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## The political economy of austerity and healthcare: Cross-national analysis of expenditure changes in 27 European nations 1995–2011 ☆,☆☆

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### ABSTRACT

Why have patterns of healthcare spending varied during the Great Recession? Using cross-national, harmonised data for 27 EU countries from 1995 to 2011, we evaluated political, economic, and health system determinants of recent changes to healthcare expenditure. Data from EuroStat, the IMF, and World Bank (2013 editions) were evaluated using multivariate random- and fixed-effects models, correcting for pre-existing time-trends. Reductions in government health expenditure were not significantly associated with magnitude of economic recessions (annual change in GDP,  $p=0.31$ , or cumulative decline,  $p=0.40$  or debt crises (measured by public debt as a percentage of GDP,  $p=0.38$  or per capita,  $p=0.83$ )). Nor did ideology of governing parties have an effect. In contrast, each \$100 reduction in tax revenue was associated with a \$2.72 drop in health spending (95% CI: \$1.03–4.41). IMF borrowers were significantly more likely to reduce healthcare budgets than non-IMF borrowers (OR = 3.88, 95% CI: 1.95–7.74), even after correcting for potential confounding by indication. Exposure to lending from international financial institutions, tax revenue falls, and decisions to implement cuts correlate more closely than underlying economic conditions or orientation of political parties with healthcare expenditure change in EU member states.

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### 1. Introduction

Virtually all European countries have experienced economic recessions since 2007. Those nations with large financial centres, including the UK, were among the first to be affected, with many other nations' banking sectors

soon caught in the ensuing turmoil. In several, politicians used large financial stimulus packages to bail out banks, absorbing their debts into the public sector's balance sheet. In parallel, recessions led to increasing job losses and falling incomes, leading to declining consumer spending and associated tax revenues. This resulted in large increases in government deficits (where annual government spending exceeded revenues), increasing national public debts. How best to respond to these combined threats of large falls in output, unemployment, and escalating debts and deficits has been a topic of vociferous debate.

The European Commission, European Central Bank, and International Monetary Fund (so-called 'troika'), along with leaders of many European nations, placed an explicit priority on deficit reduction. In a letter to Europe's finance ministers on 13th Feb 2013 the European Union's

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Commissioner for Economic and Monetary Affairs, Ollie Rehn, wrote that “when public debt levels rise above 90% they tend to have a negative impact on economic dynamism” [1]. Concerns were widespread that high levels of debt could trigger declines in economic growth [2], as well as lead to costly, unsustainable debt repayments. To reduce deficits, governments began implementing austerity programmes, so named because they typically involve budget cuts. However, austerity measures also may include policies that increase taxes on corporations, individual or household incomes, value-added or sales taxes, and other forms of taxation.

Why are some EU policymakers making large cuts to healthcare spending while others are not? It has been hypothesised that larger economic shocks, such as GDP falls, unemployment, and debt, may trigger policymakers to make deep healthcare cuts [3]. Yet, a brief look at cross-national data in Europe shows that there is no inevitable relationship between recessions and healthcare cuts. When comparing the size of the economic recessions that began in 2007, defined as the peak-to-trough change in GDP, with the subsequent magnitude of budget cuts, reflecting the delay in budget cycles, there is little or no obvious correlation [4]. Take Austria and Germany, for example. Both experienced recessions of similar size and timing (2008–2009), yet Austria saw reduced government spending on health, of US\$90.1 per capita, adjusted for purchasing-power and inflation, while Germany saw an increase of US\$57.4 per capita. As Fig. 1 demonstrates, policymakers have made widely differing budgetary choices about health expenditures in response to these downturns [5–8]. Some countries have allowed total spending to rise in the face of increasing population needs, in spite of budgetary pressures from rising deficits and debts. Another group of countries has specifically allowed healthcare expenditure to rise, a measure that would facilitate improvement in the quality and accessibility of health services while fostering economic growth [9]. Yet a third group of governments, potentially influenced by an influential consensus among international institutions that fiscal consolidation would promote future growth, appears to have substantially reduced government spending [10,11].

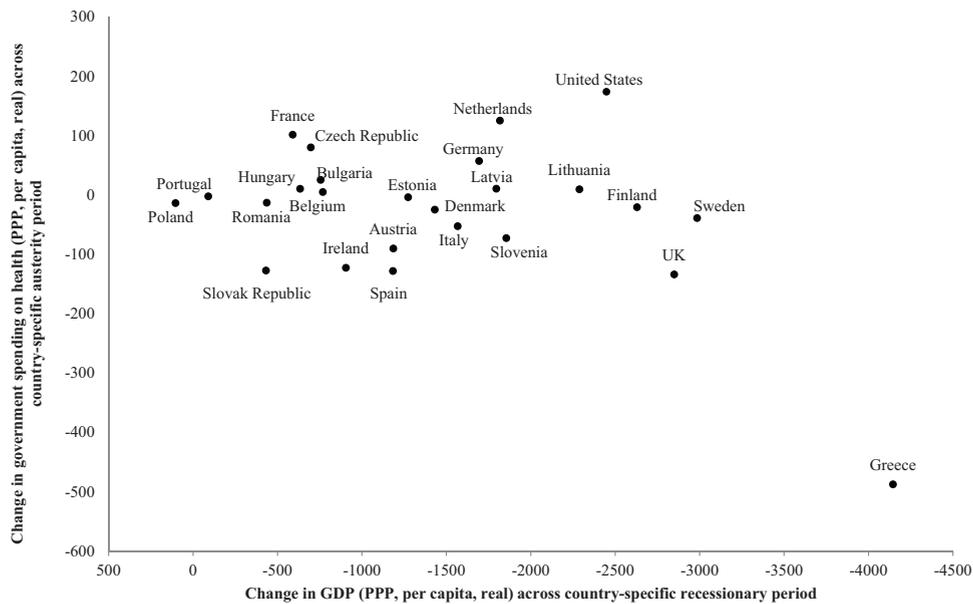
This large variation in political responses to a European-wide economic shock creates a quasi-natural experiment for understanding the political economy of healthcare budget allocations. While currency fluctuations may account for some of the variation among countries outside the Eurozone, some countries (e.g., Iceland, Greece, Ireland, UK, Spain, Slovenia and Spain) implemented large reductions in spending on health, while others (e.g., Netherlands, France, and Switzerland) have allowed real levels of spending to increase (Fig. 1; see Web Appendix 1). However intuitive it may seem that recessions lead to cuts, these data indicate that there is scope for different policy choices, with recent research showing that the depth of recession does not seem to correspond directly to changes in health expenditure [12].

Previous research has identified at least four further explanations beyond the depth of recession for how healthcare budgets will be affected by an economic crisis. First, a ‘visibility’ hypothesis suggests that cuts to prominent

areas of public spending, such as health, will be politically unpopular and less likely to be implemented in periods of retrenchment [13]. Summarising previous episodes of fiscal retrenchment in Europe during the 1980s and 1990s, Pierson observes that because healthcare spending is highly visible, accounting for >10% of GDP in almost all European countries, and is used by virtually all the population, “governments generally found health care to be a cause of political headaches rather than a target for successful retrenchment” [14]. Second, the ideology of the governing political parties has been proposed to shape budgetary responses to recessions. For example, while left-leaning parties may be more likely maintain safety net programs through increased government spending, right-leaning parties may prioritise deficit and debt reduction by shrinking the role of the state, including health system spending [15]. Thus, this “party hypothesis” suggests that reductions in healthcare spending are more likely to occur when the majority party in power has a right-wing orientation. Third, a ‘debt crisis’ hypothesis suggests that rising levels of public debt will necessitate reductions in government spending, to avoid increasing rates of debt service payments, a position often articulated by politicians pursuing deep cuts as an austerity strategy [2,16]. The prominence of healthcare within government spending makes it an obvious target for governments that concentrate their efforts on cuts rather than tax rises.

A fourth major hypothesis in the political economy literature focuses on the role of external factors, such as international financial institutions (IFIs). Historically, IFIs have advocated for ‘structural adjustment programmes’, which include privatization, liberalization, and austerity policies, privileging conditions that facilitate private-sector investment [17–19]. The involvement of the International Monetary Fund has been identified as a major determinant of reductions in healthcare budgets, with its policy prioritising accumulation of reserves [20,21]. In Eastern Europe, countries that borrowed from the IMF had 8% greater cuts to government spending [22]. Across 135 countries, between 1996 and 2006 non-IMF borrowing countries, on average, increased government spending on health by \$0.45 for every \$1 of donor aid while IMF borrowing countries increased health spending by only \$0.01 for every additional dollar [23]. The IMF has historically encouraged reductions in social protection spending by increasing co-payments for care [24]. In Europe during the Great Recession, external pressure has come from a tripartite coalition of the European Central Bank, European Commission, and International Monetary Fund. In Greece, for example, conditionalities of troika bailout packages included a restriction of public health spending to less than 6% of GDP. Hence, an alternative hypothesis is that pressure from international financial institutions may account for a greater propensity to pursue cuts and, within them, to concentrate reductions in the healthcare sector.

In this paper, we test each of these alternative hypotheses about government budgetary changes using multivariate cross-national statistical models and data from 27 EU countries between 1995 and 2011. First, we assess whether healthcare reductions were a direct result of economic recessions by modelling annual changes to



**Fig. 1.** Change in GDP and change in government spending on health across country-specific recession and austerity periods. Cross-national variations in healthcare spending, by country-specific recession and austerity periods, 24 EU countries and the United States. *Notes:* Source: WHO Health expenditure database 2013 edition, EuroStat 2013 edition. Recessionary- and austerity-periods are defined in detail for each country in Web Appendix 1. Recession is defined as declining GDP (adjusted for inflation and purchasing-power) in consecutive years. Austerity is defined as declining government expenditure (adjusted for inflation and purchasing-power) in consecutive years. Data on small populations (i.e., Malta, Luxembourg, and Cyprus) excluded from the graphic. The US is included in this figure as a comparison but is not included in the other analyses in this paper.

GDP per capita, cumulative GDP declines, and changes in tax revenues per capita [7,29,30]. Second, we test the visibility hypothesis by measuring whether government spending on health is protected or targeted in periods of state retrenchment [12]. To measure state retrenchment we constructed a novel indicator of austerity, which we defined as a reduction in total government expenditure, adjusted for inflation and purchasing-power between two consecutive years [8,10], which we cross-validated with IMF codings of fiscal austerity [25]. Second, to test whether variations in healthcare spending could be accounted for by differing party ideology, as has been shown in relation to public health policy [26], we assessed whether governing parties with Left or Right orientations were more likely to implement healthcare cuts than Centre parties [14,27,28]. Third, we tested the debt crisis hypothesis by examining whether countries with high levels of public debts as a fraction of GDP are more likely to reduce healthcare spending [25,26]. Finally, we examined the international institutions hypothesis by measuring whether exposure to IMF lending increases the likelihood of healthcare austerity among recipients of bailout packages [29].

## 2. Data and method

Data on public healthcare expenditure were taken from EuroStat's 2013 general government expenditure data on health [31]. Metrics of political ideology, derived from an assessment of the economic policy of governing parties contained within their manifestos, were assembled from the World Bank Political Institutions database 2012 [27]. If economic decisions made by the executive deviate from party manifestos then the coding follows

the party leader rather than the manifesto. IMF program participation was coded using data from the IMF's Monitoring of Fund Arrangements database (MONA), using harmonised sources of archived 1993–2003 and current data (2002–2013) [32]. These data included receipt of Stand-By Arrangements (short-term allocations for balance of payments problems) and Extended Fund Facilities (medium-term allocations for balance of payments problems) [33]. In the 2007–2011 period many of these programmes were coupled with lending from the European Central Bank, although the conditions of the packages were formalised in the IMF arrangements so were included in our metrics of program participation. Web Appendix 2 provides summary statistics for all variables.

To evaluate putative economic, social and political determinants of changes in healthcare spending we used multivariate statistical models [34]. As the recent recession was a Europe-wide phenomenon, we evaluated both within- and between-country differences in responses to austerity so as to assess cross-national variations. When a large proportion of observations do not exhibit change on a key explanatory variable (i.e., where there is relatively little within-country variation) the fixed effects modelling framework restricts the sample to only those observations that change value within the panel [35]. This reduces the estimation sample to only 8 countries with respect to exposure to IMF lending. Further fixed-effects estimates magnify the relative importance of independent variables with potential measurement error [36,37]. Thus, to maximise the available variation, random-effects are the preferred statistical approach for testing hypotheses to avoid risk of spurious results from inflating the contribution of measurement error to the total variation. We tested

the validity of the model specification using a Hausman test and, as a robustness check, correct for spatial correlation using time dummies and further adjust for country-year time trends.

Thus, our statistical model is as follows:

$$\begin{aligned} \Delta \text{Health}_{i,t} = & \alpha_i + \beta_1 \Delta \text{GDP}_{i,t} + \beta_2 \Delta \text{TAX}_{i,t-1} + \beta_2 \text{Debt}_{i,t-1} \\ & + \beta_3 \text{Left}_{i,t} + \beta_4 \text{Right}_{i,t} + \beta_5 \text{Austerity}_{i,t} \\ & + \beta_6 \text{IMF}_{i,t} + \theta_i + \varepsilon_{i,t} \end{aligned} \quad (1)$$

Here  $i$  is country and  $t$  is year.  $\Delta$  denotes the annual change, as a first-difference. Because we are interested in both the probability and also the extent of healthcare austerity, we modelled health spending both as a binary measure of public healthcare austerity and also as a measure of the annual change in public healthcare spending, adjusted for inflation and purchasing-power in USD. GDP is the annual change in Gross Domestic Product (adjusted for inflation and purchasing-power parity). This allows us to test whether annual change in GDP impacted healthcare spending during the most recent crisis. Tax is change in the per capita tax revenue, adjusted for inflation and purchasing-power. Debt is total government debt in the previous year, measured as a percentage of GDP, which has been a major feature in debates on fiscal consolidation [38]. Left and Right are dummies for the political ideology of the governing party with Centre as the baseline. Austerity measures whether the government reduced total government expenditure, i.e., periods of state retrenchment, adjusting for inflation and purchasing-power, between two years. IMF is a dummy variable for whether a country was exposed to an active lending programme. It is coded 1 in the year after the agreement with the IMF has been established, allowing for a lag in implementing fiscal consolidation, and remains 1 as long as the agreement continues [39].  $\theta$  is a random effect, reflecting the pooled effect of within- and between-country variation. Missing observations are primarily found among new member states in the political ideology variable (Missing  $N=120$ ); thus, following previous analyses, missing data has been omitted from the analysis rather than imputed [40].

Because the recipients of the IMF loans are more likely to be experiencing economic downturns, there is potential for a residual, unobserved selection bias in our model, even after correcting for annual GDP changes and other economic controls. Hence, in a subsequent step we constructed a statistical counterfactual using a 'control function' approach (also known as the two-stage Heckman correction model) that in the first stage assesses the hazard of entering into an IMF lending programme, then corrects for this hazard in a second stage based on an *a priori* identification of determinants of IMF exposure [29,41,42]. These models are used to correct for selection bias in the treatment variables, using a previously validated specification in political economy models of the effect of the IMF exposure on government spending [22]. All models include robust and clustered standard errors by country, to reflect non-independence of country sampling. Models were estimated using STATA v12.1. To visualise the predicted probabilities

of healthcare austerity under alternative policy scenarios we use the STATA module CLARIFY using 1000 repeated draws from the probability distribution [43].

### 3. Results

#### 3.1. Cross-national determinants of changes in healthcare spending

Table 1 shows the results of our statistical models. Turning first to the economic factors, although the size of the recession is initially significant when  $\alpha=0.05$ , after adjusting for tax revenues the effect disappears, indicating that the effect of recession operates through the government's revenue base. Neither annual change in GDP nor levels of public debt as a fraction of GDP was significantly associated with changes in health spending ( $p=0.31$  and  $p=0.38$ , respectively). In contrast, changes in tax revenue per capita were a strongly significant determinant of healthcare spending changes. Each US \$100 decrease in amount the government received through tax revenues was associated with a US \$2.72 per capita fall in healthcare expenditure (95% CI: \$1.03–4.41).

As shown in Table 1, the political affiliation of the governing party was not statistically significantly correlated with reduced healthcare expenditure. Whether the governing parties were of the Right ( $p=0.55$ ) or Left ( $p=0.34$ ) political orientation measured by World Bank metrics had no effect on healthcare budgetary changes as compared with Centre parties, both before and after adjusting for fluctuations in the tax revenue base.

We also tested whether changes in healthcare spending reflected the decision to pursue austerity in total government spending. We found that governments that implemented reductions in total government spending also significantly reduced healthcare expenditures, on average, by US \$64.4 per year, although there was significant variation in the magnitude of these declines (95% CI: –\$37.2 to –\$91.6).

#### 3.2. Effects of international financial institutions

We next tested whether receipt of International Monetary Fund loans had an effect on healthcare budgets and on generalised budget reductions. We observed that IMF recipient countries were 3.9-times more likely to make healthcare cuts than non-IMF recipient countries (95% CI: 1.95–7.74). However, among countries that cut total government spending, those receiving IMF loans were 28% more likely to cut healthcare budgets than non-IMF recipients that also pursued austerity in response to recession (95% CI: 0.13–0.44). IMF recipients also tended to make larger cuts to healthcare budgets, averaging about 50% more than non-IMF recipient countries. Overall, countries receiving IMF loans reduced per capita healthcare expenditure by an additional US \$44.8 (95% CI: –\$6.28 to –\$83.3), even after correcting for the severity of recessions and public debt.

To put these effects in perspective, we decomposed our statistical model to estimate budgetary scenarios under alternative exposures to the IMF, as depicted in Fig. 2.

**Table 1**

Economic and political determinants of annual change in health spending among 27 EU countries, 1995–2011.

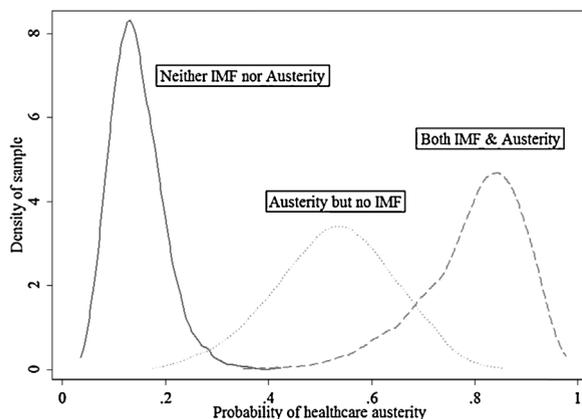
| Covariates  | Annual change in health spending <sup>a</sup> |               |               |                |                |                |
|---|---|---------------|---------------|----------------|----------------|----------------|
|   | (1)   | (2)           | (3)           | (4)            | (5)            | (6)            |
| \$10 annual increase in GDP <sup>a</sup>              | 0.28* (0.10)                                  | 0.23* (0.097) | 0.21* (0.096) | 0.13 (0.083)   | 0.12 (0.082)   | 0.089 (0.0085) |
| \$100 annual increase in tax revenue <sup>a</sup>     |   | 4.04** (1.10) | 4.11** (1.07) | 3.29** (0.79)  | 2.96** (0.83)  | 2.72** (0.82)  |
| Public debt as percentage of GDP in the previous year |   |               | −0.041 (0.14) | −0.021 (0.14)  | −0.075 (0.14)  | −0.17 (0.19)   |
| Implemented austerity in current year                 |   |               |               | −63.3** (11.7) | −61.5** (11.7) | −64.4** (13.3) |
| IMF bailout active in current year                    |   |               |               |                | −29.3* (13.1)  | −44.8* (18.7)  |
| Left governing party <sup>b</sup>                     |   |               |               |                |                | −14.0 (14.4)   |
| Right governing party <sup>b</sup>                    |   |               |               |                |                | −10.8 (17.7)   |
| Country-years   | 409   | 397           | 391           | 391            | 391            | 339            |
| Countries   | 27  | 27            | 27            | 27             | 27             | 27             |
| R <sup>2</sup>  | 0.090   | 0.13          | 0.12          | 0.23           | 0.24           | 0.26           |

Source: EuroStat 2013 edition, IMF MONA 2013 edition, World Bank Political Institutions Database 2013 edition.

Notes: Standard errors in parentheses, adjusted for repeated observations: \* $p < 0.05$ , \*\* $p < 0.01$ . IMF bailouts include Stand-by Arrangements, usually short-term lending to states to cover the effect of unanticipated shocks, and Extended Fund Facilities, which are usually medium- or long-term lending programmes aimed at overcoming weaknesses in the national economy which may have precipitated or exacerbated the shock.

<sup>a</sup> Units in per capita, constant purchasing-power-parity USD.

<sup>b</sup> Baseline category is Centre. Taken from the World Bank Political Institutions database, Left governing party and Right governing party are measures of the economic ideology of the governing party (or the party whose leader is head of a coalition) derived from party manifestos.



**Fig. 2.** Probability of healthcare austerity controlling for political and economic determinants. Notes: Density estimates are based on the models reported in Table 2 and Web Appendix 3. Variance around the means were estimated from 1000 repeated draws of the sample probability distributions using STATA module CLARIFY.

First, we estimate the probability of healthcare austerity given the mean level of covariates described above using a logistic regression model (see Web Appendix 3) [43]. The values reported in Table 2 are the predicted probabilities of

**Table 2**

Probability of healthcare austerity controlling for economic and political determinants, 27 EU countries, 1995–2011.

|                      | Probability of healthcare austerity (95% CI) |
|----------------------|--|
| No austerity or IMF  | 0.15 (0.064–0.27)                            |
| Austerity but no IMF | 0.53 (0.29–0.74)                             |
| IMF and austerity    | 0.79 (0.56–0.94)                             |

Notes: All other variables (including annual change in GDP, change in tax revenue, level of public debt, and political ideology of governing party) were set at their mean values. Probabilities estimated using Clarify for STATA. Results from full model in Web Appendix 3.

healthcare austerity (with confidence intervals) given specific values of all other covariates in the model. Fig. 2 plots the uncertainty around our predicted probabilities given different levels of exposure to the IMF, austerity, and recession. As shown in the figure, IMF borrowing countries had an 80% probability of reducing healthcare spending (95% CI: 0.56–0.94); non-IMF borrowing countries that made general government cuts had an 52% probability of reducing healthcare spending (95% CI: 0.29–0.74), even after adjusting for the annual change in GDP and debt as a fraction of GDP; and countries that pursued general government stimulus had an 15% probability of reducing healthcare spending (95% CI: 0.06–0.27).

### 3.3. Comparing differences in healthcare budgetary changes within and between nations

To provide further insight into the mechanisms underlying reductions in healthcare expenditure, we restrict the model to ‘within-country’ variation, country fixed-effects (Web Appendix 4). A Hausman test comparing random and fixed effects models reveals that none of the coefficients significantly change apart from those with low-levels of within country variation (i.e., principally the IMF participation) and those where the country-specific mean is operationally ambiguous (i.e., political ideology) (Web Appendix 5). This model revealed two important differences in within-country dynamics. First, while the absolute level of debt is not a statistically significant determinant of healthcare reductions between countries, higher levels of debt relative to the historical mean are significantly associated with healthcare cuts between 1995 and 2011. Each 1% rise in the level of public debt over the mean level is associated with a US \$1.87 decline in healthcare spending (95% CI: −\$1.06 to −\$2.74). However, neither actual debt service as a fraction of GDP nor the absolute level were statistically significant factors ( $p = 0.55$ ,  $p = 0.15$ ,

respectively). Second, after correcting for the decision to reduce healthcare spending, the estimated effect of the IMF is insignificant. This evidence is consistent with a mechanism whereby, within countries, much of the association between receipt of IMF loans and healthcare spending is mediated by an increased likelihood of pursuing austerity.

### 3.4. Testing potential selection bias

Treatment, i.e., seeking and receiving an IMF loan, is non-random. As such it was necessary to consider the potential for confounding by indication, whereby there were unobserved factors that predisposed countries to seek IMF loans that would have also driven reductions in healthcare spending. To address this, in a first step we used a “control function”, based on a previously validated model of the determinants of IMF participation (Web Appendix 6) [22,44]. Vreeland’s work on entry into an IMF programme highlights the importance of three factors: Debt servicing, deficit, and foreign reserves [29]. Debt servicing is excluded from this model because it is consistently insignificant. We also include a measure of change in the level of GDP and the level of GDP, adjusted for inflation and purchasing-power, to capture the impact of economic shocks on selection into the IMF and also the observed association between smaller incomes and IMF lending. After controlling for the hazard of participating in an IMF lending program, we found that the estimated associations of the IMF with healthcare spending were a reduction of US \$49.5 (95% CI: –\$2.56 to –\$96.5), consistent with the random effects model specifications.

### 3.5. Robustness checks

To test the robustness of our statistical models, we included time trends and time dummies in the models and found no qualitative or significant change in the model. Additionally to check the influence of potential outliers, we removed Greece from the models (Web Appendix 7) and re-ran models excluding standardised residuals greater than two (see Web Appendix 8). In both cases, none of the results was qualitatively or significantly changed. In a further check, we re-estimated our basic model by measuring the depth of recession (from peak-to-trough) to include the entire period from 2007 to 2011 and found no significant changes (Web Appendix 9). To investigate whether budgetary deficits, rather than overall debt levels, factored more prominently into budget decision-making, we added a measure of the deficit and found that it was also insignificant ( $p=0.89$ ). We also tested whether public debt measured per capita, rather than as a fraction of GDP, altered our results. We found that our results were not qualitatively changed and that public debt (per capita, adjusted for inflation and purchasing-power) remained insignificant ( $p=0.77$ ). We also found that when we included annual change in government spending in the model, rather than a binary measure of austerity, our results did not qualitatively change as the government spending variable remained significant at the  $\alpha=0.05$  level ( $p=0.034$ ) (see Web Appendix 10). In a further step, we re-estimated our models using the IMF’s binary indicator of fiscal consolidation which only covers pre-recessionary

periods, observing that effect sizes were statistically indistinguishable from our dating of austerity (Test of effect homogeneity:  $\chi^2(1) = 1.64, p = 0.20$ ) [25].

As a specificity test, we restricted the outcome variable to government spending on health through social health insurance schemes, which would be less influenced by intentional spending reduction choices (austerity) (Web Appendix 11) [7]. We found that the association of austerity was insignificant ( $-\text{US}\$7.52, p = 0.21$ ), and that both per capita tax revenues ( $p = 0.43$ ) and exposure to IMF ( $p = 0.53$ ) had no effect in the context of low power, as data were missing for Romania and Latvia, two austerity countries. Similarly, when we included a measure of the change in the level of private healthcare expenditure to capture the extent to which patients transitioned away from the private sector and turned toward the public sector, as witnessed in Greece and Ireland, (and where spending automatically increased the public sector’s health spending during economic downturns) we find that our measure of austerity remains significant ( $-\text{US}\$69.29, p < 0.001$ ), while exposure to the IMF ( $p = 0.45$ ) had no effect. Again this variation in the IMF is likely due to missing data from Romania and Latvia (Web Appendix 12). Finally we estimate a fixed-effects logistic regression model to test the robustness of our random-effects estimates used in Table 2 and Fig. 2 and find that, similar to our linear model, the results are not qualitatively changed (see Web Appendix 13).

## 4. Conclusion

Our findings reveal five important points about the political economy of healthcare budget choices. First, we reject the ‘visibility hypothesis’, that proposes that healthcare sectors may be protected during periods of austerity. In contrast, we observed that much of the burden of budget cuts is being concentrated in the healthcare sector, particularly in countries exposed to IMF lending agreements. Second, we show that cuts to healthcare spending are not an inevitable consequence of recessions as neither the annual change in GDP per capita or the cumulative GDP loss were associated with such cuts. Third, we also reject the ‘party hypothesis’, observing that the ideology of governing parties had no effect on changes to healthcare spending. Fourth, although we find little support for the ‘debt crisis’ hypothesis, as levels of debt as a fraction of GDP are not associated with spending changes, we did observe within-countries that increasing debt, irrespective of its level, was linked to expenditure reductions. Fifth, consistent with data from prior historical recessions, receipt of loans from the IMF was significantly associated with the decision to implement large cuts to the health sector (‘international institutions’ hypothesis). Finally, we also observed that social insurance systems were less susceptible to austerity policies and tax revenue fluctuations than were countries with tax-financed healthcare systems, although social insurance systems did appear to be more susceptible to declines in GDP per capita [7].

Our study has several important limitations. First, due to lack of available data, we were unable to differentiate the types of healthcare spending reduction measures implemented in response to recession. Some

spending reductions may be desirable, such as substitution of generics for branded pharmaceuticals. The European Observatory on Health Systems and Policies has found a diverse set of responses, including indiscriminate cuts in Greece to introducing user fees and co-payments for pensioners in Ireland, to restricting access to care for immigrants in Spain [45]. Second, although we have attempted to control for change in the levels of private sector health-care spending, where the private sector is large there may be an ‘automatic stabilizer’ effect. Thus, in Greece and Ireland, patients who previously used the private sector turned to the public sector, automatically increasing the public sector’s spending during the economic downturn. As this automatic rise in health spending has tended to occur in some of the economies worst hit by the crisis in Europe, the data on healthcare expenditures would tend to understate the magnitude of austerity observed in this study. Third, in some countries, such as the UK, policy-makers have ostensibly ‘ring-fenced’ healthcare spending. However, a decision to hold health budgets constant in the context of inflation amounts to a net decline in real terms. Our model investigated spending changes in real terms; future work may be needed to assess potential differences between nominal and real spending to better understand the political economy of austerity and intentionality of policy choices [46].

Future work is needed to investigate the health effects of budgetary reductions or their downstream effects on public health spending. In Greece, public sector cuts have been associated with increased waiting times, reduced accessibility to local services [47], and shortages of health-care supplies [48], all contributing to a reduction in the number of people who are utilizing healthcare services. There has also been a concurrent rise in the number of people using street clinics run by NGOs [47]. And yet, because Greece is not a lone case, more research is needed to fully understand the impact of healthcare austerity on population health in other contexts [49]. Further, while our control function model accounted for the non-random assignment of some countries to treatment (i.e., IMF lending) and case studies of IMF intervention have already described the mechanisms by which exposure to the IMF leads to reduced health spending, future research tracing the decision-making processes by which IMF-lending leads to reductions in spending on health might reveal the sources of such policy initiatives. For example, governments may be using the cover of the IMF to make ideologically motivated changes in health policy [50,51].

Contrary to widespread perceptions, our findings do not support the notion that the pursuit of austerity is determined by the ideology of the governing party after controlling for economic factors. There was no significant association of political party, whether Left or Right, with the decision to reduce healthcare budgets. Alternatively, we find that receipt of IMF loans is associated with cuts to healthcare spending. Countries which borrowed from the IMF were also less likely to protect healthcare budgets when they decided to implement austerity measures. Taken together, these observations may offer some explanation for the growing disenchantment with democracy now apparent in some European countries.

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## Appendix A. Web Appendix

Supplementary data associated with this article can be found, in the online version, at <http://dx.doi.org/10.1016/j.healthpol.2013.11.008>.

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