Do unemployment, income, and inequality explain regional differences in health? Evidence from a country in crisis

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ABSTRACT

Increased economic instability among developed countries has led to a renewed interest on the impact of the economic cycle on health outcomes. However, empirical evidence has not provided clear answers concerning that relationship. We contribute to this discussion by looking into the economic variables through which such a link could occur. Using a dynamic panel data model, we examine the connection between unemployment, inequality, and income and the total mortality rate. Our results suggest that, although short-term unemployment is associated with lower mortality rates, this effect vanishes with long-term unemployment. We also find that unemployment among people older than 55 years old results in significantly higher mortality rates. We do not find any influence on mortality rates from inequality or income.

Keywords: mortality rates, recession, austerity, local governments, social protection, Portugal

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I. Introduction

The Great Recession has posed major threats for health and health care in both developed and developing countries. There is a widespread concern that periods of economic downturn adversely affect health outcomes, due to its effects on unemployment, income, and inequality (WHO, 2009). This perception was challenged by a series of influential papers by Ruhm (2000 2003 2005), Neumayer (2004), and Tapia-Granados (2005a 2005b 2008) who concluded that recessions tend to lower mortality rates.

Mortality has fallen dramatically over time, in tandem with general improvements in economic conditions.[2] Since the Great Depression of the 1930s, and with the remarkable exception of Japan, researchers could only study public health consequences of severe economic episodes in developing economies: Mexico (Cutler et al., 2002), Russia and other post-communist countries (Walberg et al., 1998 and Stuckler et al., 2009a), and East/Southeast Asian nations (Chang et al., 2009). While the latter economic crisis seemed to have few adverse health consequences in Malaysia, they were far more significant in Indonesia and Thailand. Malaysia's refusal to reduce health expenditures, in a clear contrast to Thailand and Indonesia's adoption of this advice made by the World Bank, probably contributed to the difference in health outcomes in these countries (Hopkins, 2006).

The Global Financial Crisis starting in 2008 changed the previous paradigm. The U.S. subprime crisis was rendered as a European sovereign debt crisis in the old continent and several austerity measures were taken to improve fiscal budgets.[3] Comparing the adoption of strict fiscal austerity in the European periphery with its rejection, by popular vote, in Iceland, Stuckler et al. (2013) concluded that it is the combination of fiscal austerity with adverse economic shocks and weak social protection that is responsible for declining health status.

In the related literature, three different avenues of research have emerged. First, a long tradition of papers have focused on the effects of business cycles, *proxied* by unemployment rates or aggregate measures of income, on population health: measured negatively by the mortality rate (e.g., Auster et al., 1969; Forbes and McGregor, 1984; Gravelle, 1984; Hitiris and Posnett, 1992; Smith, 1999; Ruhm, 2000, 2003; Gerdtham and Johannesson, 2003) or positively by the life expectancy at birth (Walberg et al., 1998 and Gravelle, 2002). More recently in this regard, despite the implementation of public health systems coverage, inequality has also been a matter of concern (Deaton and Paxson, 1998; Marmot Report, 2012). Another line of studies has concentrated their attention on mortality rates at the hospital level, where resource use, policy and technological changes are important explanatory

[2] For an analysis on the determinants of mortality as well as their historical evolution see Cutler et al., 2006.
[3] For more information on the unequal health among European nations see Mackenbach et al. (2013).

factors (e.g., Cutler, 1995; Manheim et al., 1992; Kessler and McClellan, 2000; Geweke et al., 2003, Gravelle et al., 2014). Lastly, other papers investigated the effects of the number of doctors or general practitioners on mortality (e.g., Auster et al., 1969; Robst, 2001; Or et al., 2005; Aakvik and Holmas, 2006).

Our paper builds on the public health literature by providing a contextually sensitive analysis on the effects of the global financial crisis and subsequent policy measures on local mortality rates. Using a dynamic panel data model we are able to tackle three important features: 1) the likelihood that relationships have an effect with time lags; 2) the existence of regional fixed effects, and 3) simultaneity among regressors. Our findings are drawn not in a normal business cycle recession but in a more severe depression. Moreover, we find substantial dissimilarities on the impact of unemployment when accounting for different age cohorts and durations.

The use of Portuguese municipal data in this paper is motivated by two reasons. First, our dataset is based on a single country and not on several countries or states with different policy instruments. In Portugal, all mainland municipalities (278) are subject to the same rules and health is one of their main competencies. Second, the rampant effects of the crisis in the country constitute a good testing ground for our research question. National unemployment levels rose from 6,3% in 2003 to 15,5% in 2012 and 16,2% in 2013. Furthermore, the health sector was particularly hit by the Memorandum of Understanding (MoU) signed with the troika composed by the European Commission, European Central Bank and the International Monetary Fund.

The remainder of the paper is organized as follows. In Section II, a short tour on the Portuguese health sector and on the impact of the European crisis in Portugal is provided. Afterwards, our dataset is presented. In Section IV, the empirical strategy is addressed while results are shown in Section V. Finally, Section VI concludes.

II. Portuguese background and the National Health Service

Article 64 of the Portuguese Constitution ensures a universal right to health protection to be met by a general and tending to be free National Health Service (henceforth, NHS). Created in 1979 (Law 56/79, 15 September) and mainly funded through transfers from the Government budget, the NHS is considered one of the major achievements of the democratic regime.[4] The financial sustainability of the NHS has, however, been deteriorating

[4] This mechanism is just one of three available and overlapping financing systems. The others are the health subsystems pre-dating the NHS and voluntary private health insurance. For more information on the NHS see Simões and Campos, 2014 (available in Portuguese).

over time, with public hospitals' debt to medical suppliers reaching an estimated €3 billion in 2009 (Augusto 2012). Regardless of improvements made in recent decades (Nunes and Coelho, 2015), there is still evidence of unequal health access across Portuguese regions and the Portuguese population as a whole (Paula Santana 2000 2002). The implementation of the memorandum of understanding (MoU) signed between the troika and the Portuguese Government in 2011 has only exacerbated the existing inequality in health care. The NHS received considerable attention in the conditions of the MoU, due to its importance in overall public expenditures (which cannot be disassociated from a major ageing problem). Thus, the MoU foresaw savings of €670 million claimed in health care (Kronenberg and Barros, 2014). The agreement implied a reform in user charges both in its structure and, remarkably, in its levels - copayments for primary care appointments rose from €2,25 to €5, whereas the cost of emergency visits increased from €3,80 to €10 in primary and from €9,60 to €20 in secondary care (Barros, 2012a). In addition, the introduction of generic drugs and some more unpopular measures, such as the decrease of the public co-payment in medical prescriptions, were also implemented. The main savings, in this latter case, have been made in public retail pharmaceutical expenditure through an enhanced promotion of competition and electronic monitoring of prescriptions (Barros, 2012b). While these changes occurred, overall austerity measures were also implemented, including wage cuts in public sector employees in 2011 and 2012, as well as large reductions in several social subsidies.

III. Dataset

We use data from all municipalities in mainland Portugal (278) over an 11 year period (2003 to 2013).[5] We collected data mainly from *Statistics Portugal* (henceforth, *INE*) but also from *Quadros de Pessoal*, a matched employer-employee database covering paid work in the country, and *IEFP*, the goverment body responsible for measuring unemployment.

- Interest Variable

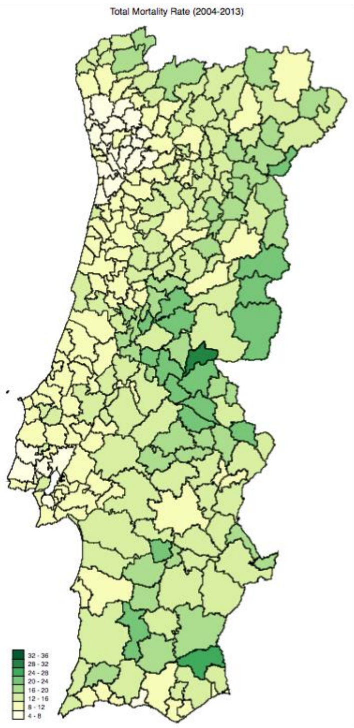
Total Mortality rate is a widely used *proxy* for health outcomes, as it is consistently quantifiable and precisely measured over time, thus allowing our results to be easily contrasted with results obtained in studies of other countries. Sen (1998) even considers it "an indicator of economic success and failure".

Figure 1 portrays the regional variation of the Total Mortality rates in Portuguese municipalities. Total mortality rate is averaged over the entire sample period and measured as

[5] For comparability reasons, we confine our attention on the 278 mainland municipalities because of data availability and given the fact that those overseas are subject to an extra layer of administration (the Regional Governments of the autonomous regions of Madeira and Azores).

total mortality rates per 1000 inhabitants (*INE*). As can be observed there is significant regional variation across municipalities, with inland regions exhibiting higher mortality rates than coastal regions, and in particular, the two large urban areas of Lisbon and Oporto exhibit the lowest levels of total mortality rates in Portugal.

Figure 1



To examine factors that define the health status of a given municipality, an aggregate health production function is a natural starting point. In other words, we consider health status as the outcome of a production process where several types of inputs may play a role. All of them are lagged one period to account for possible simultaneity.

– Crisis variables:

The net effect of recessions on mortality remains an open empirical question. If in principle it is possible to theoretically support the idea that mortality rates could decrease during recessions, there are also a number of potentially harmful effects of these events (Catallano and Bellows, 2005; Economou et al., 2008). On the one hand, the decreased economic activity could be translated in a lower number of work-associated injuries and traffic accidents (Ruhm 2000 2003 2005). Moreover, it is also possible for individuals to undertake time-intensive exercise and benefit from a less poluted environment. On the other, crisis may also be associated with less healthy lifestyles (such as increased consumption of cheap food, drinking or smoking as a response to stress) and an increased fear of being unemployed

(Ferrie et al., 1995). Several studies in the public health field suggest that unemployment may have a negative impact on mental health with increased suicides and murderers. This idea is consistent with the literature on happiness economics where unemployment tends to lead to a reduction in happiness and general well-being (Clark and Oswald, 1994; Winkelmann and Winkelmann, 1998; Theodossiou, 1998). We study these effects using $unemprate_{t-1}$ (the total unemployment rate) and unemployment rates by age-cohort in Figure 2 and duration in Figure 3 (*IEFP*).

Figure 2

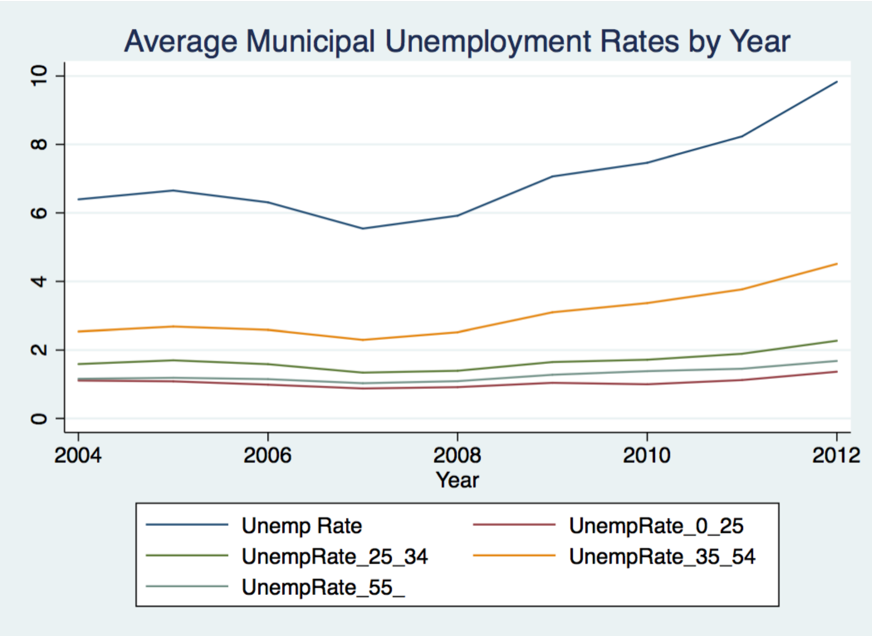
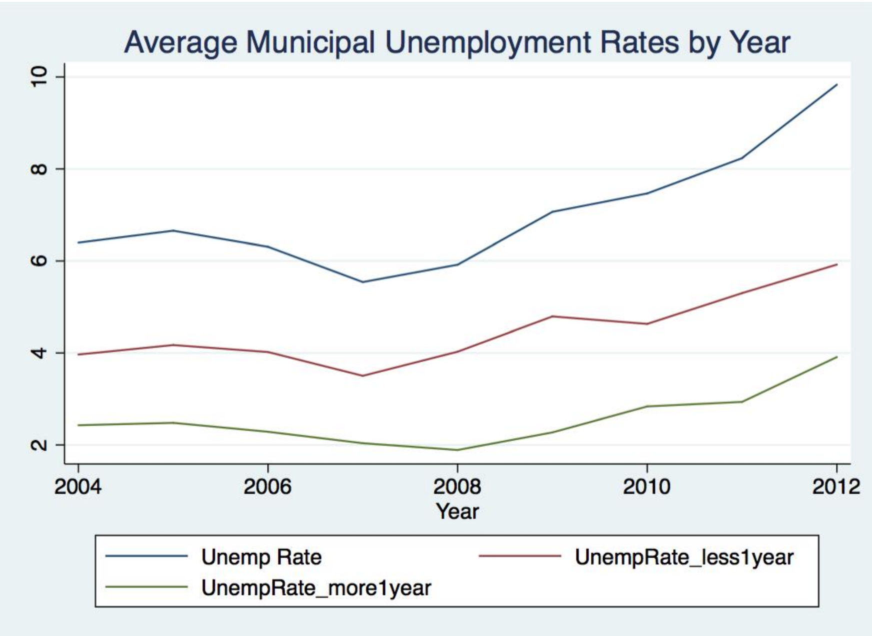


Figure 3



In addition, it is relatively well established that there is a causal protective effect of income on health. To the extent that transitory income changes impact on consumption, less resources may result in health care consumption delays and poor disease management for financially constrained patients (Viscusi, 1994; Smith, 1999; Gerdtham and Johannesson, 2004). The absolute income hypothesis can then be summarized by Pritchett and Summers' (1996) "Wealthier is healthier".

Additionally, according to the alternative relative income hypothesis (Rodgers 1979), an individual's health is also affected by the level of inequality within a society. We test both ideas including an inequality measure, the $p90p10_{t-1}$ Index (which computes the ratio of the 90th and 10th percentiles), $wage\_tot_{t-1}$ (the average total wage in the municipality) and an interaction term $wage\_tot*p90p10_{t-1}$ (*Quadros de Pessoal*). We choose this inequality variable rather than the most traditional Gini Index because it solves the problem known as top coding (or right censoring in general), i.e., that values at the top of the income distribution may not be fully observed in these large databases. In this regard, we should highlight the importance of the inequality variable since this is the first time, to the best of our knowledge, that micro level data on all paid work in the country is used to compute it.[6]

– Social protection variables:

In order to test the idea put forward by Stuckler et al. (2013) that it is the link between recessions and austerity that leads to an increase in mortality rates, we include the percentage of population in the municipality who benefited from two important social subsidies: $BenefSubsDoença_{t-1}$, $BenefRendimentoSocialInserção_{t-1}$ (*INE*).[7] The latter is particularly relevant since it constitutes a safety net for the most vulnerable share of people with a difficult family and economic background.

– Health systems variables:

To control for the unequal regional health access and for the response of the NHS we add the number of medical appointments on hospitals and official clinics, divided by the municipal population.

– Population characteristics:

To assess the impact of the geographic distribution and demographic structure of the population we add the $Popdensity_{t-1}$ (population density), $Population15_{t-1}$ (the percentage of the population below 15 years old), $Population65_{t-1}$ (the percentage of the population above 65 years old) Sex_ratio_{t-1} (the number of average females per 100 men) (*INE*).

[6] We computed this variable using the Stata command Ineqdeco.

[7] We do not include the unemployment subsidies due to its high correlation (above 0,67) with the unemployment rates.

– Other controls:

We *proxy* the level of education in each municipality using the percentage of *Graduates*$_{t-1}$ who work in that given area. We expect the mortality risk to be lower for more educated people (Lleras-Muney, 2005), either because education turns people into better decision makers (Grossman, 1972), with access to better jobs (Kemna, 1988) or given that poor health results in lower education (Currye and Hyson, 1999). Finally, Year dummies are also added to take into account specific year effects.

Table 1 displays the descriptive statistics of the variables that were used in the empirical estimations. Comparing the percentages of population above 65 with the share of people below 15 years old, one can clearly see an important ageing problem.

Table 1. Descriptive Statistics.

	Mean	**Standard Deviation**	**Min**	**Max**
TotalMortality	12,934	4,324	4,800	33,300
UnempRate	7,046	2,536	1,517	17,399
UnempRate_0_25	1,055	0,415	0,175	3,150
UnempRate_25_34	1,682	0,591	0,168	4,125
UnempRate_35_54	3,041	1,299	0,467	8,619
*UnempRate_55_*	1,267	0,571	0,103	4,001
UnempRate_less1year	4,482	1,485	0,992	13,628
UnempRate_more1year	2,564	1,431	0,268	9,938
p90p10	3,203	1,027	1,650	9,752
wage_tot	768,842	192,121	383,036	2 666,659
rateBenefDoenca	7,046	1,959	1,810	15,757
rateBenefRSI	5,758	3,602	0,474	28,597
SexRatio	92,987	3,385	79,200	107,300
Population65	22,855	6,675	9,159	44,403
Population15	13,932	2,517	5,216	21,562
Graduates	0,065	0,033	0,000	0,302
wage_tot	768,842	192,121	383,036	2 666,659
AppHospitalsPC	2,180	23,761	0,000	448,085
AppOfficialClinicsPC	2,907	1,311	0,000	8,219
rateBenefIllness	7,046	1,959	1,810	15,757
rateBenefRSI	5,758	3,602	0,474	28,597
popdensity	0,311	0,850	0,005	7,411

IV. Empirical Strategy

In order to accurately estimate the impact of the Crisis in health we need to deal with three potential problems. In this section we describe these problems as well as a model with potential to solve them.

Firstly, even though we control for several possible explanatory variables, if we fail to include one factor correlated with the previous covariates, our analysis will suffer from an omitted variable bias problem. In the context of municipal data this problem is most likely to occur. Consequently, there might exist several unobserved attributes (e.g., drinking, smoking and eating behaviors) that lead to the necessity of incorporating municipal fixed effects in the estimation process.

Secondly, the assumption that health outcomes are solely explained by contemporaneous variables may be a further source of omitted variable bias. If health today also depends on the previous status, the variable presents some degrees of persistence. Hence, we need to control for this dynamic nature with an appropriate panel data model.

Lastly, the direction of causality may not be completely understood (Stewart, 2001). For instance, we do not know if it is more unemployment that leads to a less healthy environment or if the effects go in the opposite direction. With standard econometric models we might not be able to solve this and our results may be inconsistent, even if we use lagged independent variables to account for simultaneity. In our case there is a clear dominance of individuals (278 municipalities) over time periods (*small T large N*). This fact thus implies that the lagged value of the dependent variable would be correlated with the error term if we solved the following equation by OLS or simple fixed effects estimators:

$$y_{it} = \sum_{j=1}^{p} \alpha_j \, y_{i,t-j} + \beta \, \boldsymbol{X'}_{i,t} + v_i + \varepsilon_{it} \qquad i = 1, \dots, N \quad t = 1, \dots, T_i \qquad (1)$$

where y_{it} is the total mortality rate for municipality i $(N = 278)$ and p is the number of lags included in the model. β is the vector of parameters to be estimated, $\boldsymbol{X'}_{i,t}$ is a vector containing the explanatory variables presented in the previous section, v_i is the unobserved municipal fixed effect, and ε_{it} is the error term.

Recently, a growing body of research has started to implement the generalized method of moments (GMM) developed by Arellano and Bond (1991) to overcome these issues. First differencing (1) removes the municipal effects (v_i) and we are able to estimate this equation using proper instrumental variables (IVs):

$$\Delta y_{it} = \Delta \sum_{j=1}^{p} \alpha_j \, y_{i,t-j} + \Delta \, \boldsymbol{X'}_{i,t} \, \beta + \Delta \, \varepsilon_{it} \qquad i = 1, \dots, N \quad t = 1, \dots, T_i \qquad (2)$$

In this framework, valid IVs are composed by: 1) levels of the dependent variable, lagged two or more periods; 2) levels of the endogenous variables lagged two or more periods; 3) levels of the pre-determined variables, lagged one or more periods, and finally, 4) the first differences of the exogenous variables. Additional moment conditions are nevertheless available if we rely on the assumption that explanatory variables are uncorrelated with the individual fixed effects. Consequently, the estimation combines both the previous set of moment conditions for the first differenced equations and those resulting from the levels equations. On the other hand, if we assume that they are correlated but the first differences of the regressors are not, lagged values of the first differences can be used as IVs in the differenced GMM (Arellano and Bover, 1995). Moreover, lagged differences of the dependent variable may also constitute valid IVs. In our case, we will use the system-GMM rather than differenced GMM as Blundell and Bond (1998) showed that this approach is preferable when variables are persistent.

V. Results and Discussion

Table 2 reports the results of the model, estimated using system-GMM. We are unable to reject the null hypothesis that all instruments are uncorrelated with the error term according to the *Hansen test* (reported *p*-values always substantially above 10% - Roodman 2014). Serial correlation tests are also reported, and in any of the specifications we are unable to reject the null hypothesis of first-order serial correlation ($p<0.001$) but always reject the null hypothesis of second-order serial correlation, thus requiring that all our specifications include one but no more than one lagged term for total mortality rate.

Specifications (1) to (3) report regressions of total mortality rate on total unemployment rate, unemployment by four age classes (0-25, 25-34, 35-54 and 55+) and by two categories of unemployment duration (smaller and higher than one year), respectively. Specifications (3) to (6) are analogous to the previous specifications, with the exclusion of some insignificant regressors (percentage of people below 15 years old and the municipal expenditures on cultural and sports).

As can be observed in any of the specifications, there is no impact of inequality or mean wage on total mortality rates, even with an interaction term included. The rate of health benefit recipients has a persistently negative impact on mortality rates (*p*-value<0.1). We cannot find any significant relationship between total mortality rate and the rate of other social benefits. The number of hospital appointments per capita does not have a significant impact on mortality, but the number of appointments in official clinics has a significant impact, although positive, on the total mortality rate, an impact that should not be causal, but rather an indication that municipalities with higher mortality rates should have more official clinics. The sex ratio has no significant impact on total mortality rates. The proportion of the Population aged 65 or more has the expected positive impact on total mortality rates but no significant impact is found, as could be expected, for the proportion of the population aged 15 or less. Also, the coefficient of population density is only significant on some specifications in an erratic fashion. The proportion of graduates in the workforce has a very significant impact on the reduction of mortality rates (*p*-value=0.01). No significant effect for the amount of municipal expenditures on cultural and sports activities is found. As for unemployment rates, our results are more nuanced. We are unable to find an impact of the overall unemployment rate on the total mortality rate. However, as can be observed in specifications (2) and (5), the effect of unemployment rates on total mortality rates is heterogeneous across age groups, with unemployment at ages 35-54 associated with smaller mortality rates while unemployment at age 55 and above is positively associates with mortality rates. Furthermore, as can be observed in specifications (3) and (6), there is a very strong negative impact of short-term unemployment rates that (p=0.01) that is completely lost on higher unemployment durations, that have no significant impact on total mortality rates.

Table 2. Estimation Results

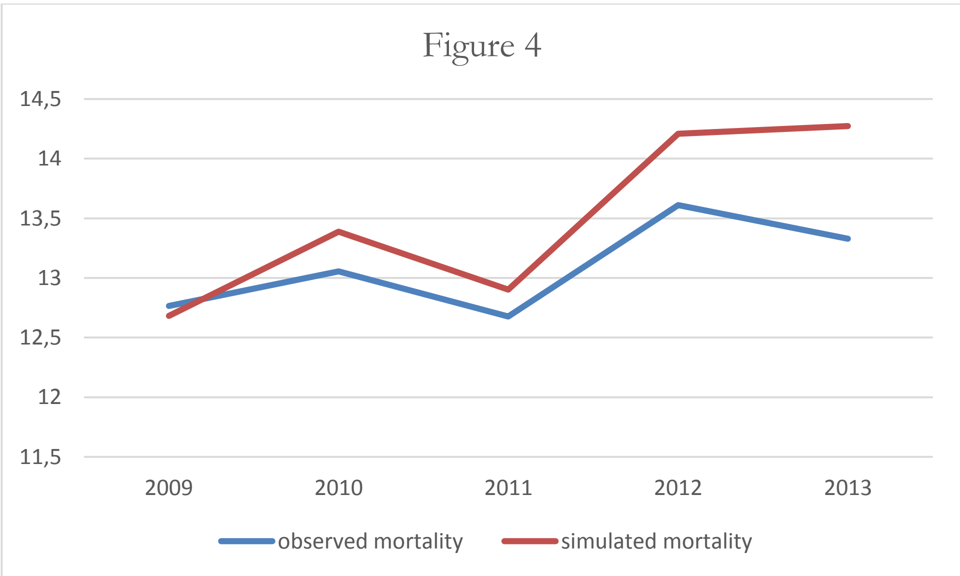
	(1)	(2)	(3)	(4)	(5)	(6)
	coef/t	**coef/t**	**coef/t**	**coef/t**	**coef/t**	**coef/t**
L.TotalMortality	0,164	0,036	0,093	0,176	0,016	0,081
	0,116	0,145	0,107	0,112	0,140	0,102
L.UnempRate2	-0,126			-0,127		
	0,094			0,094		
L.wage_tot	0,002	0,001	0,003	0,002	-0,001	0,004
	0,004	0,005	0,005	0,004	0,005	0,005
L.wage_tot_p90p10	0,000	0,000	-0,000	0,000	0,000	-0,000
	0,001	0,001	0,001	0,001	0,001	0,001
L.p90p10	-0,430	-0,480	0,005	-0,346	-0,425	0,030
	0,653	0,883	0,774	0,634	0,789	0,704
L.rateBenefIllness	-0,344*	-0,402*	-0,406*	-0,400**	-0,401*	-0,387*
	0,185	0,214	0,228	0,173	0,224	0,227
L.rateBenefRSI	0,058	0,104*	0,069	0,043	0,078	0,067
	0,051	0,062	0,051	0,048	0,060	0,048
L.AppHospitalsPC	0,005	0,007	0,006	0,004	0,007	0,007
	0,009	0,010	0,010	0,009	0,010	0,011
L.AppOfficialClinicsPC	1,243***	0,615	1,410***	1,315***	0,646	1,408***
	0,422	0,421	0,490	0,405	0,456	0,483
L.SexRatio	-0,061	-0,069	-0,039	-0,062	-0,048	-0,028
	0,044	0,051	0,043	0,043	0,050	0,042

L.Population65	0,300***	0,432***	0,366***	0,306***	0,420***	0,374***
	0,086	0,111	0,101	0,083	0,102	0,092
L.Population15	-0,061	0,071	0,033			
	0,118	0,149	0,128			
L.Graduates	-0,479***	-0,461**	-0,428***	-0,477***	-0,396**	-0,391***
	0,133	0,190	0,131	0,138	0,194	0,138
L.Popdensity	0,649**	0,452	0,514*	0,682**	0,348	0,425
	0,296	0,359	0,299	0,295	0,362	0,306
L.ExpCultSports_PC	0,025	0,567	0,629			
	0,643	0,824	0,713			
2005.Year	0,542***	0,579**	0,525**	0,577***	0,652***	0,536***
	0,203	0,259	0,202	0,202	0,239	0,196
2007.Year	0,178	0,227	0,036	0,185	0,212	0,008
	0,196	0,195	0,202	0,197	0,192	0,198
2008.Year	0,346	0,615*	0,058	0,382	0,606*	-0,011
	0,252	0,331	0,258	0,246	0,338	0,261
2009.Year	-0,011	0,548	-0,118	0,007	0,537	-0,187
	0,272	0,365	0,274	0,272	0,358	0,272
2010.Year	1,134***	1,440***	1,326***	1,253***	1,430**	1,243***
	0,408	0,549	0,448	0,393	0,577	0,454
2011.Year	0,261	0,768	0,177	0,363	0,759	0,047
	0,407	0,509	0,486	0,394	0,514	0,515
2012.Year	1,281***	1,839***	1,544***	1,394***	1,805***	1,414**
	0,477	0,598	0,543	0,467	0,599	0,556
2013.Year	0,047	0,646	0,444	0,131	0,816	0,359
	0,597	0,709	0,658	0,590	0,682	0,656
L.UnempRate_0_25		-0,061			-0,362	
		0,980			0,961	
L.UnempRate_25_34		1,016			1,169	
		0,922			0,891	
L.UnempRate_35_54		-1,178**			-1,227**	
		0,551			0,505	
*L.UnempRate_55_*		1,296**			1,510**	
		0,643			0,610	
L.UnempRate_less1year			-0,496**			-0,534***
			0,202			0,198
L.UnempRate_more1year			0,113			0,157
			0,182			0,178
Constant	11,519*	10,678	6,348	10,381*	10,555	5,210
	6,562	8,696	8,472	6,091	7,129	7,580
Number of observations	2 498	2 498	2 498	2 498	2 498	2 498
j	71,000	71,000	63,000	69,000	69,000	61,000
Hansen p-value	0,302	0,234	0,442	0,266	0,233	0,460
ar1 p-value	0,000	0,000	0,000	0,000	0,000	0,000
ar2 p-value	0,557	0,798	0,869	0,478	0,792	0,894

Note: Two-step results with robust standard errors corrected for finite samples for estimations of system-GMM linear models for panel data (which combine equations in first-differences and equations in levels) were computed using xtabond2 command in the software Stata13. Note: *** p<0.01, ** p<0.05, * p<0.1 *t*-statistics.

Our results suggest that overall rates of unemployment, inequality or income do not seem to have an impact on mortality rates. Thus, we find no support for either the relative or absolute income hypothesis for the aggregate municipal population. However, unemployment seems to place vulnerable older people at a higher mortality risk. Long-term unemployment seems to have no negative impact on mortality rates, unlike short-term (possibly frictional) unemployment. Our results on the duration of unemployment are consistent with those of Gordo (2006) who found that being unemployed for a lengthy period has a significant and negative effect on health satisfaction. Our results also highlight the importance and effectiveness of health specific benefits (in contrast to more generally attributed social benefits) in decreasing mortality rates. Education also seems to be protective of unemployment, even when controlling for income.

Finally, in order to measure the impact of the increase of unemployment at ages 55 and older we compare observed morality rates since 2009 for Portugal with simulated mortality rates in 2009 had the unemployment rate for people aged 55 or more remained at 2008 levels, according to the results of specification (3). Results are displayed in Figure 4. As can be observed, unemployment of older people is sufficient to account for almost one full point of the mortality rate in 2013, and for around 0.4 points in the mortality rate in each year of the period 2010-2012.



VI. Concluding Remarks

This paper aims to assess the impact of the recent global financial crisis in health outcomes. By estimating the magnitude and how far causal relations may be generalizable for different places and populations, we hope to contribute to more evidence based policy recommendations. We proxy health status using total mortality rates at the municipal level and we use three economic cycle variables: unemployment rate, an inequality measure and average income levels. The analysis was performed for all 278 mainland Portuguese municipalities from 2003 to 2013. Our results suggest that, although short-term unemployment could result in lower mortality rates, this effect disappears with long-term unemployment. We also find that unemployment among people older than 55 years old results in significantly higher mortality rates. Hence, we identify one of the most fragile groups in the population.

The current report also presents some limitations. According to Macintyre et al. (2002), geographical variations in health may be related with two types of explanations: compositional (i.e. based on the personal characteristics of those that are concentrated in a given place) or contextual/ collective (i.e. the physical and cultural environment, as well as the local norms and traditions of communities, may play a role). Using aggregate data, however, we might not be able to disentangle these effects (Gravelle, 1998 2002). We deal with these issues, to the extent that is possible, using a method that incorporates three important characteristics: 1) the likelihood that past lags may have a contemporaneous effect; 2) the existence of local unobserved heterogeneity, and 3) a reciprocal relationship among regressors. In fact, the properties of individuals are themselves shaped by the local environment but they also have an impact on the surrounding area.

Nevertheless, it might be interesting to study how behaviors in relation to smoking, drinking habits and unprotected sex may differ from region to region.

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