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Abstract[*]

Past research has provided evidence of the role of some personal characteristics as risk factors for depression. However, few studies have examined jointly their specific impact and whether country characteristics change the probability of being depressed. In general, this is due to the use of single-country databases. The aim of this paper is to extend previous findings by employing a much larger dataset and including the country effects mentioned above. The paper estimates probit models with country effects and explores linkages between specific environmental factors and depression using data from the 2007 Gallup Public Opinion Poll. Findings indicate that depression is positively related to being a woman, adulthood, divorce, widowhood, unemployment and low income. Moreover, there is evidence of the significant positive association between inequality and depression, especially for those living in urban areas. Finally, some population's characteristics facilitate depression (age distribution and religious affiliation).

JEL classification: D01, I10, I12, J18, Z13
Keywords: Depression, Health, Well-being, Cross-country research

1. Introduction

Depression is one of the world's most widespread mental illnesses and one that affects people for a wide variety of reasons. The relevance of investigating the factors that facilitate depression is twofold. On one hand, it has a strong impact on quality of life and happiness. On the other hand, this knowledge may be useful for identifying at-risk groups and for health policy design.

As the Centre for Economic Performance (2006) argued, massive distress is a major form of deprivation. In 2001, the World Health Organization (WHO) projected that depression was expected to be the leading mental disorder in the developed world by 2020. Two years later, WHO estimated that the overall cost of mental disorders accounted for between three and four percent of Gross Domestic Product, and WHO (2007) stated that depression alone is responsible for 4.5 percent of the worldwide total burden of disease.

Previous researches have shown that there is a set of individual characteristics that facilitate depression, including but not limited to age, divorce, widowhood, and being a woman (Al-Issa, 1982; Gurland et al., 1988; Miech and Shanahan, 2000; Myers et al., 1984; Turner and Turner, 1999; and Van de Velde, Levecque and Bracke, 2009). Most studies, however, have focused on only one dimension or used single-country surveys. In other words, they did not consider all individual characteristics at the same time, or they were unable to include background effects.

As well-being is directly related to depression and unhappiness, depression should become a policy issue. As Layard (2008) pointed out, what matters is to find the conditions in which (un)happiness occurs in order to undertake active policies. Hence, the aim of this paper is to determine the factors that increase the probability of being depressed at both the micro and macro levels.

The main contributions of this study are threefold. First, by employing a large dataset, we are able to extend previous findings and to compute simultaneously the effects of specific individuals' characteristics on the probability of being depressed. Second, we assess how individuals are affected by background—in particular, whether countries' attributes are significant stressors (e.g., economic performance, religion, and age distribution, among others). Finally, we show the role of living in urban areas as a specific stressor when income inequality is relatively high; this finding highlights the role of social networks.

The dataset for this research is the 2007 Gallup Public Opinion Poll that allows us to consider a large and widely heterogeneous set of micro-data (93 countries and more than 80,000 observations).

This paper is organized as follow. Section 2 presents some empirical evidence linked with the effect of individuals' characteristics (gender and age, among others). Section 3 describes the (less developed) literature about the impact of background and country characteristics on the probability of being depressed. Section 4 outlines the main features of the dataset and econometric methods applied in this analysis and describes the variables, and Section 5 presents results. Section 6 concludes.

2. Which Characteristics of Individuals Facilitate Depression?

There is a large body of research that focus on the higher rates of depression among women in comparison to men (Al-Issa, 1982 and Myers et al., 1984). Furthermore, Turner and Turner (1999) showed that emotional reliance was related to depression, and in particular that the positive linkage between them was greater for women. Van de Velde et al. (2009) considered the frequency and occurrence of certain depressive symptoms and found a higher prevalence of them in women than men.

In line with this, some studies specifically linked depression among women with interpersonal dependence towards men, the low prestige of the role of homemaker and having greater responsibilities (Gove and Tudor, 1973; Rosenfield, 1999; Roxburgh, 2004; and Simon, 1995). Barnett and Gotlib (1988) argued that people who need the approval of others for the maintenance of their self-esteem are more likely to feel depressed. Analyzing depression among employed people, Roxburgh (2004) provided evidence of a higher level of depression among women. The author also found, however, that women with multiple roles tended to be less depressed than women with few roles.

We also expect that the chances of depression are affected by age. Age involves several issues; hence the expected sign cannot be unambiguously determined. Being older may imply a change in social status, maturity, the erosion of functions and power and other life-course adjustments that depend on specific experiences. For example, Pearlin et al. (1981) held that a more positive self-image reduced depression. Gurland et al. (1988) and Kennedy et al. (1989) showed that physical limitations for performing daily activities increased depression, while Mirowsky and Ross (1992) argued that age in itself does not increase depression.

Being religious has different implications for mental health and may condition life choices or judgments about life's experiences. Watson, Morris and Hood (1989) show that among religious people, depression is lower among those with intrinsic religious motivations than among those with extrinsic motivations. Genia and Shaw (1991) argue that religious people (those affiliated with a religious group) tend to be less depressed than atheists and agnostics.

Inevitably in a study of this issue, we investigate the role of religious orientation and religiosity. Even when this relationship has been previously examined at the micro level, we add an unexplored field: the role of religious orientation at the country level. In particular, we assess whether the percentage of Catholics, Muslims or Protestants make any significant difference in the probability of being depressed.

Urban environments may be more stressful than rural environments. Rural networks are denser and more kin-based than those in urban areas. Moreover, crime rates, divorce, and other social pathologies are higher in cities than in county areas (Glass and Singer, 1972; House, Umberson and Landis, 1988; and Krupat and Guild, 1980). However, living in a city may facilitate finding a job or increase access to services such as drinking water or telephone lines. Therefore, we also explore whether living in urban areas makes a significant difference.

Negative life-events may also influence the chances of being depressed. Ford et al. (2004, 2007) held that family break-up, family conflicts, the mental health of the mother, and adverse family events play a huge direct role in causing mental illness. Moreover, disruptive experiences (such as being divorced or widowed) or unemployment may be important stressors. As proof of this, Turner (1994) showed that marital conflict had a significant effect for both women and men, though higher for the former. Unemployment also is expected to play a relevant role. Roxburgh (1996) found that labor market stress was significant. Miech and Shanahan (2000) found that being out of the labor force and widowhood increase depression.

Finally, we examine the role of income. Higher income is associated with higher living standards and greater life satisfaction, since more resources are available with which to cope with life's stressful events and circumstances (Burr, McCall and Powell-Griner, 1994). In addition to the limited resources by definition associated with poverty, previous studies have consistently found the incidence and persistence of depression to be higher among persons with low incomes who have smaller social networks (Cochran et al., 1990; Conger et al., 1990; House, Umberson and Landis, 1988; and Voydanoff and Donnelly, 1988). Our dataset does not include a direct question about income level or educational level or an

4

indirect question about relative income. However, we include three variables related to income and quality of life: 1) having running water, 2) having electricity and 3) having a telephone. We expect the presence of these factors to reduce the probability of being depressed.

3. Are Countries' Characteristics Relevant Stressors?

The second main motivation of this study is to show how individuals are affected by background. In particular, we assess whether depression has causes at the macro level.

Wechsler (1961) showed that depression and suicide were more frequent in communities that had rapidly grown, and increased population may imply changes that may alter social organizations or disorganization. The author found that more cases of depression were registered in those communities where the percentage of young population is relatively higher than that of older people. Following this argument, our model includes the percentage of people aged between 15 and 64 and the percentage of people aged 65 or older.

Moreover, quality of life is linked with poverty, crime, (dis)satisfaction and other life's experiences. Poor countries provide worse access to basic services (communication, education, health, transportation, etc.). High inequality, moreover, may increase feelings of dissatisfaction or frustration. Since economic resources allow people to maintain extended networks and frequent contact with other people (friends or family), we hypothesize that, while relatively higher Gross Domestic Product (GDP) per capita may be negatively related to depression, inequality (measured through the GINI index) and depression are positively related.

Costa-Font and Gil (2006) found a significant impact of socio-economic inequality on reported depression in Spain, corroborating findings elsewhere (La Gory and Fitzpatrick, 1992; Lorant et al., 2003; Muramatsu, 2003; Scheffler, Zhang and Snowden, 2001; Scheffler, 1999 and Zimmerman and Katon, 2005). Wilkinson (1997) argues that stress caused by the perception of income inequality leads to depression and poorer health.

However, GDP per capita is a variable that captures an average economic characteristic of the country and is not related to personal income level. Hence, we do not expect GDP per capita to possess great explanatory power. Indeed, we speculate that a measure of income inequality (as the GINI index) is a good predictor of depression due to its relationship with income distribution in a specific country.

4. Data and Methodology

The data source is the Gallup Public Opinion Poll; the fieldwork was carried out in 2005 and 2006. Considering coverage, the level of tools standardization and the methodology, this survey is an unprecedented initiative.

This survey has important advantages that allow researchers to assess a great variety of issues and, at the same time, to including a large set of countries.

With this poll, Gallup seeks to construct a micro-level dataset that reports views and attitudes of the world population in the same way that macroeconomic variables such as Gross Domestic Product, unemployment and infant mortality are measured.

The question used in the survey questionnaire to identify if respondent has felt depressed is: "*Did you experience the following feelings during A LOT OF THE DAY yesterday? How about depression?*" Responses were grouped in the following categories:

a. Yes
b. No
c. Do not know
d. Refuse

In this case, we focus on determining which elements shape the probability of being depressed. Hence, we consider only responses to the first and second categories ("yes" or "no") and we generate the following binary dummy variable:

DEPRESSION = 1 if respondent answered "yes" and 0 if he/ she indicated "no"

The available data allow us to include 93 countries and more than 80,000 observations. This large dataset includes countries from every inhabited continent at different stages of development that present very different backgrounds. Table 1 shows the weighted frequency distribution of the answers to this question.

Table 1. Distribution of Answers

DEPRESSION			
	0	1	Total
Total	**85.37**	**14.63**	**100**
Mauritania	97.27	2.73	100
Denmark	96.94	3.06	100
Albania	96.79	3.21	100
Austria	95.98	4.02	100
Sweden	95.61	4.39	100
Switzerland	95.49	4.51	100
Netherlands	95.08	4.92	100
Senegal	94.77	5.23	100
Laos	94.38	5.62	100
Germany	93.87	6.13	100
Ireland	93.51	6.49	100
Mozambique	92.97	7.03	100
Canada	92.70	7.30	100
Burkina Faso	92.68	7.32	100
Uzbekistan	92.62	7.38	100
Norway	92.24	7.76	100
Poland	92.10	7.90	100
Slovenia	91.69	8.31	100
New Zealand	91.61	8.39	100
Niger	90.92	9.08	100
Kenya	90.85	9.15	100
Panama	90.31	9.69	100
Brazil	89.82	10.18	100
United Kingdom	89.71	10.29	100
Mali	89.53	10.47	100
Belgium	89.26	10.74	100
Spain	88.86	11.14	100
Paraguay	88.57	11.43	100
Zambia	88.48	11.52	100
Israel	88.41	11.59	100
Benin	88.38	11.62	100
Finland	88.37	11.63	100
Nigeria	88.34	11.66	100
Honduras	88.04	11.96	100
Latvia	87.95	12.05	100
Kyrgyzstan	87.85	12.15	100
Argentina	87.61	12.39	100
Ghana	87.40	12.60	100
Tanzania	87.05	12.95	100
El Salvador	86.60	13.40	100
Vietnam	86.43	13.57	100
Slovakia	86.41	13.59	100
Bulgaria	86.23	13.77	100
Jamaica	86.13	13.87	100
Greece	86.03	13.97	100
Cameroon	86.01	13.99	100
India	85.98	14.02	100
Costa Rica	85.95	14.05	100

Nepal	85.80	14.20	100
Czech Rep.	85.78	14.22	100
Romania	85.76	14.24	100
Estonia	85.52	14.48	100
United States	85.29	14.71	100
Italy	85.24	14.76	100
Kazakhstan	85.16	14.84	100
Macedonia	85.01	14.99	100
Chile	84.94	15.06	100
Sri Lanka	84.35	15.65	100
Uruguay	84.17	15.83	100
Venezuela	84.03	15.97	100
Croatia	83.92	16.08	100
Russia	83.91	16.09	100
Georgia	83.79	16.21	100
Colombia	83.73	16.27	100
Ukraine	83.34	16.66	100
Pakistan	82.79	17.21	100
Malawi	82.24	17.76	100
Jordan	82.22	17.78	100
South Africa	80.87	19.13	100
Belarus	80.85	19.15	100
Uganda	80.35	19.65	100
Burundi	79.99	20.01	100
Hungary	79.97	20.03	100
Tajikistan	79.55	20.45	100
Moldova	79.37	20.63	100
Dominican Rep.	79.30	20.70	100
Egypt	78.81	21.19	100
Portugal	78.74	21.26	100
Madagascar	78.55	21.45	100
Guatemala	78.53	21.47	100
Singapore	77.07	22.93	100
Nicaragua	77.00	23.00	100
Ecuador	76.75	23.25	100
Azerbaijan	76.30	23.70	100
Zimbabwe	76.18	23.82	100
Haiti	76.09	23.91	100
Turkey	75.94	24.06	100
South Korea	75.56	24.44	100
Peru	75.00	25.00	100
Rwanda	74.61	25.39	100
Bangladesh	72.36	27.64	100
Bolivia	71.85	28.15	100
Ethiopia	48.74	51.26	100

Note: Values in percentage.

Given that our dependent variable is binary, we estimate a probit model in order to determine which characteristics affect the probability of being depressed. After estimating the probit model, we compute the probability that the dependent variable equals one ("being depressed"), and we also estimate the marginal effects of the independent variables. These figures are the changes in the abovementioned probability given a change in the independent variables. The complete description of variables is reported in Table 2.

Table 2. Description of Independent Variables

AGE	Respondent age
AGE SQUARED	AGE * AGE
RELIGIOSITY	1 if attending a place of worship or religious service within the last seven days
CATHOLICS '80	Percentage of Catholics in total population in 1980
COUNTRY I	1 if living in country i
DIVORCED	1 if divorced
ELECTRICITY	1 if having electricity
GDP PER CAPITA	Logarithm of Gross Domestic Product per capita (Atlas Method, 2005)
GINI	GINI index (2005)
MAN	1 if a man
MARRIED	1 if married or living as married
MUSLIMS '80	Percentage of Muslims in total population in 1980
POPULATION 15-64	Percentage of people aged between 15 and 64 in total population
POPULATION OVER 65	Percentage of people aged 65 or older in total population
PROTESTANTS '80	Percentage of Protestants in total population in 1980
RELIGION	1 if religion is an important part of his/her daily life
TELEPHONE	1 if having a telephone
UNEMPLOYED	1 if being unemployed
URBAN	1 if living in urban areas
URBAN INEQUALITY	URBAN * GINI index (2005)
WATER	If having access to running water
WIDOWED	1 if widowed

Source: Authors' compilation.

Finally, in order to compare results, in all cases we estimated two versions. In the first version, we included country effects (Model I). As we expected that some variables representing country characteristics play a relevant role, the second version (Model II) includes variables such as Gross Domestic Product per capita, and GINI index.

5.   Results

Table 1 shows that 14.6 percent of respondents answered that they had felt depressed. Keeping in mind that the question referred to the previous day, this ratio is very high. When considering responses per country, the table also reveals a very different pattern of behavior, as the ratio varies widely from 2.7 percent in the case of Mauritania to 51.3 percent in the case of Ethiopia.

Table 3 presents the marginal effects computed after probit models estimation. As shown in the table, in both models we obtained a probability of being depressed very close to the percentage of people that answered "yes" to the abovementioned question.

Table 3. Impacts of Independent Variables on Depression
(marginal effects after probit models estimation)

	Model I – with country effects		Model II – with country characteristics	
Probability of being depressed (depression=1)	12.84%		13.82%	
	Marginal impact	Standard deviation	Marginal impact	Standard deviation
MAN	-0.017***	[0.002]	-0.015***	[0.003]
AGE	0.005***	[0.000]	0.004***	[0.000]
AGE SQUARED	-0.00004***	[0.000]	-0.00003***	[0.000]
MARRIED	-0.016***	[0.004]	-0.014***	[0.003]
DIVORCED	0.044***	[0.006]	0.047***	[0.006]
WIDOWED	0.027***	[0.006]	0.034***	[0.006]
UNEMPLOYED	0.038***	[0.003]	0.036***	[0.003]
URBAN	0.014***	[0.003]	-0.015	[0.011]
RELIGION	0.002	[0.003]	0.005*	[0.003]
RELIGIOSITY	-0.004	[0.003]	0.003	[0.003]
WATER	-0.025***	[0.004]	-0.024***	[0.004]
ELECTRICITY	-0.021***	[0.005]	0.005	[0.003]
TELEPHONE	-0.032***	[0.003]	-0.020***	[0.003]
ETHIOPIA	0.2960***	[0.027]		
SOUTH KOREA	0.1268***	[0.021]		
BOLIVIA	0.1198***	[0.022]		
TURKEY	0.1081***	[0.020]		
SINGAPORE	0.1029***	[0.020]		
PORTUGAL	0.0976***	[0.019]		
EGYPT	0.0908***	[0.020]		
BANGLADESH	0.0902***	[0.020]		
GUATEMALA	0.0796***	[0.020]		
ECUADOR	0.0732***	[0.019]		
PERU	0.0683***	[0.020]		

Table 3. , continued

	Model I – with country effects		Model II – with country characteristics	
Probability of being depressed (depression=1)	12.84%		13.82%	
	Marginal impact	Standard deviation	Marginal impact	Standard deviation
AZERBAIJAN	0.0682***	[0.019]		
MOLDOVA	0.0619***	[0.018]		
NICARAGUA	0.0545***	[0.019]		
HUNGARY	0.0498***	[0.017]		
ZIMBABWE	0.0461**	[0.018]		
JORDAN	0.0427**	[0.018]		
RWANDA	0.0413**	[0.017]		
BELARUS	0.0351*	[0.017]		
BRAZIL	-0.0276*	[0.013]		
CAMEROON	-0.0296*	[0.013]		
UNITED KINGDOM	-0.0296*	[0.013]		
ARGENTINA	-0.0307*	[0.014]		
GHANA	-0.0310**	[0.013]		
FINLAND	-0.0319**	[0.013]		
LATVIA	-0.0333**	[0.013]		
UGANDA	-0.0341**	[0.014]		
KYRGYZSTAN	-0.0350**	[0.013]		
NIGERIA	-0.0416**	[0.013]		
JAMAICA	-0.0454**	[0.017]		
MALAWI	-0.0470***	[0.013]		
SLOVENIA	-0.0493***	[0.012]		
HONDURAS	-0.0551***	[0.012]		
BELGIUM	-0.0568***	[0.011]		
PARAGUAY	-0.0569***	[0.012]		
TANZANIA	-0.0602***	[0.012]		
PANAMA	-0.0620***	[0.012]		
CANADA	-0.0643***	[0.010]		
POLAND	-0.0654***	[0.011]		
NORWAY	-0.0659***	[0.011]		
ZAMBIA	-0.0662***	[0.007]		
NEW ZEALAND	-0.0693***	[0.011]		
BENIN	-0.0714***	[0.011]		
IRELAND	-0.0738***	[0.010]		
MALI	-0.0804***	[0.009]		
UZBEKISTAN	-0.0812***	[0.009]		
GERMANY	-0.0816***	[0.009]		
KENYA	-0.0941***	[0.008]		
MOZAMBIQUE	-0.0947***	[0.008]		
SWITZERLAND	-0.0956***	[0.008]		

Table 3., continued

	Model I – with country effects		Model II – with country characteristics	
Probability of being depressed (depression=1)	12.84%		13.82%	
	Marginal impact	Standard deviation	Marginal impact	Standard deviation
NIGER	-0.0957***	[0.008]		
SWEDEN	-0.0993***	[0.008]		
BURKINA FASO	-0.0994***	[0.008]		
AUSTRIA	-0.1043***	[0.007]		
LAOS	-0.1052***	[0.008]		
SENEGAL	-0.1073***	[0.007]		
NETHERLANDS	-0.1120***	[0.007]		
DENMARK	-0.1164***	[0.006]		
ALBANIA	-0.1165***	[0.007]		
MAURITANIA	-0.1371***	[0.004]		
GDP PER CAPITA			-0.000	[0.002]
GINI			0.074***	[0.022]
URBAN INEQUALITY			0.065**	[0.027]
CATHOLICS '80			-0.0003***	[0.000]
MUSLIMS '80			-0.0001***	[0.000]
PROTESTANTS '80			-0.0009***	[0.000]
POPULATION 15-64			0.001**	[0.000]
POPULATION OVER 65			-0.001***	[0.000]
Observations	83,429		83,429	
Pseudo R-squared	0.06		0.02	

Notes: Robust standard errors in brackets.
* significant at 10%; ** significant at 5%; *** significant at 1%
Unites States is the omitted variable in Model I
Only countries with significant effects are included in the table. Countries not included are the following: Bulgaria, Burundi, Chile, Colombia, Costa Rica, Croatia, Czech Republic, Dominican Republic, El Salvador, Estonia, Georgia, Greece, Haiti, India, Israel, Italy, Kazakhstan, Macedonia, Madagascar, Nepal, Pakistan, Romania, Russia, South Africa, Slovakia, Spain, Sri Lanka, Tajikistan, Ukraine, Uruguay, Venezuela and Vietnam.

As previous literature on the issue has argued, the fact that men tend to be less depressed than women is clearly confirmed by our model. Being a man reduced the probability of being depressed by almost 1.6 percentage points.

We initially also addressed the hypothesis that age should be an important predictor of depression. We verify this assumption and also add new elements to the discussion. As was mentioned above, the impact of age on depression is multidimensional (social status, maturity, the erosion of functions and power and other life-course circumstances, etc.). The models show that age has a positive impact, as the net effect of being older tends to favor depression but with a decreasing growth rate (age-squared variable is significant at 1 percent).

Furthermore, the age distribution of the population also matters. While the percentage of people aged 65 or older has a negative effect, the percentage of people aged between 15 and 64 shows a positive effect. We thus confirm the findings of Wechsler (1961). This result may be related to the specific stressors experienced by a fast-growing population: higher population concentration, the urbanization process and increased demand for all basic services.

The results consistently support the facts that marital status also plays a relevant role in shaping depression. Those who are married or living as married tend to be less depressed than single people, while those who have experienced marital break-up or widowhood are more likely to be depressed than single people and/ or married people. Furthermore, being divorced (an experience that may imply conflict with another person) registers a higher (negative) impact than being widowed.

Moreover, as hypothesized, negative life experiences such as being unemployed also increase the probability of being depressed. The models show that the effect is relatively high, approximately 3.7 percentage points. WHO (2008) similarly argues that increased depression and anxiety are adverse health effects of unemployment.

Regarding GDP per capita and income inequality, the results clearly corroborate our hypothesis. Model II shows that GDP per capita is not a significant predictor of depression. Indeed, what matters is income inequality, as we find that a higher GINI index raises the probability of being depressed.

Previous researches have also found theses effects. Burr, McCall and Powell-Griner (1994) and Freeman (1998) hold that, without the presence of an income distribution variable (such as the GINI index), an income variable (such as GDP per capita) may capture the effect of income inequality and result in a negative association between this variable and depression. In order to test this result, we estimate Model II without two independent variables (GINI index and the interacted variable) and verify the previous result: GDP per capita becomes significant and with a negative sign (this model is not included in Table 3).

Furthermore, the income inequality effect is much higher in urban areas. Model I (country effects model) shows that being depressed is positively linked to living in urban areas. In Model II, we interacted the GINI index with the variable representing the place of residence (URBAN). This variable turned out to be significant at 1 percent, while URBAN is not significant.

The conclusion that arises from the joint examination of results is that depression is not directly related to living in urban areas; instead, the relevant factor that influences the

probability of being depressed is income inequality, whose explanatory power is higher in urban areas.

One direct possibility for this finding may be that income inequality is more visible in urban areas, where homeless persons and beggars—as well as the conspicuously wealthy—are seen in everyday life. Additionally, an indirect possibility is that social networks may be more supportive in rural than urban areas and may better equip rural residents to deal with social problems.

The set of variables linked to personal income (having running water, telephone and electricity) shapes depression in the expected direction. Model I shows that all of them are significant at 1 percent and negatively related to depression. However, Model II indicates that electricity is not significant. Keeping in mind that GDP turned out not to be significant, this finding may have a similar explanation.

In contrast, having running water and a telephone are not only linked to personal income but also have implications for personal health and the possibility of being in touch with other people. On the other hand, having electricity may be more directly related to income, and its effect in Model I may imply an income-inequality effect more than a pure income-level effect.

When considering religion and religiosity, results indicate that attendance of religious services makes no significant difference in shaping depression. However, results linked to the importance of religion in people's life are ambiguous. Model I shows that assigning importance to religion is not significant, while Model II shows a weak positive effect (significant at 10 percent). We also test whether religious affiliation at the country level was significant. In this regard, we first find that, no matter which religion is considered, the higher the percentage of religious people, the less likely people are to be depressed. Second, even when the probability of being depressed falls when the percentage of Catholics, Muslims or Protestants in total country population is up, the impact of the latter religious affiliation is much higher.

In addition to specific countries' characteristics, model I includes binary variables that equal one if the respondent lives in this country and zero if not. The marginal effects of this set of variables, reported in Table 3, are used to calculated quintiles and construct the depression map shown in Figure 1 (figures appear at end of paper).

The United States (US) is the omitted variable in Model I, and the results should therefore be interpreted with respect to this country. We choose this country given the relative abundance of information and research on it, hence the basis of comparison is easier

established. A large set of countries shows no significant differences with the US (shown in white on our map). Positive marginal effects indicate that people tend to be more depressed than US citizens and vice versa. Ethiopia is ranked first, i.e., with the highest incidence of depression (29.6 percentage points), while Mauritania is found at the bottom of the ranking, with -13.7 percentage points.

In line with our previous findings, the ranking shows that people in the three most equitable countries of the sample—Denmark, Norway and Sweden—are less likely to be depressed than US citizens.

At the other extreme, the three least equitable countries are Bolivia, Brazil and Honduras. Bolivia, which presents the highest GINI index, registers a relatively high positive marginal effect. In the other two cases, the negative effect may be explained by the very high percentage of people with religious affiliation; this phenomenon may outweigh the GINI effect.

We speculate that the same is true in the case of the large and heterogeneous set of countries that registers no significant differences with the US. They present very different GINI index, age distribution and religion affiliation, but the net effect of these forces is not significant.

Moreover, considering the 41 countries that register a significant negative sign (lower probability of being depressed), 27 present more income equality than the US. Among the less equitable countries (14 cases) that register a negative marginal effect, we find the following countries where the percentage of religious people is high: Honduras and Panama (high percentage of Catholics), Niger and Senegal (where the percentage of Muslims is very high), Jamaica and Uganda (high ratio of Protestants) and Brazil and Mozambique (where the aggregate affiliation with the three religions is very high). This effect may more than compensate for the income inequality effect.

Regarding GDP per capita, we find that the richest countries (Ireland, Norway and Switzerland) show a decline in the probability of being depressed, as do the poorest countries of our dataset (Malawi, Tanzania and Niger). Once again, we point out the effect of income inequality as a relevant stressor instead of average income at country level.

In order to shed light on the relationship among GINI index, GDP per capita and our ranking of countries, Figures 2 and 3 show the dispersion graphs. Figure 2 illustrates a high dispersion between GDP per capita and our ranking while Figure 3 shows a negative association between inequality and our ranking.

6.   Conclusions

This study's main contributions are threefold and may be a factor of influence in identifying risk groups and in designing targeted health policies.

First, by employing a large dataset, we present econometric evidence that verifies previous findings. Being a woman, being older, divorce, widowhood, unemployment, and not having running water or a telephone are factors that raise the probability of being depressed.

Second, new evidence is provided about the effects of environmental factors or country characteristics. While lower income inequality, a high rate of religious people in the total population and a high rate of people aged 65 and older tend to reduce depression, a high rate of people aged between 15 and 64 has the opposite effect.

Third, we find that it makes no significant difference whether people live in an urban area or not in itself. However, when we interact this variable with the GINI index, we find that, given a specific level of inequality, living in urban areas favors depression. This phenomenon may be related to the presence of more homeless persons and beggars and higher crime rates in urban areas, and it may motivate the action of civil society in strengthening social networks that better enable people to deal with those problems.

These results indicate that social conditions and country characteristics are specific factors that influence depression. Findings shed light on the need for further research about the roles of culture, political context and other countries' characteristics as potential stressors.

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Figure 1. Depression Map
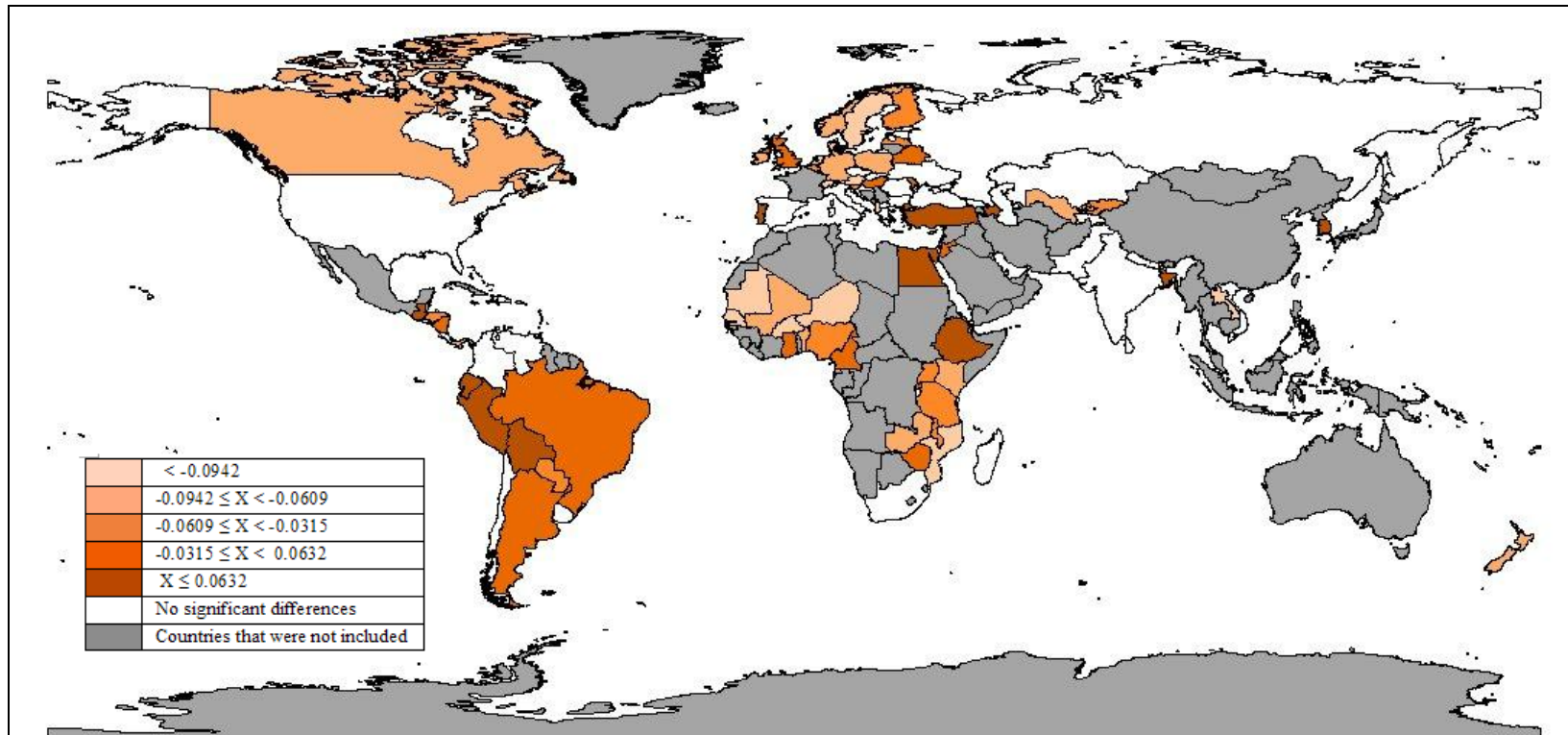
Source: Authors' compilation by considering the marginal effects per country of residence.

Figure 2. Relationship between GDP per capita and Marginal Effects on Depression
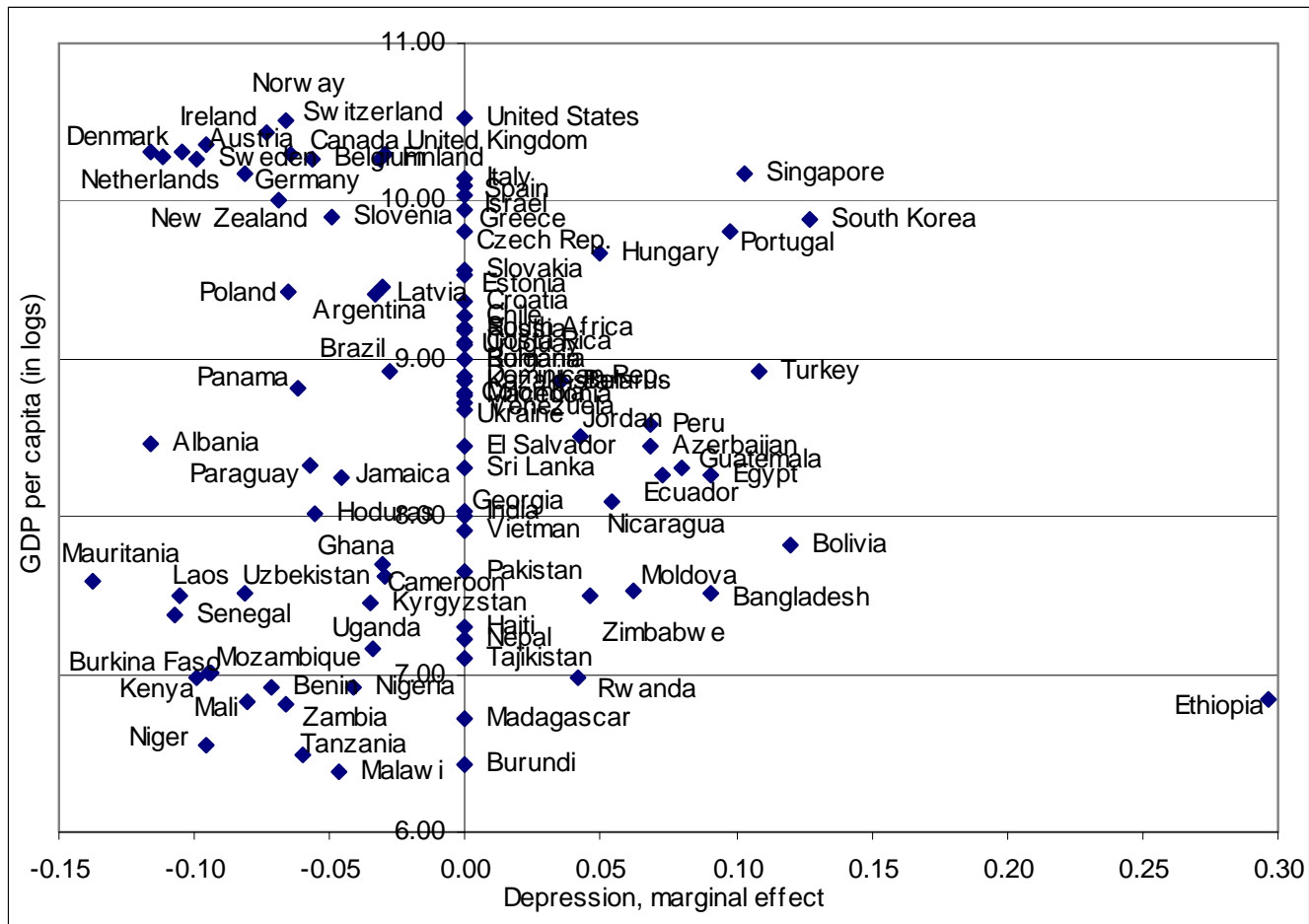
Source: Authors' compilation by considering the marginal effects per country of residence and GDP per capita (Gallup).

Figure 3. Relationship between GINI Index and Marginal Effects on Depression
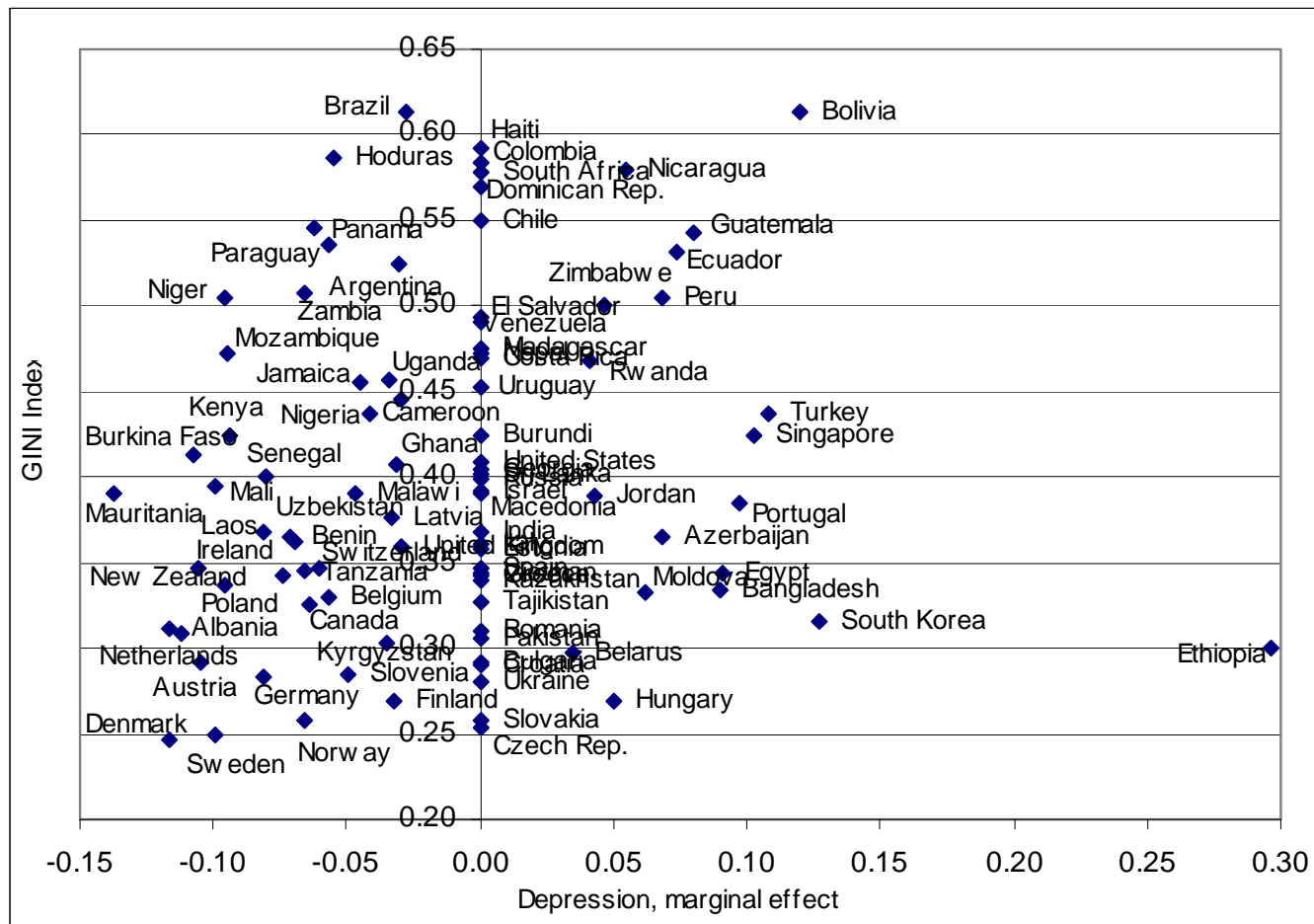
Source: Authors' compilation by considering the marginal effects per country of residence and GINI Index (Gallup).