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MENTAL HEALTH AND THE CRISIS: EVIDENCE FROM SHARE

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Abstract

Mental health constitutes a significant share of the global burden of disease. It is shaped to a great extent by socioeconomic factors and is vulnerable to external shocks. The recent financial crisis brought about stressors prone to trigger and aggravate mental illnesses. This project presents a micro analysis of the effect of the economic crisis on mental health in eleven European countries, through the estimation of individual health production functions accounting for socioeconomic controls and macroeconomic indicators. We find that mental health has deteriorated since 2007, even though the development of depression episodes is unchanged. Additionally, his variation can be partially attributed to economic recession and budgetary cuts in health spending.

Key words: Mental Health, crisis, health production function

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The author dedicates this work project to their family and friends.

1 – Introduction

Mental health is defined by the WHO as "a state of complete physical, mental and social well-being, and not merely the absence of disease". A healthy mind is essential for the well-functioning of a human being (Sen, 1992), and neuropsychiatric (mental) disorders have been estimated to account for 12% of the global burden of disease (Lopez, et al. 2006), rendering mental health to be as important as physical health and equally worthy of concern. While illnesses may have a strong endogenous biological and genetic component, mental health is significantly influenced by exogenous forces, acting through socioeconomic channels that shape it throughout the life course (Fryers, Melzer, Jenkins, & Brugha, 2005; Lorant, et al. 2003).

In light of the recent financial crisis, there has been a growing concern regarding public health outcomes (Karanikolos, et al., 2013), in particular the mental health of the population. Not only has the crisis taken its toll on public spending on health and health systems, it has also brought about stressors prone to trigger episodes of mental illness or aggravate preexisting ones, such as increased unemployment rates, cuts on social support and precarious life conditions, and deteriorating health, to name a few.

The concerns spawned a great deal of studies regarding public health and the crisis. The following work will specifically analyze how mental health for the older groups of the population of 11 European countries has been affected by the financial crisis of 2008. We present an individual-level micro analysis through the estimation of mental health production functions that take into account covariates for the socioeconomic status and indicators influenced by the crisis. The first estimation concerns a measure for mental health called Zung Self-Rating Depression Scale (Zung, 1965), while the second runs a probit estimation to assess the impact of the same variables on the probability of

becoming clinically depressed. We then take the estimated variation in mental health caused by the crisis and economic downturn against a potential scenario where economic growth remained on its trend, resorting to the prediction of the output gap – the distance to the potential level of GDP – to yield the variation assumed to be caused by the crisis alone. We find that average mental health has deteriorated since 2007, while the emergence of depression has remained unchanged. Moreover, the variation on mental health score associated with crisis variables varies across countries and explains the differences in scores.

Section 2 provides a short summary of the literature on the determinants of mental health, and the impact of the crisis on health indicators. Section 3 describes the data and the methodology employed, and explains the construction of the mental health indicator. Section 4 shows the variation in mental scores across years and the results of the regressions, and Section 5 concludes with a discussion of the results, some limitations to the analysis and possible policy implications.

2 – Literature Review

Financial crises and public health are intertwined issues, as the former comprises spending restructures and adverse consequences for health and healthcare that need to be fully comprehended. The body of work done on determinants of mental illness and how public mental health has been shaped by the recent crisis can be linked together through the role of social disadvantage indicators (unemployment, income) and public social support.

The literature focusing on the determinants of mental health and common mental disorders (non-psychotic depression and anxiety), although mainly epidemiological and descriptive, is somewhat smooth and aligned in its findings. In general terms, the results

of previous studies on the impact of socioeconomic factors such as education, housing, income, and occupational status, only differ on the degree of impact and significance of certain variables (Lehtinen, Sohlman, & Kovess-Masfety, 2005). The WHO has released a report on social determinants of mental health which provides an extensive review of results on this subject and is most useful on understanding the broader picture (World Health Organization and Calouste Gulbenkian Foundation, 2014). Mental health is found to be determined to a great extent by social, economic and physical influences, and its distribution comes as a consequence of social inequalities. The formation of mental health is a process that begins before birth and accumulates throughout the lifespan, meaning that initial disadvantages are important factors at every point in time. The main findings report a strong correlation of mental health state with social status, and a higher vulnerability of those most disadvantaged and in the lower ranks of the distribution. The prevalence of common mental disorders is perpetuated by unemployment and poverty, although these indicators do not serve as good predictors for the onset of an episode (Weich & Lewis, 1998).

While the report draws a picture of those more prone to poor mental health, there are other factors at the individual level that influence mental health stock. A review of European country-level studies shows that positive mental health scores are higher for men, and those in the highest ranks of the income gradient with access to social support, significantly decreasing with age and adverse conditions such as poor housing or death of a spouse (Lehtinen, Sohlman, & Kovess-Masfety, 2005). Educational attainment, described as important factor in health formation (Kenkel, 1995), appears as a good predictor of mental health state and may serve as a proxy for socioeconomic status (Fryers, et al. 2005). The socioeconomic status as measured by the income gradient is

also a commonly used explanatory variable for the distribution of poor mental health, but the descriptive nature of the data may be subject to biases as the social status seems to lose its impact when controlling for other factors (Araya, Lewis, Rojas, & Fritsch, 2003). Another indicator found to lose its impact is low social support - when referring to older adults, its role is overtaken by physical health condition in explaining the onset of depression (Kennedy, Kelman, & Thomas, 1990), which could mean that the impact of social support on the elderly population may be channeled into mental health formation through medical assistance.

As for the crisis, studies have come around to assess the health consequences, whether in terms of policies and health systems changes or public health indicators. The trend for Europe has impaired GDP growth and rising unemployment, but the growth of health expenditures is not homogeneous across countries. While some increased their spending to protect the health systems, others were forced to cut expenses. In what concerns public health, emergence of economic downturns has been associated with an increase in suicides, although with no evident impact on overall mortality (Baumbach & Gulis, 2014). At the country level, an example shows increased demand for mental and addiction-related consultations has been verified in Spain (Gili, Roca, Basu, McKee, & Stuckler, 2012), a country particularly affected by the crisis in the years following 2008. There is therefore solid evidence for increased demand of mental health services in crisis years, on the form of decreasing condition.

The key finding relating the work on mental health and its determinants, and the assessments of the financial crises, is the role of social support. Both strands of literature find that countries with higher levels of social spending and overall support present the best scores in terms of mental disorders indicators (Lorant, et al., 2003), and were able to

mitigate the impact of the increase in unemployment on suicide rates (Stuckler, Basu, Suhrcke, Coutts, & Mckee, 2009). There is an obvious bridge between the two subjects: the importance of social spending can be related to the role of socioeconomic indicators in determining the incidence of mental illness, suggesting a channel through which the crisis affects the population. This implies that the consequences for mental health will not be uniform for every country and may vary according to the public policies.

3 – Data / Methodology

To work out the impact of the crisis in the mental health of the population, we turn to a micro-level analysis instead of a macro one. We take individual responses across eleven European countries as our output variable to build up micro health indicators, instead of aggregate indicators, and will assess the changes in mental health through the estimation of health production functions that account for socioeconomic influences as well and exogenous macroeconomic variables. The aim is to attain a clear analysis, controlling for social and personal influences, of whether mental health has deteriorated due to the crisis or as a result of other conditions. In addition, provided that economic variables pose a direct influence to individual mental health, we can estimate the variation in mental health caused by the crisis alone when comparing to a scenario with no crisis, i.e. pre-crisis forecasts, thus having the assumed true variation by country in mental health attributed to the crisis.

For the assessment of mental health in Europe throughout the crisis, the data is be withdrawn from the Survey of Health, Ageing and Retirement in Europe (SHARE), a multidisciplinary cross-national European panel database of micro-data on health and socioeconomic indicators, from individuals aged 50 and over.

The motivation behind this choice is lies on the fact that the oldest groups of the population, akin to those in the lowest socioeconomic ranks, are more prone to mental illness. Not only does age have a negative effect on mental health, this effect is enhanced as the individuals grow older since old age encompasses a faster deteriorating health, as well as more precarious living conditions (e.g. decreased income, abandonment). Moreover, these same conditions also make the older population more vulnerable to the consequences of economic recession, as this segment will more likely rely on social support for subsistence. Therefore, this analysis will focus on a more exposed part of the European population and how their mental health has been affected by the crisis years. The estimated panel model will contain data from three years corresponding to three waves from the SHARE: 2007, 2011 and 2013. The first year captures the environment before the onset of the 2008 crisis, while the two post-crisis years capture the changes in our desired variables. We use two distinct years after 2008 to try to understand if, given a decrease, we can already see an improvement in mental health in 2013. We expect to observe a decrease in 2011, followed by a slight improvement on 2013 as some economies begin to pick themselves up in terms of growth – an improvement, however, not expected to compensate the previous deterioration.

The withdrawn sample consists of eleven European countries: Austria, Germany, Sweden, the Netherlands, Spain, Italy, France, Denmark, Switzerland, Belgium and the Czech Republic. These are the countries for which the SHARE provides information for the same individuals in the three aforementioned years. They do, however, constitute a representative sample of Europe as a whole – Austria, Germany, the Netherlands, Switzerland and Belgium represent Central Europe; Sweden and Denmark represent Northern Europe; and Spain, Italy and France represent the Southern European countries

particularly affected by the crisis, with the Czech Republic, however, standing alone representing Eastern Europe.

3.1 – Mental Health Indicator

The mental health indicator is the Zung Self-Rating Depression scale (Zung, 1965). It uses a set of twenty questions to build a score ranging from 20 to 80 that assesses individual mental health in terms of depression. In other words, mental health can be seen as a spectrum and the Zung Scale provides a feasible position within this spectrum (Dungan, et al., 1998). Most depressed individuals score between 50 and 69, hence positive mental health decreases with the score. This score does more than just diagnose individuals with depression, it creates a gradient that allows distinction between mild and severe illness. Not only does it show the incidence of depression, it also allows for a test of difference in means between the desired periods, as episodes of depression may have stayed constant but mental health as a whole may have deteriorated. The challenge here is to match questions from the SHARE dataset regarding mental health to the subjective questions of the indicator (Table 1 of the appendix). Due to lack of available data, five questions were dropped from the score[1] which will range from 15 to 60 in this study, making the depression threshold stand now at 37,5. The direction of the score was also inverted so that positive mental health increases with the score, for a faster interpretation of the results (depression is then diagnosed for scores below 37,5).

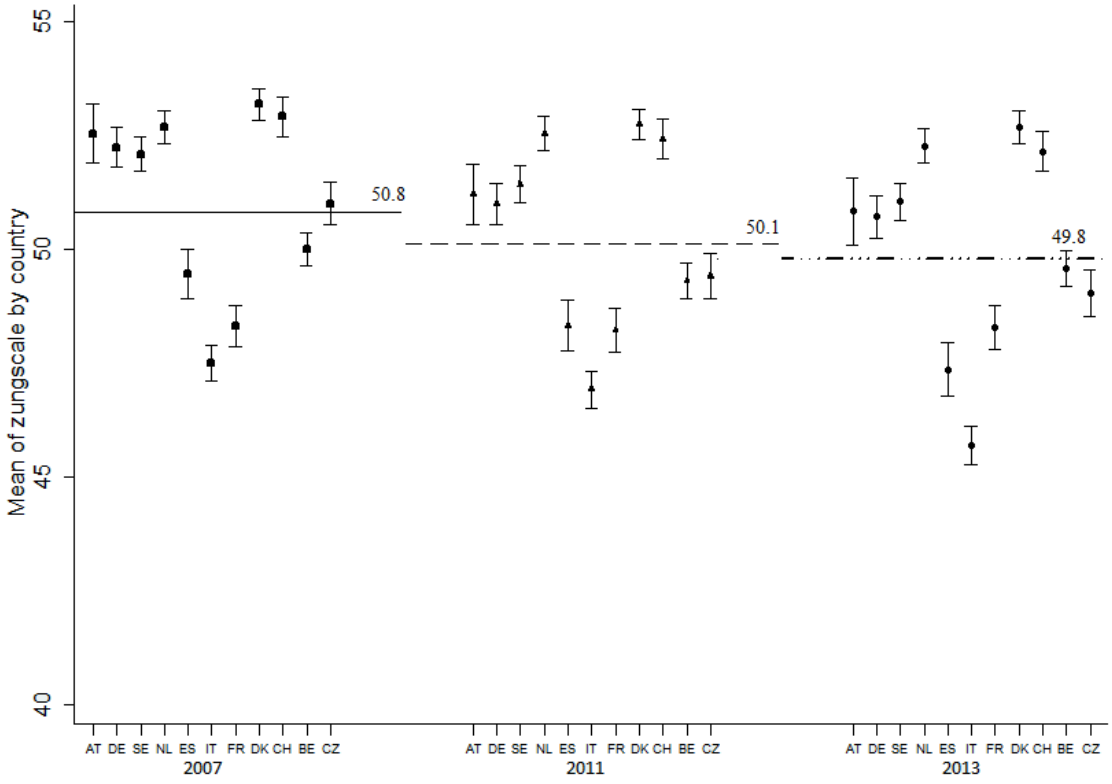
4 – Results

The mental health indicator was constructed based on individual responses to the 15 questions of the survey. From our sample comprising 11 European countries we can both

[1] As shown in the GHQ-12 and MHI-5 comparison (Hoeymans, A., Westert, & Verhaak, 2004), it is viable to assess mental health through a minimalist indicator, provided that the questions are directly answered by the subjects. Our work adapts previously collected responses to the questionnaire, and opted for an indicator with more questions to minimize errors.

take each country's and the overall European mean score. The distribution of means is presented in Graph 1, where country-level scores by year are show against the overall average of the same period. Each point in the plot represents the country's mean score and confidence interval, and the horizontal lines mark the average score for all 11 countries. Average mental condition has decreased over the three periods, with statistically significant differences both at the aggregate and country-level (Tables 2, Tables 2a) – k) of the appendix). While the relative position of each nation does not change significantly, all of them show a decreasing trend. The most affected regions, Southern (Spain, Italy and France) and Eastern European (Czech Republic) remain below average, which is coincidental with their exposure to the consequences of the crisis. Other countries, while remaining above, have shifted their relative positions, with Denmark and Sweden leading the chart in more recent years, and Austria and Germany falling behind.

Graph 1 – Distribution of the Mental Health Mean Score indicator



In terms of number of depression cases (those scoring below 37,5), the results comply: the percentage of depressed elder individuals in Europe significantly increased by two percentage points in the years after the crisis. However, this is not true for all the countries in the sample, as we observe no significant differences in 5 out of 11 nations. The fact is that, while mental health as a whole has deteriorated after the onset of the crisis, the incidence of clinical depression does not appear to have uniformly changed. As mentioned before, it is likely that mental health does not change uniformly across Europe due to country differences.

But these numbers cannot be taken alone. The above discussion of mental health literature points out age and social position as important determinants of mental state, as well as physical condition (overall condition and the presence of long-term illness). Moreover,

Table 2 – Differences in mean scores and proportion of depressed respondents since 2007

	2007	**2011**	**2013**
Zung Scale Mean Score	50.82	50.14	49.79
Diff. from 2007	-	-0.69***	-1.03***
%Dep	7.83%	9.20%	9.95%
Diff. from 2007 (pp.)	-	1.37***	2.12***
N	13262	13262	13262

* $p<0.10$; ** $p<0.05$; *** $p<0.01$

our sample was withdrawn from the SHARE survey, meaning that we are analyzing respondents over 50 years old – not only does health production deteriorate with age, the depreciation increases with time. Hence, this decrease in mental health condition can be attributed in great part to an ageing, increasingly unhealthy sample.

To account for all that, we first carry out an estimation of a health production function that uses the Zung Scale indicator as the output variable to measure mental health. That will tell us what factors had influence in this observed decrease, and whether we can relate it to the onset of the crisis. Secondly, we use a probit panel regression to understand which variables explain the emergence of depression cases, i.e. what causes an individual from our sample to become (clinically) depressed. It may be important to distinguish the two analysis because the decrease of the average mental health state may not imply an overall increase of the clinical depression cases in some countries.

To perform this, a list of covariates is described below. For a quick consultation, a table is available in the appendix (Table 3).

- *Age:* the literature is quite strong on asserting the negative impact of ageing on positive mental health (Lorant, et al., 2003), not only by common mental illnesses but by increased prevalence of neurodegenerative disorders. Mental health deteriorates with age as stressors accumulate throughout the lifespan, and through the degeneration of cognitive abilities. But it may not be appropriate to assume the relationship is linear – the deterioration (depreciation rate) of overall health is not a constant parameter as it increases with age, hence the assumption that the contribution of age alone for mental health is uneven is a strong hypothesis to be tested. Here, we will test the hypothesis of a quadratic relationship.
- *Education:* education as an explanatory variable for mental health can be seen through two different angles. Firstly, one can use educational level as a proxy for individual socioeconomic status (Fryers, et al. 2005). Since mental health depends on social position and inequality, with the higher ranks being the healthiest, it will vary positively with educational achievement. Secondly, education is seen as an input

in the health production function for health formation models (Kenkel, 1995), since it is assumed that highly educated individuals with know how to produce health more efficiently with the available resources and have a higher initial stock of health *ex ante*. From what could be collected from the database, we establish dummies for both primary and secondary level of education. Education is here taken separately since different levels may have different increments in the production function.

- *Gender:* It has been medically documented that women are twice more likely than man to develop mental illness (Bird & Rieker, 1999). Biologically, this is attributed to genetic predisposition and differences in brain chemistry between the sexes, causing women to be exposed to higher hormonal fluctuations strongly associated with depression. Some other explanations do suggest that differences in prevalence of mental illness between sexes are a consequence of reporting bias – an explanation that has been debunked. Gender here is taken to be equal to 1 if the respondent is male.
- *Income:* akin to education, income comes in here as a measure of socioeconomic status. Like previous research has shown, there is an income gradient in the distribution and prevalence of mental illness, therefore making it an important variable in assessing mental health state. This variable may also capture changes in income *as a consequence* of the crisis, and this must be taken into account in a further interpretation of the results. Income is taken in a logarithmic scale for this estimation for an easier interpretation, and all currencies are converted to euros.
- *Long Term Illness:* like previously stated, physical conditions gave an important role in explaining poor mental health. With a dummy variable that captures the presence of a long term illness, we are controlling for physical conditions severe enough to

have an impact on mental health. This is a dummy equal to 1 if the respondent reports a long-term illness.

- *Medical Service Consumption (nr. consultations):* this variable will capture every other condition not included in the question regarding long term illnesses, as the poor mental state can also arise from recent medical conditions. It also captures the respondent's utilization of medical services.
- *Activity:* daily exercise is advocated as a fairly good treatment against depressive symptoms. A systematic review found exercise to be slightly more effective than prescribed medication on improving depression outcome (Cooney, et al., 2013). This may be due to the release of endorphins (*feel-good* brain chemicals) during physical activity, and through improvements in the immune system. The results, however, are somewhat weak as some are based on a small number of studies. Ciucurel and Iconaru (2012) further find a strong association between sedentarism in the elderly population and the development of depression. It is important to include an indicator which measures how active an individual remains, as it will influence depression and its onset. This variable is qualitative, and dummies are generated for the frequency of physical acitivy.
- *Occupational Status*: three dummies regarding occupation status are included, for whether the respondent is unemployed, retired or on disability leave. Adverse life conditions can manifest on employment status, hence it is important to distinguish how the respondent left the workforce. Occupation can be a significant influence in mental condition, as well as a consequence of the crisis, hence this variables can be taken to have a twofold interpretation.

Alongside with the controls, the crisis impact on mental health is assessed through the inclusion of two year dummies for 2011 and 2013 controlling for the years in our data following 2008. If, by holding all else constant, the coefficients associated with the year controls are negative and significant, part of the mental health (negative) variation can then be attributed to the passing of those years alone – the years of crisis.

In addition to these, real GDP growth and unemployment rates for 2007, 2011 and 2013 are employed in the first regressions to account for the economic environment of each period. These are macroeconomic variables easily perceived by the population in general and may be viable when included in the regressions, serving also as a way of understanding which forces of the economic environment are felt at the individual level. The next analysis, however, will be managed through additional regressions employing GDP output gap estimations (source: OECD). The output gap measures the deviation of GDP from its trend – how much the indicator deviated from its potential level. In a scenario of economic downturn, as it was the onset of the 2008 crisis, GDP falls in comparison with the potential trend and output gap estimations are negative. Using this sort of variables makes it easier for generating a "counterfactual"; the output gap measures a deviation relatively to a potential level that serves as a "control group" not exposed to the crisis. If economic fluctuations are powerful enough to be felt in the mental health production function at the individual, the macro variables should yield significant coefficients, albeit going in different directions in each of our regressions: if, for instance, economic growth has a positive impact on mental health, the coefficient should be positive in the fixed-effects (positive increment in the Zung scale) and negative in the probit (decreases the probability of depression).

The first function is attained by a fixed effects estimation separated by sex to account for gender differences. The second part uses a probit panel estimation, both with and without country dummies variables (Austria is omitted). The results are presented in Tables 4 & 5, respectively[2].

Table 4 presents six fixed effects regression for the sample of eleven countries, either pooled or separated by gender. The nonlinear relationship of age is disentangled through the inclusion of the square of age, otherwise it would not be significant in this estimation. Surprisingly enough, we see that age has a positive impact on individual mental health, although this influence is mitigated as the subject grows older. A possible explanation is the existence of two forces in ageing, the first acting towards improving (mental) health (Van Landeghem, 2008) and the second acting through an increasing health depreciation rate (Grossman, 2000). Another explanation comes from the fact that the sample itself only captures the population over 50 years old. Following the age-dependent happiness curve assumption by Van Landeghem (2008), it may happen that we are looking at the lower end of the function and therefore only capturing post-middle age effects.

Regarding socioeconomic factors, the results are not conclusive. Education is not significant in any specification, presenting a contradictory negative coefficient for the female sample. The variable may not have any conclusive influence for two reasons: first, the data only allowed distinction between primary/basic and secondary education, and remained undistinguishable for any other schooling level; second, it is possible that the impact of this variable is mitigated as one grows old and health deteriorates as a consequence of old age and its problems. The same result goes for the income level

[2] The regressions are not separated by country due to the inclusion of individual-invariant macroeconomic variables. These present a high correlation amongst themselves for each given country, and collinearity issues omit them in the regressions.

Table 4 – Fixed-effect regression at individual level

Dependent variable	Zung Scale	Zung Scale (Women)	Zung Scale (Men)	Zung Scale	Zungscale (Women)	Zungscale (Men)
Age	1.263	1.367	1.060	1.258	1.354	1.061
	(8.30)***	(7.43)***	(3.01)***	(8.28)***	(7.37)***	(3.01)***
Age^2	-0.008	-0.009	-0.007	-0.008	-0.009	-0.007
	(13.35)***	(10.55)***	(8.06)***	(13.33)***	(10.46)***	(8.10)***
Educ1	0.129	-0.733	1.244	0.207	-0.647	1.336
	(0.16)	(0.67)	(1.08)	(0.26)	(0.59)	(1.16)
Educ2	0.301	-0.163	0.826	0.412	-0.066	0.953
	(0.58)	(0.23)	(1.12)	(0.79)	(0.09)	(1.29)
L. Term Illness	-1.474	-1.540	-1.389	-1.478	-1.549	-1.391
	(17.21)***	(12.88)***	(11.50)***	(17.26)***	(12.95)***	(11.52)***
LogIncome	0.002	-0.018	0.024	0.001	-0.018	0.024
	(0.15)	(1.03)	(1.40)	(0.11)	(1.04)	(1.37)
Actv – Rare	0.707	0.826	0.578	0.711	0.833	0.579
	(5.44)***	(4.55)***	(3.15)***	(5.47)***	(4.58)***	(3.16)***
Act – Occas.	0.846	0.854	0.843	0.857	0.866	0.849
	(7.56)***	(5.57)***	(5.20)***	(7.67)***	(5.65)***	(5.24)***
Act – Freq	0.886	0.721	1.077	0.903	0.741	1.089
	(9.14)***	(5.33)***	(7.86)***	(9.33)***	(5.48)***	(7.95)***
Nr. Consult.	-0.059	-0.057	-0.061	-0.058	-0.057	-0.061
	(13.51)***	(9.97)***	(9.23)***	(13.47)***	(9.93)***	(9.23)***
Unemployed	-1.145	-1.489	-0.705	-1.137	-1.483	-0.692
	(4.09)***	(3.80)***	(1.79)*	(4.06)***	(3.79)***	(1.76)*
Retired	0.332	0.091	0.630	0.344	0.124	0.627
	(2.48)**	(0.49)	(3.30)***	(2.57)**	(0.66)	(3.28)***
Disabled	-1.018	-1.211	-0.780	-1.007	-1.181	-0.778
	(3.64)***	(3.14)***	(1.94)*	(3.60)***	(3.06)***	(1.93)*
2011 year	-0.910	-1.023	-0.595	-0.726	-0.931	-0.278
	(1.85)*	(1.84)*	(0.46)	(1.44)	(1.62)	(0.21)
2013 year	-1.130	-0.992	-1.055	-0.971	-1.034	-0.607
	(1.53)	(1.19)	(0.54)	(1.29)	(1.20)	(0.31)
GDP growth	0.160	0.226	0.070	-	-	-
	(4.03)***	(4.15)***	(1.22)			
Unmp. Rate	-0.025	-0.016	-0.037	-	-	-
	(1.80)*	(0.82)	(1.93)*			
Output Gap	-	-	-	0.094	0.092	0.098
				(4.04)***	(2.83)***	(2.98)***
Constant	4.553	-0.099	14.408	4.637	0.540	14.002
	(0.54)	(0.01)	(0.67)	(0.55)	(0.06)	(0.65)
R^2	0.05	0.04	0.05	0.05	0.04	0.05
N	39,499	22,483	17,016	39,499	22,483	17,016

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

variable, with non-significant coefficients. But bearing in mind this sample comprises very distinct countries with different economies, it is possible however for this to be a result of different purchasing powers that complicate the inference of an income gradient. These results may highlight the importance of physical health in the development of mental illness in old age, as socioeconomic background loses its power in explaining mental health distribution.

On that same page of physical health, the frequency of physical activity, a long term illness and the number of doctor consultations within a month all present the expected sign for the coefficients, supporting the inferences made above. As for occupational status, unemployment and disability leaves are predictors of bad mental condition but, surprisingly, retirement poses a highly positive influence. This may create two opposite forces in the formation of elderly mental health – while the increasingly poor physical condition drives it down, the ability to quit the labor force at that time is a strong positive influence. Once again, the role of social support is reinforced – the ability to retire comfortably can be of great importance to mitigate the adversities of poor health.

In terms of the crisis, the results indicate a somewhat significant negative impact of its onset on mental health in Europe. Although not overall significant, the dummies for 2011 and 2013 indicate a decrease in average mental health following 2008. Gender differences can additionally be noted, as the dummies are more significant for the female population and with a more negative impact on mental health. Holding all other covariates constant, we can infer that the climate of crisis alone taken by the year dummies has contributed to worsen mental health outcomes in Europe. Adding to this, the significance of real GDP growth and unemployment rate also vary with gender – although the coefficient signs remain the same, GDP is only significant for the female sample, with a higher impact as

well, while unemployment is only significant for the male one. A strong hypothesis cannot be presented to support this finding, but it can be inferred that men may tend to be more concerned about labor market conditions than women, while the female population may remain more aware of economic growth. However, much like other determinants of mental health, this inferences may be quite subjective and vary according to the chosen sample. Nevertheless, the signs are compliant with the previous assumption, as we observe mental health improving with economic growth and worsening with increasing unemployment.

The last three regressions vary very little in terms of results, except for the year dummies. The presence of the output gap drains the significance of the years of the crisis, possibly because the former will be expected to comprise more information about the economic scenario. No other macroeconomic variables were included due to collinearity issues.

The results for the probits on Table 4 need a slightly different interpretation. The output variable is a dummy equal to 1 if the respondent presents depression, i.e. scores below 37,5. Hence, this shows a binary outcome estimation for the probability an individual has of developing depression, instead of the impact of each variable on the individual position across the mental health spectrum.

In this model, all covariates have the predicted signs and are statistically significant. Gender differences are evident and strongly significant, as women show a higher predisposition for the development of depression. The probability of the onset of a depression episode decreases with age, but at a decreasing rate – the nonlinear relationship is again employed in the probit – and by quitting the labor force by unemployment or disability leave. Education and income decrease the probability of an episode, meaning

Table 5 – Panel probit regressions for the onset of depression

Output: %Depression				
gender	-0.441	-0.452	-0.437	-0.452
	(12.38)***	(12.60)***	(12.20)***	(12.61)***
Age	-0.163	-0.163	-0.164	-0.163
	(7.70)***	(7.68)***	(7.75)***	(7.67)***
Age^2	0.001	0.001	0.001	0.001
	(8.54)***	(8.57)***	(8.58)***	(8.56)***
Educ1	-0.498	-0.317	-0.525	-0.319
	(9.18)***	(5.65)***	(9.66)***	(5.68)***
Educ2	-0.553	-0.516	-0.581	-0.519
	(10.13)***	(9.13)***	(10.61)***	(9.17)***
L. Term Illness	0.579	0.616	0.574	0.616
	(18.65)***	(19.56)***	(18.50)***	(19.57)***
LogIncome	-0.026	-0.014	-0.028	-0.014
	(6.13)***	(3.25)***	(6.63)***	(3.22)***
Actv – Rare	-0.338	-0.350	-0.351	-0.350
	(6.46)***	(6.64)***	(6.70)***	(6.65)***
Act – Occas.	-0.436	-0.403	-0.454	-0.403
	(9.45)***	(8.66)***	(9.84)***	(8.68)***
Act – Freq	-0.523	-0.467	-0.546	-0.469
	(14.26)***	(12.59)***	(14.89)***	(12.65)***
Nr. Consult.	0.017	0.015	0.017	0.015
	(14.13)***	(12.17)***	(14.22)***	(12.12)***
Unemployed	0.466	0.433	0.475	0.430
	(5.20)***	(4.83)***	(5.29)***	(4.79)***
Retired	0.108	0.013	0.114	0.012
	(2.29)**	(0.27)	(2.42)**	(0.25)
Disabled	0.514	0.517	0.518	0.515
	(6.96)***	(6.94)***	(7.00)***	(6.91)***
2011 year	-0.206	-0.056	-0.356	-0.107
	(5.57)***	(1.36)	(7.22)***	(1.73)*
2013 year	-0.437	-0.148	-0.571	-0.182
	(7.88)***	(2.20)**	(8.29)***	(2.02)**
GDP growth	-0.124	-0.053	-	-
	(8.36)***	(2.72)***		
Unmp. Rate	0.024	0.007	-	-
	(7.15)***	(1.30)		
Output Gap	-	-	-0.079	-0.029
			(10.53)***	(2.84)***
Country Controls	No	Yes	No	Yes
Constant	4.056	3.514	4.238	3.450
	(5.53)***	(4.71)***	(5.78)***	(4.67)***
N	39,639	39,639	39,639	39,639

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

that in this case the incidence of depression is mediated by a social gradient in our sample, like shown in the literature. Physical activity and condition indicators also behave as predicted. The differences come from the inclusion of country controls. As mentioned before, depression distribution is not uniform across countries – it is easy to see on Tables 2 a) – k) that even the initial proportion of depressed respondents differs greatly, and the same goes for the consequent variation following the crisis. With that and the role of public spending, it would be likely for the evolution of mental health to differ significantly between European countries. From one model to the other, the significance of the crisis-related variables disappears when the country dummies are introduced. While GDP and unemployment presented strong predictors of depression onset, their role is mitigated when controlling for the country – GDP has a lower impact and unemployment loses significance – which points towards the importance of each country's individual role concerning public mental health. The most surprising finding, though, is the estimated impact for the year dummies which turn out to decrease probability of depression in the first estimation, although not significantly for 2011 in the second regression, suggesting an improvement already on course (the full regression is presented in Table 4a) of the appendix). The output gap regressions vary little, just like in the fixed-effects models, but as expected has a good contribution on preventing the onset of depression.

From this first stage analysis, the conclusion are mostly in accordance with the previously raised points. Mental health depends on endogenous socioeconomic cofactors as well as physical ones, but is also shaped by external forces, both social and economic. However, while the average mental level of the population has decreased in the past six years, the actual number of depression cases in this sample varies according to country and is mostly independent of the crisis alone. This may come from the fact that the mean score decrease

does not necessarily imply onset of depression. Mental health can be regarded as a spectrum, and moving across the range of the indicator does not translate into a developed illness. This is presumably one of the main reasons behind the uneven trends on depression within countries.

The question may now be how much has each country's average score changed as a result of the downturn. This variation in mental health score is taken to be the value of the estimated coefficients for the year dummies plus the coefficient associated to the variation in the designated macro variable. However, had we chosen to measure GDP level or growth by itself, we would have had to account for both the observed value in the crisis setting and the previously forecasted value or the expected trend, to consequently subtract those values and derive the effect truly generated by the crisis. Using notation from policy analysis, the idea would have been to subtract the average value of the "control group" – a potential economy with no crisis – to that of the "treatment group" – economy under crisis. Obviously, the designations are loosely employed here as there is no control or direct counterfactual to the European economic situation, but resorting to GDP forecasts is a potential way to tackle this issue. Nevertheless, we chose to employ the output gap into our regression analysis as an easier approach to the issue. The output gap measures the deviation of GDP from its potential level as a percentage of the latter. In other words, it is in itself a measure of the difference between the observed and the counterfactual value for GDP in each country. In the years following the crisis, the output gap is predicted to be negative as recession drives GDP down; moreover, our estimated coefficients are positive, hence negative output gap drives mental health further down. The increment on mental health in each year will be given by:

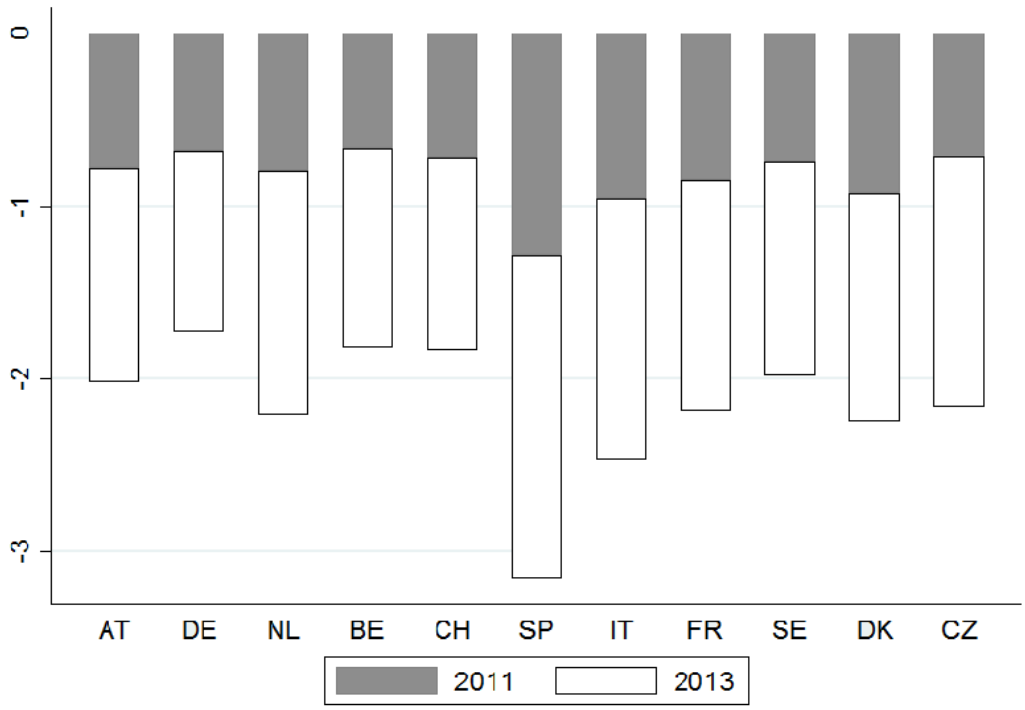
$$\Delta Zung_t = Year_t + 0{,}094 output\_gap_t$$

The results by country are depicted in Graph 2. The gray bars are the increment in 2011, and the upper white bars correspond to 2013. The entire bars represent the whole variation in the Zung Scale score in 2013.

We can see that the (negative) variation attributed to 2013 is indeed much higher than the variation in 2011 alone. This is attributable to both the higher coefficients and the more negative GDP levels, as some countries remained in recession. Unfortunately, this implies that mental health in Europe is not yet experiencing an improvement possibly because the end of the crisis has only just begun. By the graph, the most affected countries are unsurprisingly Spain, Italy and France, the proxy group for the South of Europe. The least affected are those in Central Europe, followed by the North (despite Denmark having a larger variation than France).

This differences in average variation in the Zung score are a consequence of differences between countries, namely in terms of public systems and spending. This had already

Graph 2 - Variation in average Zung Scale score by country



been mentioned in the probit estimations, where the importance of the country controls had been highlighted. The aforementioned literature has also been keen on emphasizing the role of social support in the prevention of mental illness, especially in the most vulnerable segments of the population. Our sample specifically aims the population over 50 years old, which immediately indicates a strong dependence on social support systems. As our analysis focuses on health, public health care spending is a fair proxy for support in terms of health care. Truth is, health care expenditure has decreased relatively to GDP since 2009 – the first measure was to increase health spending, but austerity-mediated budget cuts promptly decelerated its growth (Tables 5 a) – c) of the appendix, source OECD). Southern European countries displays the lowest shares, with Spain on the bottom – consistent with its position in Graph 2. However, after 2011 this percentage began to grow again which would have been compatible with our previous expectations of improved health outcomes in 2013. This leaves the hypothesis that improving mental is more difficult after triggering a stressor and requires more time than expected.

5 – Discussion / Conclusion

This project focuses on mental health issues in Europe as a consequence of the financial crisis and builds a regression analysis upon an individual mental health indicator. The results, although small in magnitude, reveal a negative effect on mental condition strongly associated with the years of economic downturn. The countries with higher budget cuts are estimated to display lower average mental health scores, reinforcing the role of the public health systems in answering to public health concerns, Furthermore, the results do not differ much from the literature on determinants of mental health, but one should bear in mind that the estimations were based on a very specific group of the population.

However, there are some concerns in this work. To pick up on the last sentence, the first

limitation comes from the collected data. The SHARE is a database designed to study ageing and socioeconomic features of the elder population in Europe and only provides data for respondents over 50 years of age. Even though it could make more sense to study the most vulnerable groups, this sample is not taken to be representative of the population. Our assumption here is that a significant part of the effect of the crisis is felt through the cuts on public spending – but this may not be true when studying a younger, less dependable sample. Moreover, even though controls for physical condition were included, it is important to note that this is a sample with presumable poor physical health, a strong influence on overall mental outcomes. This must be taken into consideration for policy implications in terms of health care spending.

Inserting macroeconomic indicators into micro-level functions may pose an additional problem. It is possible that the relationship with individual mental health is not as strong as estimated, since the assumption that variables such as GDP growth and unemployment rate have a direct relevant effect at the micro level is a strong one. Further research should be conducted in order to establish strong proxies for macro variables that directly influence individual outcomes.

Nevertheless, the policy implications are straightforward in this matter. There is a strong need to protect the vulnerable population in times of crisis – mental health is just one of the many aspects to be addressed. While the deterioration is not alarming, we expect to raise awareness for the vulnerability of mental health in periods of economic stress, and for the possible channels of action. Not only does the crisis triggers potential stressors, it generates unstable living conditions. The designed approach should comprise both medical assistance for mental health, as well as a stronger concern for the lower socioeconomic groups, those more vulnerable to negative variations in health scores.

Still, it should be noted that these results apply to overall individual mental health as a relative position in a spectrum. Assessing the development of clinical depression requires a both more thorough and more medicine-oriented approach, with a stronger biological and biochemical background. Nevertheless, the WHO statement clearly indicates that one should not aim solely at mental illness and overlook poor mental health by itself, hence it is crucial to control for these crisis related variations.

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Appendix

Table 1: Zung Self-Rating Depression Scale (adapted for this study)

	A little of the time	Most of the time
1. I feel downhearted and blue	4	1
2. Morning is when I feel best	1	4
3. I have crying spells or feel like it	4	1
4. I have trouble sleeping at night	4	1
5. I eat as much as I used to	1	4
6. I get tired for no reason	4	1
7. I find it easy to do the things I used to	1	4
8. I feel hopeful for the future	1	4
9. I am more irritable than usual	4	1
10. I feel I am useful and needed	1	4
11. My life is pretty full	1	4
12. I feel others would be better off if I were dead	4	1
13. I still enjoy the things I used to do	1	4
14. My mind is as clear as it used to be	1	4
15. I am restless and can’t keep still	4	1

The respondents choose the option which best fits the statement, and the values are added up to build the score, which ranges from 15 to 60 in this adaptation.

Tables 2a) – k): Differences in Mean Scores and proportion of depressed individuals for each individual country

a) Austria	**2007**	**2011**	**2013**
Zung Scale Mean Score	52.54	51.22	50.85
Diff. from 2007	-	-1.33***	-1.69***
%Dep	5.17%	6.56%	9.15%
Diff. from 2007 (pp.)	-	1.39	3.98**
N	498	498	498

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

b) Germany	**2007**	**2011**	**2013**
Zung Scale Mean Score	52.25	51.00	50.72
Diff. from 2007	-	-1.25***	-1.53***
%Dep	3.88%	5.93%	5.60%
Diff. from 2007 (pp.)	-	2.05**	1.72*
N	927	927	927

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

c) Sweden	**2007**	**2011**	**2013**
Zung Scale Mean Score	52.09	51.44	51.05
Diff. from 2007	-	-0.65**	-1.04***
%Dep	3.32%	4.31%	5.15%
Diff. from 2007 (pp)	-	0.99	1.83**
N	1196	1196	1196

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

d) Netherlands	**2007**	**2011**	**2013**
Zung Scale Mean Score	52.69	52.55	52.27
Diff. from 2007	-	-0.14	-0.41
%Dep	4.01%	3.94%	4.38%
Diff. from 2007 (pp.)	-	0.07	0.37
N	1367	1367	1367

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

e) Spain	**2007**	**2011**	**2013**
Zung Scale Mean Score	49.47	48.33	47.37
Diff. from 2007	-	-1.14***	-2.10***
%Dep	13.36%	17.93%	21.29%
Diff. from 2007 (pp.)	-	4.57***	7.93***
N	1151	1151	1151

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

f) Italy	**2007**	**2011**	**2013**
Zung Scale Mean Score	47.51	46.93	49.79
Diff. from 2007	-	-0.58**	-1.80***
%Dep	14.39%	16.89%	18.78%
Diff. from 2007 (pp.)	-	2.50**	4.39***
N	1639	1639	1639

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

g) France	**2007**	**2011**	**2013**
Zung Scale Mean Score	48.33	48.24	48.30
Diff. from 2007	-	-0.09	-0.03
%Dep	13.28%	12.83%	12.53%
Diff. from 2007 (pp.)	-	-0.45	-0.75
N	1310	1310	1310

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

h) Denmark	**2007**	**2011**	**2013**
Zung Scale Mean Score	53.19	52.75	52.69
Diff. from 2007	-	-0.44*	-0.5**
%Dep	3.80%	3.46%	3.46%
Diff. from 2007 (pp.)	-	0.34	0.34
N	1473	1473	1473

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

i) Switzerland	**2007**	**2011**	**2013**
Zung Scale Mean Score	52.92	52.42	52.16
Diff. from 2007	-	-0.50	-0.76**
%Dep	2.81%	3.28%	2.81%
Diff. from 2007 (pp.)	-	0.47	0.00
N	849	849	849

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

j) Belgium	**2007**	**2011**	**2013**
Zung Scale Mean Score	50.00	49.32	49.59
Diff. from 2007	-	-0.68**	-0.41
%Dep	9.09%	10.85%	10.80%
Diff. from 2007 (pp.)	-	1.76*	1.71*
N	1757	1757	1757

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

k) Czech Rep.	**2007**	**2011**	**2013**
Zung Scale Mean Score	51.01	49.42	49.05
Diff. from 2007	-	-1.59***	-1.96***
%Dep	7.11%	9.70%	10.95%
Diff. from 2007 (pp.)	-	2.59**	3.84***
N	1035	1035	1035

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

Table 3 – List of covariates employed in the regressions

List of covariates	
Gender	Gender=1 if respondent is male
Age	Measured in years
Education	Educ1=1 for primary education Educ2=1 for secondary education
Long-term Illness	=1 for a long term illness
Income	Log of income level
Physical Activity (frequency)	=1 for "Rare" =1 for "Occasionally" =1 for "Frequently
Medical Consultations	No. of medical consultations in the last month
Occupational Status	=1 for "Unemployed" =1 for "Retired" =1 for "Disabled"
Year Dummies	=1 for 2011 =1 for 2013
GDP	Real GDP growth
Unemployment Rate	Unemployment rate at the end of the year
Output Gap	Estimated output gap

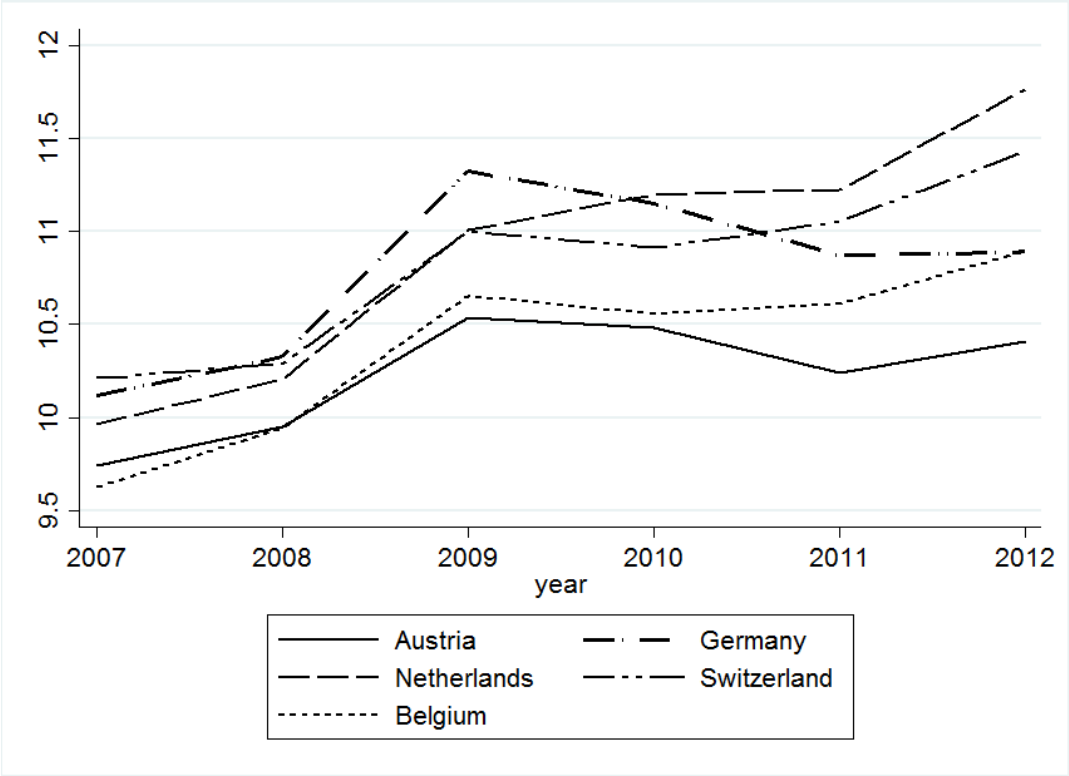
Table 5 a) – Full probit estimations with country controls

%Depression		
gender	-0.452	-0.452
	(12.60)***	(12.61)***
Age	-0.163	-0.163
	(7.68)***	(7.67)***
Age^2	0.001	0.001
	(8.57)***	(8.56)***
Educ1	-0.317	-0.319
	(5.65)***	(5.68)***
Educ2	-0.516	-0.519
	(9.13)***	(9.17)***
L. Term Illness	0.616	0.616
	(19.56)***	(19.57)***
LogIncome	-0.014	-0.014
	(3.25)***	(3.22)***
Actv – Rare	-0.350	-0.350
	(6.64)***	(6.65)***
Act – Occas.	-0.403	-0.403
	(8.66)***	(8.68)***
Act – Freq	-0.467	-0.469
	(12.59)***	(12.65)***
Nr. Consult.	0.015	0.015
	(12.17)***	(12.12)***
Unemployed	0.433	0.430
	(4.83)***	(4.79)***
Retired	0.013	0.012
	(0.27)	(0.25)
Disabled	0.517	0.515
	(6.94)***	(6.91)***
2011 year	-0.056	-0.107
	(1.36)	(1.73)*
2013 year	-0.148	-0.182
	(2.20)**	(2.02)**
GDP growth	-0.053	-
	(2.72)***	
Unmp. Rate	0.007	-
	(1.30)	
Output Gap		-0.029
		(2.84)***
Constan	3.298	3.230
	(4.42)***	(4.37)***
Germany	-0.028	0.003
	(0.24)	(0.03)
Sweden	-0.035	-0.018
	(0.30)	(0.16)
Netherlands	-0.078	-0.048
	(0.68)	(0.43)
Spain	0.524	0.586
	(4.10)***	(5.20)***
Italy	0.757	0.853
	(6.98)***	(8.31)***
France	0.609	0.664
	(5.72)***	(6.39)***
Denmark	-0.370	-0.301
	(3.18)***	(2.63)***
Switzerland	-0.268	-0.274
	(2.10)**	(2.15)**
Belgium	0.429	0.501
	(4.13)***	(4.88)***
Czech Rep.	0.437	0.469
	(3.98)***	(4.29)***
N	39,639	39,639

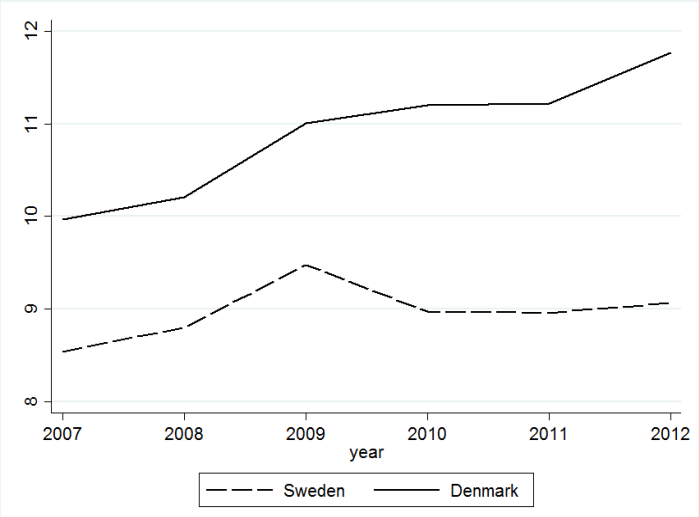
* $p<0.1$; ** $p<0.05$; *** $p<0.01$

Tables 6 a – c) – Health Expenditure as a percentage of GDP

a) Central Europe



b) Northern Europe



c) South and Eastern Europe