phi)\ln(\bar{c}) +$$
$$\alpha(\phi)\ln\left\{\frac{1+\alpha(\phi)}{1+\alpha(\phi)+\gamma}\left[(1-\tau) y_i + (1-\beta)\tau\bar{y}\right]\right\} +$$
$$\gamma \ln\left\{\frac{\gamma}{1+\alpha(\phi)+\gamma}\left[(1-\tau) y_i + (1-\beta)\tau\bar{y}\right]\right\} + \delta \ln(\beta\tau\bar{y})$$

As is evident from the above equation it is differentiable and continuous given the logarithmic form. The first three terms involving β are decreasing with β in the interval [0, 1], while the last term is increasing with β. This means that the solution for β need not be interior in the interval [0, 1]. However, concavity of the function ensures single peakedness as we will see below.

Taking the first derivative of utility function with respect to β, the first order condition for a maximum is:

$$\left[1+\alpha(\phi)\right]\frac{-\tau\bar{y}\dfrac{1+\alpha(\phi)}{1+\alpha(\phi)+\gamma}}{\dfrac{1+\alpha(\phi)}{1+\alpha(\phi)+\gamma}\left[(1-\tau) y_i + (1-\beta)\tau\bar{y}\right]} + \gamma\frac{-\tau\bar{y}\dfrac{\gamma}{1+\alpha(\phi)+\gamma}}{\dfrac{\gamma}{1+\alpha(\phi)+\gamma}\left[(1-\tau) y_i + (1-\beta)\tau\bar{y}\right]} + \delta\frac{\tau\bar{y}}{\beta\tau\bar{y}} = 0$$

Rearranging the above equation as follow yields the only solution for β

$$-\tau\bar{y}\frac{1+\alpha(\phi)}{1+\alpha(\phi)+\gamma}\frac{1+\alpha(\phi)+\gamma}{\left[(1-\tau)y_i+(1-\beta)\tau\bar{y}\right]}+\left[-\tau\bar{y}\frac{\gamma}{1+\alpha(\phi)+\gamma}\right]\frac{1+\alpha(\phi)+\gamma}{\left[(1-\tau)y_i+(1-\beta)\tau\bar{y}\right]}+\delta\frac{1}{\beta}=0$$

$$-\tau\bar{y}\frac{1+\alpha(\phi)}{\left[(1-\tau)y_i+(1-\beta)\tau\bar{y}\right]}+(-\tau\bar{y})\frac{\gamma}{\left[(1-\tau)y_i+(1-\beta)\tau\bar{y}\right]}+\delta\frac{1}{\beta}=0$$

$$-\tau\bar{y}\frac{1+\alpha(\phi)+\gamma}{\left[(1-\tau)y_i+(1-\beta)\tau\bar{y}\right]}+\delta\frac{1}{\beta}=0$$

$$\delta\frac{1}{\beta}=\tau\bar{y}\frac{1+\alpha(\phi)+\gamma}{\left[(1-\tau)y_i+(1-\beta)\tau\bar{y}\right]}$$

$$\beta=\frac{\delta\left((1-\tau)y_i/\tau\bar{y}+1\right)}{1+\alpha(\phi)+\gamma+\delta} \qquad \text{(A1)}$$

To find whether this value of β is a maximum we take the second derivative of the indirect utility function as follows:

$$\frac{\partial^2 V}{\partial\beta^2}=-(\tau\bar{y})^2\frac{\left(1+\alpha(\phi)+\gamma\right)}{\left[(1-\tau)y_i+(1-\beta)\tau\bar{y}\right]^2}-\delta\frac{1}{\beta^2}$$

Since we assume that $0<\gamma<1$, $0<\delta<1$ and $\alpha(\phi)>0$, we have $\frac{\partial^2 V}{\partial\beta^2}<0$. This establishes a global maximum at the value of β as described in Eq. (A1). However, as discussed above this value may not be interior. As evident from Eq. (A1), it is increasing with y_i and could increase to a value greater than 1 for a sufficiently large y_i. We therefore write the optimal preferred value of β for any agent in the economy as follows:

$$\beta=\min\left[\left(\frac{\delta\left((1-\tau)y_i/\tau\bar{y}+1\right)}{1+\alpha(\phi)+\gamma+\delta}\right),\quad 1\right]$$

Note however that the fact that there is a global maximum to the indirect utility function establishes single peakedness. This is because the global maximum for any agent could either occur to the right of the interval or in the middle of the interval [0, 1] in which case the utility function is single peaked as illustrated below:

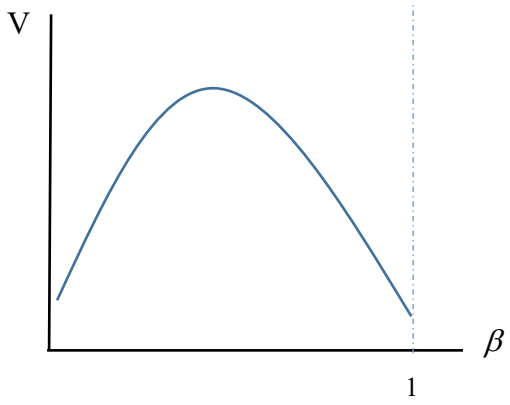

Figure A1: interior max

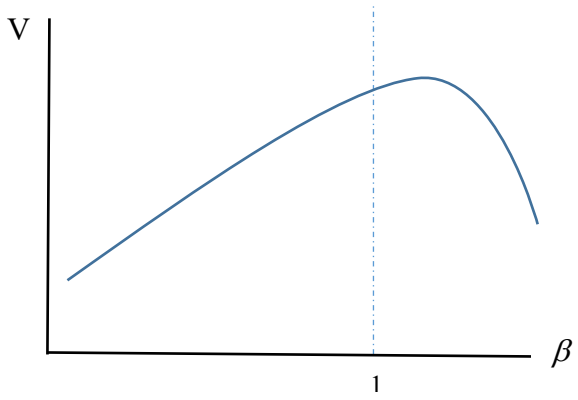

Figure A2: corner solution, β=1

Due to single peakedness we can invoke the median voter theorem and equate the political economy outcome to value of β in Eq. (A1). Also, since the median is below the mean in the presence of inequality, this value is less than 1 and we have an interior solution for the median voter's preferred value of β. The proof of Proposition 2 is then established simply by taking the derivatives of β as in Eq. (A1) with respect to α and γ.

Appendix B
Appendix B.1 Countries used for regression analyses

Afghanistan, Albania, Algeria, Angola, Argentina, Armenia, Australia, Austria, Azerbaijan, Bahrain, Bangladesh, Belarus, Belgium, Belize, Benin, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Burkina Faso, Burundi, Cabo Verde, Cambodia, Cameroon, Canada, Central African Republic, Chad, Chile, China, Colombia, Comoros, Congo, Dem. Rep., Congo, Rep., Costa Rica, Cote d'Ivoire, Croatia, Cuba, Cyprus, Czech Republic, Denmark, Djibouti, Ecuador, Egypt, Arab Rep., El Salvador, Equatorial Guinea, Eritrea, Estonia, Ethiopia, Finland, Gabon, Gambia, The, Georgia, Germany, Ghana, Greece, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, Hungary, Iceland, India, Indonesia, Iraq, Ireland, Israel, Italy, ,Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kuwait, Kyrgyz Republic, Lao PDR, Latvia, Lebanon, Lesotho, Liberia, Libya, Lithuania, Luxembourg, Madagascar, Malawi, Malaysia, Mali, Mauritania, Mauritius, Moldova, Mongolia, Montenegro, Morocco, Mozambique, Myanmar, Namibia, Nepal, Netherlands, Nicaragua, Niger, Nigeria, Norway, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Qatar, Romania, Russian Federation, Rwanda, Sao Tome and Principe, Senegal, Serbia, Seychelles, Sierra Leone, Singapore, South Africa, Spain, Sri Lanka, Sudan, Suriname, Sweden, Switzerland, Syrian Arab Republic, Tajikistan, Tanzania, Thailand, Togo, Trinidad and Tobago, Tunisia, Turkmenistan, Uganda, Ukraine, United Arab Emirates, United Kingdom, United States, Uruguay, Uzbekistan, Vietnam, Yemen, Rep., Zambia, Zimbabwe.

Table B1: Countries as per Different Democratic Groups (EIU, 2019 classification)

Full Democracies	
Australia	Mauritius
Austria	Netherlands
Canada	Norway
Chile	Portugal
Costa Rica	Spain
Denmark	Sweden
Finland	Switzerland
Germany	United Kingdom
Iceland	Uruguay
Ireland	
Luxembourg	

Flawed and Hybrid Democracies			
Algeria	Ghana	Madagascar	Serbia
Albania	Greece	Malawi	
Argentina	Guatemala	Malaysia	
Armenia	Guyana	Mali	
Bangladesh	Haiti	Moldova	
Belgium	Honduras	Mongolia	
Benin	Hungary	Morocco	
Bolivia	India	Namibia	
Bosnia and Herzegovina	Indonesia	Nepal	
Botswana	Israel	Nigeria	
Brazil	Italy	Pakistan	
Burkina Faso	Jamaica	Panama	
Cabo Verde	Japan	Papua New Guinea	
Colombia	Kenya	Paraguay	

Cote d'Ivoire	Kyrgyz Republic	Peru
Croatia	Latvia	Philippines
Cyprus	Lebanon	Poland
Czech Republic		
Ecuador	Lesotho	Romania
El Salvador	Liberia	Senegal
Estonia	Lithuania	
Gambia, The	Montenegro	
Georgia		

Authoritarian regime

Afghanistan	Congo, Rep.	Kazakhstan	Sudan
Angola	Cuba	Kuwait	Syrian Arabic Republic
Azerbaijan	Djibouti	Lao PDR	Tajikistan
Bahrain	Egypt, Arab Rep.	Mauritania	Togo
Belarus	Equatorial Guinea	Mozambique	Turkmenistan
Burundi	Eritrea	Myanmar	United Arab Emirates
Cambodia	Ethiopia	Nicaragua	Uzbekistan
Cameroon	Gabon	Niger	Vietnam
Central African Republic	Guinea	Qatar	Yemen, Rep
Chad	Guinea-Bissau	Russia	Zimbabwe
China	Iraq	Rwanda	
Comoros	Jordan		
Congo, Dem. Rep.	Libya		

We use the above listing to distinguish between the fully democratic and less democratic (flawed, hybrid and authoritarian) nations, For our regression estimations.

Table B2: Country-specific Summary Statistics for α (using Legatum Prosperity Index)

Country	**Min α**	**Max α**	**Std.dev. α**	**Mean α**
Afghanistan	3.208	6.560	1.102	
Albania	23.603	33.750	3.426	
Algeria	31.887	59.256	7.985	
Angola	34.070	60.501	8.744	
Argentina	17.978	21.371	1.161	
Armenia	5.769	13.148	1.984	
Australia	24.893	32.301	3.068	
Austria	25.518	28.309	0.734	
Azerbaijan	23.126	59.499	11.359	
Bahrain	36.124	62.870	6.994	
Bangladesh	30.068	34.522	1.384	
Belarus	28.339	43.780	4.453	
Belgium	29.323	31.577	0.604	
Belize	38.060	42.498	1.360	
Benin	32.370	40.608	3.106	
Bolivia	28.680	37.995	2.838	
Bosnia and Herzegovina	14.948	24.849	2.721	
Botswana	16.675	63.130	16.456	
Brazil	11.053	15.128	1.481	
Burkina Faso	21.091	28.746	2.678	
Burundi	7.711	16.007	2.999	
Cabo Verde	43.833	73.792	9.571	

Cambodia	9.997	17.257	2.569
Cameroon	12.951	15.016	0.694
Canada	21.475	24.563	0.941
Central African Republic	5.659	11.325	2.091
Chad	8.958	13.255	1.404
Chile	14.548	18.174	1.320
China	33.169	40.139	2.255
Colombia	34.417	40.930	2.506
Comoros	10.431	15.848	1.942
Congo, Dem. Rep.	12.790	28.920	4.988
Congo, Rep.	36.689	87.262	17.815
Costa Rica	29.973	40.074	3.315
Cote d'Ivoire	10.915	25.667	5.753
Croatia	50.973	75.337	7.246
Cuba	58.447	76.060	6.214
Cyprus	18.082	24.098	1.691
Czech Republic	52.645	66.604	4.058
Denmark	44.878	49.294	1.333
Djibouti	80.000	130.402	17.492
Ecuador	19.562	26.414	2.005
Egypt, Arab Rep.	15.473	22.480	2.567
El Salvador	20.564	26.373	2.066
Equatorial Guinea	18.888	66.602	13.969
Eritrea	18.670	25.065	2.875
Estonia	41.535	53.189	4.038
Ethiopia	15.759	40.053	8.563
Finland	37.099	42.960	1.882
Gabon	21.741	59.696	11.671
Gambia, The	49.160	54.435	1.342
Georgia	8.238	16.507	2.861
Germany	27.045	29.986	1.039
Ghana	27.815	37.548	3.141
Greece	17.257	23.835	2.442
Guatemala	14.889	17.566	0.920
Guinea	10.133	20.397	3.080
Guinea-Bissau	6.961	16.651	3.636
Guyana	32.237	45.632	3.937
Haiti	21.571	30.584	3.227
Honduras	13.236	16.425	0.904
Hungary	31.469	36.336	2.100
Iceland	46.935	53.629	2.423
India	19.137	31.101	4.490
Indonesia	29.048	47.752	6.396
Iraq	20.465	90.464	26.587
Ireland	23.198	45.004	8.851
Israel	28.038	31.182	0.903
Italy	33.312	35.720	0.937
Jamaica	27.423	36.925	2.542
Japan	47.504	54.018	1.752
Jordan	18.507	33.550	5.660
Kazakhstan	49.194	87.985	11.917
Kenya	17.530	40.911	8.442
Kuwait	107.581	207.860	37.676
Kyrgyz Republic	15.122	33.274	5.493
Lao PDR	28.489	55.659	9.412

Latvia	26.221	29.410	1.198
Lebanon	13.231	16.805	1.175
Lesotho	16.905	25.256	2.724
Liberia	5.232	8.949	1.022
Libya	30.172	81.143	21.481
Lithuania	28.205	35.280	2.032
Luxembourg	76.584	115.636	11.737
Madagascar	24.064	35.030	3.989
Malawi	22.851	46.718	7.826
Malaysia	39.845	50.848	3.949
Mali	13.189	39.544	9.396
Mauritania	24.674	35.513	3.182
Mauritius	20.251	29.197	3.264
Moldova	8.966	28.320	5.338
Mongolia	37.910	58.287	6.780
Montenegro	18.030	22.438	1.689
Morocco	17.528	21.907	1.363
Mozambique	37.685	109.998	27.476
Myanmar	14.709	39.309	9.163
Namibia	9.294	12.899	1.235
Nepal	13.961	20.496	2.491
Netherlands	20.692	23.206	0.684
Nicaragua	20.648	22.368	0.598
Niger	12.454	17.820	2.011
Nigeria	12.609	21.261	2.408
Norway	51.784	62.844	3.261
Pakistan	21.746	31.254	2.474
Panama	27.804	33.104	1.967
Papua New Guinea	195.815	299.860	32.859
Paraguay	16.897	20.065	0.911
Peru	28.741	39.722	3.523
Philippines	20.242	27.330	2.783
Poland	35.083	40.311	2.097
Portugal	18.618	20.586	0.572
Qatar	95.448	233.773	56.379
Romania	58.977	73.882	4.865
Russian Federation	30.517	34.814	3.038
Rwanda	28.272	41.304	4.370
Sao Tome and Principe	31.910	72.882	13.698
Senegal	19.398	27.440	2.244
Serbia	16.928	19.441	0.782
Seychelles	46.389	64.974	5.368
Sierra Leone	2.728	7.881	1.714
Singapore	35.070	40.618	1.982
South Africa	11.570	13.613	0.742
Spain	27.198	28.459	0.498
Sri Lanka	28.534	36.699	2.430
Sudan	9.176	17.498	2.498
Suriname	21.116	25.784	1.403
Sweden	42.694	51.747	3.058
Switzerland	8.479	10.471	0.735
Syrian Arab Republic	34.597	38.545	1.788
Tajikistan	12.619	17.342	1.444
Tanzania	23.734	65.800	15.894
Thailand	67.922	93.894	8.463

Togo	9.926	15.063	1.813
Trinidad and Tobago	17.525	35.298	5.035
Tunisia	21.776	27.867	2.229
Turkmenistan	11.786	19.339	3.053
Uganda	13.383	32.837	6.741
Ukraine	14.018	27.140	3.861
United Arab Emirates	36.223	78.891	15.986
United Kingdom	35.887	44.237	2.907
United States	7.105	7.469	0.135
Uruguay	19.995	28.213	2.650
Uzbekistan	21.920	33.645	3.430
Vietnam	24.320	31.445	2.083
Yemen, Rep.	10.430	14.828	1.316
Zambia	23.321	75.061	16.375
Zimbabwe	6.892	14.247	2.262

Appendix C

The following tables report regression results when controlling for business cycles, as denoted by positive or negative growth rates of the countries.

Table C1: Results when controlling business cycles (γ measued by Legatum Prosperity Index)

VARIABLES	Public health spending (%government expenditure)	Public health spending (%government expenditure)	Public health spending (%government expenditure)	Public health spending (%government expenditure)	Public health spending (%government expenditure)
	(1) Pooled OLS	(2) FE	(3) RE	(4) RE fully democratic	(5) RE Less democratic
α	-0.038***	-0.020**	-0.023***	-0.064	-0.022***
	(0.011)	(0.008)	(0.008)	(0.039)	(0.008)
Ln(y)	-0.491	-0.859	-0.398	-0.647	-0.638*
	(0.374)	(0.757)	(0.332)	(1.975)	(0.336)
prop	0.063	0.179***	0.170***	-0.144**	0.170***
	(0.056)	(0.068)	(0.050)	(0.073)	(0.057)
oop	-0.160***	-0.143***	-0.147***	-0.152	-0.146***
	(0.018)	(0.018)	(0.016)	(0.093)	(0.016)
Exthe	-0.146***	-0.125***	-0.126***	-0.192	-0.127***
	(0.025)	(0.018)	(0.017)	(0.201)	(0.017)
Business cycle	0.425*	-0.093	-0.095	-0.170	-0.070
	(0.250)	(0.094)	(0.090)	(0.180)	(0.099)
Year Trend	0.051**				
	(0.021)				
Constant	-78.934*	21.504***	17.951***	30.510	19.504***
	(41.911)	(6.338)	(2.955)	(21.244)	(2.964)
Year effects	No	Yes	Yes	Yes	Yes
Democracy types	Yes	No	No	No	No
Observations	1,625	1,661	1,661	225	1,436
R-squared	0.654	0.331			
Number of countries		147	147	20	127

The table presents the POLS, FE and RE results when using public health spending (as %government expenditure) as the dependent variable. The returns to health has been proxied by the Legatum Prosperity Index. α is computed as $\left\{\frac{y}{m}\gamma - 1 - \gamma\right\}$. Column (1) presents the POLS results when using the entire sample. Column (2) presents the FE results when using the entire sample. The Hausman test fails to reject the null and suggests the use of RE models. Column (3) represents the RE model using entire data. Column (4) reports the RE results for sub-sample of fully democratic countries. Column (5) reports the RE results when using a sample of less democratic nations. The control variables used in each specification are - income, old age dependence ratio, out of pocket health expenditure and the share of health funding from external sources. We have defined business cycles on the basis of year-on-year economic growth rates of countries. We use a binary dummy (equal to one when the growth rate is positive and equal to zero when the growth rate is negative). The key negative relation, as hypothesised in our proposition holds true even for this set of regressions. Clustered standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table C2: Results when controlling business cycles (γ measued by HAQI)

VARIABLES	Public health spending (%government expenditure)	Public health spending (%government expenditure)	Public health spending (%government expenditure)	Public health spending (%government expenditure)	Public health spending (%government expenditure)	Public health spending (%government expenditure)
	(1)	(2)	(3)	(4)	(5)	(6)
	POLS	POLS	FE	RE	FE fully democratic	FE Less democratic
α	-0.064***	-0.056***	-0.078***	-0.069***	-0.130*	-0.078***
	(0.012)	(0.011)	(0.014)	(0.010)	(0.067)	(0.014)
Ln(y)	0.053	-0.273	0.913	-0.068	5.437***	0.996*
	(0.256)	(0.286)	(0.560)	(0.214)	(1.711)	(0.581)
prop	0.107**	0.053	0.281***	0.135***	-0.022	0.284***
	(0.042)	(0.055)	(0.067)	(0.041)	(0.126)	(0.078)
oop	-0.164***	-0.159***	-0.167***	-0.163***	-0.333***	-0.164***
	(0.016)	(0.016)	(0.018)	(0.013)	(0.096)	(0.018)
Exthe	-0.116***	-0.132***	-0.145***	-0.140***	-0.564*	-0.141***
	(0.019)	(0.022)	(0.020)	(0.018)	(0.312)	(0.020)
Business cycle	-0.049	-0.240	-0.496	-0.328	0.488	-0.767*
	(0.563)	(0.518)	(0.390)	(0.380)	(0.300)	(0.450)
Year Trend	0.001	0.018				
	(0.018)	(0.021)				
Constant	14.033	-12.762	9.078**	17.834***	-29.669	8.995**
	(36.082)	(39.890)	(4.486)	(2.033)	(19.992)	(4.333)
Year effects	No	No	Yes	Yes	Yes	Yes
Democracy types	No	Yes	No	No	No	No
Observations	539	528	539	539	69	470
R-squared	0.568	0.597	0.399		0.732	0.396
Number of countries			147	147	20	127

The table presents the POLS, FE and RE results when using public health spending (as %government expenditure) as the dependent variable. The returns to health has been proxied by HAQI. α is computed as $\left\{\frac{y}{m}\gamma - 1 - \gamma\right\}$. Columns (1) and (2) present the POLS results when using the entire sample but controlling for democracy types in Column (2). The Hausman test rejects the null and suggests the use of FE models. Column (3) reports the FE results for the entire sample. Column (4) reports the corresponding RE results. Column (5) reports the FE results when using a sample of fully democratic nations. Column (6) reports FE results for the less democratic nations. The control variables used in each specification are - income, old age dependence ratio, out of pocket health expenditure and the share of health funding from external sources. We have defined business cycles on the basis of year-on-year economic growth rates of countries. We use a binary dummy (equal to one when the growth rate is positive and equal to zero when the growth rate is negative). The key negative relation, as hypothesised in our proposition holds true even for this set of regressions. Clustered standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.