

Departamento de Economía
Facultad de Ciencias Sociales
Universidad de la República

Documentos de Trabajo

**A cross-country analysis of the risk factors for
depression at the micro and macro level**

Natalia Melgar y Máximo Rossi

Documento No. 19/09
Setiembre 2009

A cross-country analysis of the risk factors for depression at the micro and macro level¹

Natalia Melgar^a

Máximo Rossi^a

¹ This article is part of the research project promoted by the Inter-American Development Bank regarding studies on *Quality of Life*

^a Department of Economics, University of the Republic, Uruguay

Abstract

Past research has provided evidence of the role of personal characteristics as risk factors for depression. However, few researches examined jointly the impact of each characteristic and whether country attributes change the probability of being depressed. This is due to the use of single-country databases. Our aim is to extend previous findings by employing a much larger dataset and including the above-mentioned country effects.

We estimate probit models with country effects and we also explore linkages between specific environmental factors and depression. The dataset for this research comes from the 2007 GALLUP Public Opinion Poll that allows us to consider a large and widely heterogeneous set of micro-data.

Findings indicate that depression is positively related to being a woman, adulthood, divorce, widowhood, unemployment and low income. Moreover, we provide evidence of the significant association between economic performance and depression. Inequality raises the probability of being depressed, specially, for those living in urban areas. Finally, some population's characteristics facilitate depression (age distribution and religious affiliation).

Key words: depression, health, well-being, cross-country research

JEL classification: D01, I10, I12, J18, Z13

Resumen

Si bien existen estudios previos sobre el rol de las características personales como factores de riesgo para la depresión, existen pocos trabajos que analicen simultáneamente el impacto de estas variables y si las características del país de residencia cambian la probabilidad de estar deprimido. Esto se debe al uso de bases de datos específicas de un país. Nuestro objetivo es extender esta literatura utilizando una base de datos más amplia que permite incluir estos efectos.

Para ello, se estiman modelos probit, uno de ellos con efectos fijos y también exploramos los vínculos entre características específicas del país y la depresión. La base de datos es la encuesta de opinión pública GALLUP que nos permite considerar un amplio y heterogéneo set de micro-datos.

Los resultados indican que la depresión está positivamente relacionada con ser mujer, adulto, divorciado, viudo y con niveles de ingreso bajos. Además, se brinda evidencia sobre la relación significativa entre el desempeño económico y la depresión. La inequidad aumenta la probabilidad de sentirse deprimido, especialmente en el caso de aquellos viviendo en ciudades. Finalmente, algunas características de la población también son determinantes de la depresión (la distribución etaria y la afiliación religiosa).

Palabras clave: depresión, salud, bienestar, análisis multi-país

Clasificación JEL: D01, I10, I12, J18, Z13

1. Introduction

Depression is one of the most widespread mental illnesses that affect people worldwide for very divergent reasons. The relevance of investigating what are the factors that facilitate depression are twofold. On one hand, it has a strong impact on the quality of life and happiness. On the other hand, this knowledge may be useful for identifying 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 first disorder in the developed world by 2020. Two years later, WHO estimated that the overall cost of mental disorders accounted for three and four percent of Gross Domestic Product and WHO (2007) stated that depression alone is responsible for 4.5% of the worldwide total burden of disease.

Previous researches have shown that there is a set of individuals' characteristics that facilitate depression such as: age, divorce, widowhood, being a woman, etc. (Al-Issa, 1982; Gurland et al., 1988; Miech and Shanahan, 2000; Myers et al., 1984; Turner and Turner, 1999 and Van de Velde et al., 2009). However, a great part of studies 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 happened in order to be able to take active policies. Hence, the aim of this paper is to determine what are the factors that hike the probability of being depressed at both, the micro and macro level.

The main contributions of this research are threefold. Firstly, 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. Secondly, we assess how individuals are affected by background. In particular, whether countries

attributes are significant stressors (economic performance, religion, age distribution, etc.). Finally, we show the role of living in urban areas as a specific stressor when income-inequality is relatively high, this finding highlight 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 two presents some empirical evidence linked with the effect of individuals' characteristics (gender, age, among others). Section three describes the (less developed) literature about the impact of background and country characteristic on the probability of being depressed. The fourth section sketches the main features of the dataset and econometric methods applied in this analysis and the description of variables. The fifth section deals with results. Finally, the conclusions are drawn in section sixth.

2. What are the individual's characteristics that 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 they found a higher prevalence of them in women than men.

In line with this, some studies specifically linked women depression with interpersonal dependence towards men, the low prestige of homemaker role 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. Roxburgh (2004) analyzed depression among employed people and she provided evidence of a higher depression level in the case women. However, the author also found 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 can not 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 more positive self-image reduced depression. Gurland et al. (1988) and Kennedy et al. (1989) showed that physical limitations for performing daily activities hiked depression while Mirowsky and Ross (1992) argued that age in itself does not hike depression.

Being religious has different implications for mental health and it may condition life choices or judgments about life's experiences. Genia and Shaw (1991) and Watson et al. (1989) held that there were no differences in depression between pro-religious and nonreligious people.

Inexorably, 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 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 et al. 1988 and Krupat and Guild, 1980). However, living in a city may facilitate to find a job or to access to some services as drinking water, phone lines, etc. Therefore, we also explore whether living in urban areas makes a significant difference.

Negative life-events also may 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 divorced or widowhood) or unemployment may be important stressors. As proof of this, Turner (1994) showed that marital conflict had a

significant effect for women and men but it was higher in the first case. 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 hike depression.

Finally, we check 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 et al., 1994). Poor people not only have less resources, prior 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 et al., 1988 and Voydanoff and Donnelly, 1988). Our dataset does not include a direct question about income level or educational level or an indirect question about relative income. However, we include three variables relate to income and quality of life: 1) having running water, 2) having electricity and 3) having a telephone. We expect that these factors drop the probability of being depressed.

3. Are countries' characteristics relevant stressors?

The second main motivation of this research 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 frequently in communities that had rapidly grown. Increased population may imply both 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 the ratio 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 others life's experiences. Poor countries provide worse access to basic services (communication, education, health, transportation, etc.). Highly inequality may upsurge feelings of

dissatisfaction or frustrations. Economic resources allow people to maintain extended networks and frequent contact with other people (friends or family). Hence, we hypothesized 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 in reported depression in Spain. Indeed, there is evidence about a significant impact of inequality on depression (La Gory and Fitzpatrick, 1992; Lorant et al., 2003; Muramatsu, 2003; Scheffler et al., 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 it is not related to personal income level. Hence, we do not expect that GDP per capita has a great explanatory power. Indeed, we speculate that a measure of income inequality (as the GINI Index) is a good predictor of depression due to relationship with income dispersion 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 include a large set of countries.

With this poll, Gallup seeks to construct a dataset at micro-level that reports views and attitudes of the world population, just as they monitor macroeconomic variables such as Gross Domestic Product, unemployment, infant mortality, etc.

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 of all five continents at different stage of development that present very different backgrounds. Table 1 shows the weighted frequency distribution of the answers to this question.

Insert TABLE 1: Distribution of answers

Given that our dependant variable is binary, we estimated a probit model. We aim at determining what are the relevant characteristics that affect the probability of being depressed. After estimating the probit model, we compute the probability that the dependant variable equals one (“being depressed”) and we also estimate the marginal effects of the independent variables. Theses figures are the changes in the above-mentioned probability given a change in the independent variables. The complete description of the included variables is reported in table 2.

Insert TABLE 2 - Description of independent variables

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's characteristics play a relevant role, the second version (model II) includes variables such as: Gross Domestic Product per capita, GINI index etc.

5. Results

Table 1 shows that 14.6 percent of respondents answered that they had felt depressed. Keeping in mind that the question was 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, the ratio varies widely from 2.7% in the case of Mauritania to 51.3% in the case of Ethiopia.

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

Insert TABLE 3 - Impacts of independent variables on depression (marginal effects after probit models estimation)

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 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 it 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, 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 verify Wechsler's findings (Wechsler, 1961). This

result may be related to the specific stressors that a population that had grown faster may experience: higher population concentration, the urbanization process and the increased demands 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 the opposite is true for those who have faced with marriage break-up or widowhood. Furthermore, being divorce (experience that may imply conflict with other person), registers a higher (negative) impact.

Moreover, as we also hypothesized, negative life-experiences as being unemployed also raises the probability of being depressed. The models also show that the effect is relatively high, approximately 3.7 percentage points. WHO (2008) 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. We find that GINI Index raises the probability of being depressed.

Previous researches have also found these effects. Burr et al. (1994) and Freeman (1998) hold that without the presence of an income dispersion variable (such as 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 III).

Furthermore, income inequality effect is much higher in urban areas. Model I (country's effects model) shows that being depressed is positively linked to living in urban areas. In model II, we interacted GINI Index with the variable representing the place of residence (URBAN). This variable resulted significant at 1 percent while URBAN is no significant.

The conclusions that arises from the jointly examination of results are that depression could not be directly related to living in urban areas in itself; indeed 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 and beggars could be seen in everyday life. Additionally, an indirect possibility concerns that social networks may be more supportive in rural areas and the better able those who live in rural areas are 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 indicated that electricity is not significant. Keeping in mind that GDP resulted no significant, this finding may have a similar explanation.

Having running water and a telephone are linked to personal income but they implications go far beyond it and they have direct effects on personal health and the possibility to be 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 the attendance to religious services makes no significant difference in shaping depression. However, results linked with the importance of religion in people's life are ambiguous. Model I shows that it is not significant while model II shows a weak positive effect (significant at 10 percent). We also tested whether religious affiliation at the country level was significant. Firstly, we found that no matter which religion is considered, the higher the percentage of religious people, the less likely to be depressed. Secondly, 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 last-mentioned religious affiliation is much higher.

Far beyond specific countries' characteristics, model I includes binary variables that equals one if respondent lives in this country and zero if not. The marginal effects of this set of variables were reported in table III, given these figures we calculated the quintiles and constructed a depression map (figure 1).

Insert FIGURE 1 – Depression map

United States (US) is the omitted variable in model I. Therefore, results should be interpreted with respect to this country. A large set of countries shows no significant differences with US (it was represented with white in our map). Positive marginal effects indicate that people tend to be more depressed than US citizens and *vice versa*. Ethiopia is ranked first (29.6 percentage points) while Mauritania is found at the bottom of the ranking (-13.7 percentage points).

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

On the other extreme, the three less equitable countries are Bolivia, Brazil and Honduras. Bolivia, that presented 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 that is affiliated to a religion; 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 registered no significant differences with 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 forty-one countries that registered a significant negative sign (lower probability of being depressed), twenty-seven presented more income-equality than US. Among the less equitable countries (fourteen cases) that registered a negative marginal effect, we find countries where the percentage of religious people is high, such as:

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 aggregated affiliation to the three religions is very high). This effect may more than compensate the income inequality effect.

Regarding GDP per capita, we find that richest countries (Ireland, Norway and Switzerland) show a decline in the probability of being depressed as do poorest countries of our dataset (Malawi, Tanzania and Niger). Once again, we stressed the effect of income-equality as 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 two illustrates a high dispersion between GDP per capita and our ranking while figure three shows the negative association between inequality and our ranking.

Insert FIGURE 2 - Relationship between GDP per capita and the marginal effects on depression

Insert FIGURE 3 - Relationship between GINI index and the marginal effects on depression

6. Conclusions

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

Firstly, by employing a large dataset, we present econometric evidence that verify previous findings. Being a woman, being older, divorce, widowhood, unemployment, having running water or a telephone are factors that drop the probability of being depressed.

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

Thirdly, 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 more homeless, beggars and higher crime rates in urban areas and it may motivate the action of civil society in strengthening social networks that allow people to be better able to deal with these 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.

References

- Al-Issa, I., 1982. Gender and Adult Psychopathology. In Al-Isaa, I., ed. *Gender and Psychothopatoly*. New York: Academic, 83-110.
- Barnett, R. and Gotlib, I., 1988. Psychosocial functioning and depression: distinguishing among antecedents, concomitants and consequences. *Psychological Bulletin*, 104, pp. 97-126.
- Burr, J., McCall, P. and Powell-Griner, E., 1994. Catholic Religion and Suicide: The Mediating Effect of Divorce. *Social Science Quarterly*, 75 (2), pp. 300-318.
- Centre for Economic Performance, Mental Health Policy Group, 2006. *The depression report. A New Deal for Depression and Anxiety Disorders*. London: London School of Economics.
- Cochran, M., Lamer, M., Riley, D., Gunnarsson, L. and Henderson, C., 1990. *Extending Families: The Social Networks of Parents and Their Children*. Cambridge: Cambridge University Press.
- Conger, R., Elder, G., Lorenz, F., Conger, K., Simons, R., Whitbeck, L., Huck, S. and Melby, J., 1990. Linking Economic Hardship to Marital Quality and Instability. *Journal of Marriage and the Family*, 52, pp. 643-656.
- Costa-Font, J. and Gil, J., 2006. Socio-Economic Inequalities in Reported Depression in Spain: a Decomposition Approach. Universitat de Barcelona, Working Papers in Economics 152.

- Ford, T., Goodman, R. and Meltzer, H., 2004. The relative school importance of child, family, school and neighbourhood correlates of childhood psychiatric disorder. *Social Psychiatry and Psychiatric Epidemiology*, 39, pp. 487-496.
- Freeman, D. G., 1998. Determinants of Youth Suicide: The Easterlin-Holinger Cohort Hypothesis Re-examined. *American Journal of Economics and Sociology*, 57, pp. 183–200.
- Genia, V. and Shaw, D., 1991. Religion, intrinsic-extrinsic orientation and depression. *Review of Religious Research*, 32 (3), pp. 274-283.
- Glass, D. and Singer, J., 1972. *Urban Stress: Experiments on Noise and Social Stressors*. New York: Academic Press.
- Gove, W. and Turdor, J., 1973. Adult sex roles and mental illness. *American Journal of Sociology*, 77, pp. 812-835.
- Gurland, B. J., Bolden, W., Teresi, J., Gurland, R. and Copeland, J., 1988. The relationship between depression and disability in the elderly - data from the comprehensive assessment and referral evaluation (CARE). In Wattis, J. and Hindmarch, I., eds. *Psychological Assessment of the Elderly*. New York: Churchill Livingstone.
- House, J., Umberson, D. and Landis, K., 1988. Structures and Processes of Social Support. *Annual Review of Sociology*, 14, 293-380.
- Kennedy, G., Kelman, H., Thomas, C., Wisniewski, W., Metz, H. and Bijur, P., 1989. Hierarchy of characteristics associated with depressive symptoms in an urban elderly sample. *American Journal of Psychiatry*, 146 (2), pp. 220-225.
- Krupat, E. and Guild, W., 1980. Defining the city: the use of objective and subjective measures for community description. *Journal of Social Issues*, 36, pp. 9-28.
- La Gory, M. and Fitzpatrick, K., 1992. Effects of Environmental Context on Elderly Depression. *Journal of Aging and Health*, 4 (4), pp. 459-479.
- Layard, R., 2008. Social Science and the Causes of happiness and Misery. Max Weber Lecture 2008/09.
- Lorant V., Deliège, D., Eaton, W., Robert, A., Philippot, P. and Anseau, M., 2003. Socio-economic Inequalities in Depression: A Meta-Analysis. *American Journal of Epidemiology*, 157 (2), pp. 98-112.
- Miech, R. and Shanahan, M., 2000. Socioeconomic Status and Depression over the Life Course. *Journal of Health and Social Behavior*, 41 (2), pp. 162-176.

- Mirowsky, J. and Ross, C., 1992. Age and depression. *Journal of Health and Social Behavior*, 33 (3), pp. 187-205.
- Muramatsu, N., 2003. County-level income inequality and depression among older Americans: Empirical analyses. *Health Service Research*, 38 (6), pp. 1863-1883.
- Myers, J., Weissman, M., Tischler, G., Holzer, C. III, Leaf, P., Orvaschel, H., Anthony, J., Boyd, J., Burcke, J., Kramer, M. and Stoltzman, R., 1984. Six-month prevalence of psychiatric disorders in three communities. *Archives of General Psychiatry*, 41, pp. 959-967.
- Pearlin, L., Lieberman, M., Menaghan, E. and Mullan, J., 1981. The Stress Process. *Journal of Health and Social Behavior*, 22, pp. 337-356.
- Rosenfield, S., 1999. Gender and Mental Health: do women have more psychopathology, men more or both the same (and why)? In Horowitz, V. and Scheid, L., eds. *A Handbook for the Study of Mental Health: Social Contexts, Theories and Systems*. York: Cambridge University Press.
- Roxburgh, S., 2004. There Just Aren't Enough Hours in the Day: The Mental Health Consequences of Time Pressure. *Journal of Health and Social Behavior*, 45, pp. 115-131.
- Roxburgh, S., 1996. Gender differences in work and well-being: effects of exposure and vulnerability. *Journal of Health and Social Behavior*, 37, pp. 265-277.
- Scheffler, R., 1999. Managed Behavioral Health Care and Supply-Side Economics. *Journal of Mental Health Policy and Economics*, 2 (1), pp. 21-28.
- Scheffler, R., Zhang, A. and Snowden, L., 2001. The impact of realignment on utilization and cost of community-based mental health services in California. *Administration and Policy in Mental Health and Mental Health Services Research*, 29 (2), pp. 129-143.
- Simon, R., 1995. Gender, Multiple Roles, Role Meaning, and Mental Health. *Journal of Health and Social Behavior*, 36, pp. 182-194.
- Turner, H., 1994. Gender and social support: taking the bad with the good? *Sex Roles*, 30, pp. 521-541.
- Turner, H. and Turner, R., 1999. Gender, Social Status, and Emotional Reliance. *Journal of Health and Social Behavior*, 40, pp. 360-373.
- Van de Velde S., Levecque, K. and Bracke, P., 2009. Measurement equivalence of the CES-D8 in the General Population in Belgium: a Gender Perspective. *Archives of Public Health*, 67, pp. 15-29.

- Voydanoff, P. and Donnelly, B., 1988. Economic Distress, Family Coping, and Quality of Family Life. In: Voydanoff, P. and Majka, L., eds. *Families and Economic Distress: Coping Strategies and Social Policy*. Beverly Hills: Sage, 97-116.
- Watson, P., Morris, R. and Hood, R., 1989. Sin and self-functioning, part 4: depression, assertiveness and religious commitments. *Journal of Psychology and Theology*, 17, pp. 44-58.
- Wechsler, H., 1961. Community Growth, Depressive Disorders, and Suicide. *The American Journal of Sociology*, 67 (1), pp. 9-16.
- Wilkinson, R. G., 1997. Health Inequalities: Relative or Absolute Material Standards? *British Medical Journal*, 314, pp. 591-595.
- World Health Organization, 2008. Now more than ever. Geneva: WHO.
- World Health Organization, 2007. *Ten statistical highlights in global public health*. Geneva: WHO.
- World Health Organization, 2003. *Investing in Mental Health*. Geneva: WHO.
- World Health Organization, 2001. *World Health Report 2001*. Geneva: WHO.
- Zimmerman F.J. and Katon, W., 2005. Socio-economic status, depression disparities and financial strain: what lies behind the income–depression relationship? *Health Economics*, 14 (12), pp. 1197-1215.

Annex I - Tables

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

TABLE 2 - Description of independent variables

AGE	Respondent age
AGE SQUARED	AGE * AGE
ATTEND	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 being 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

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]		
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]		
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 significant countries were included (no significant countries are: 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).

Annex II - Figures

FIGURE 1 – Depression map

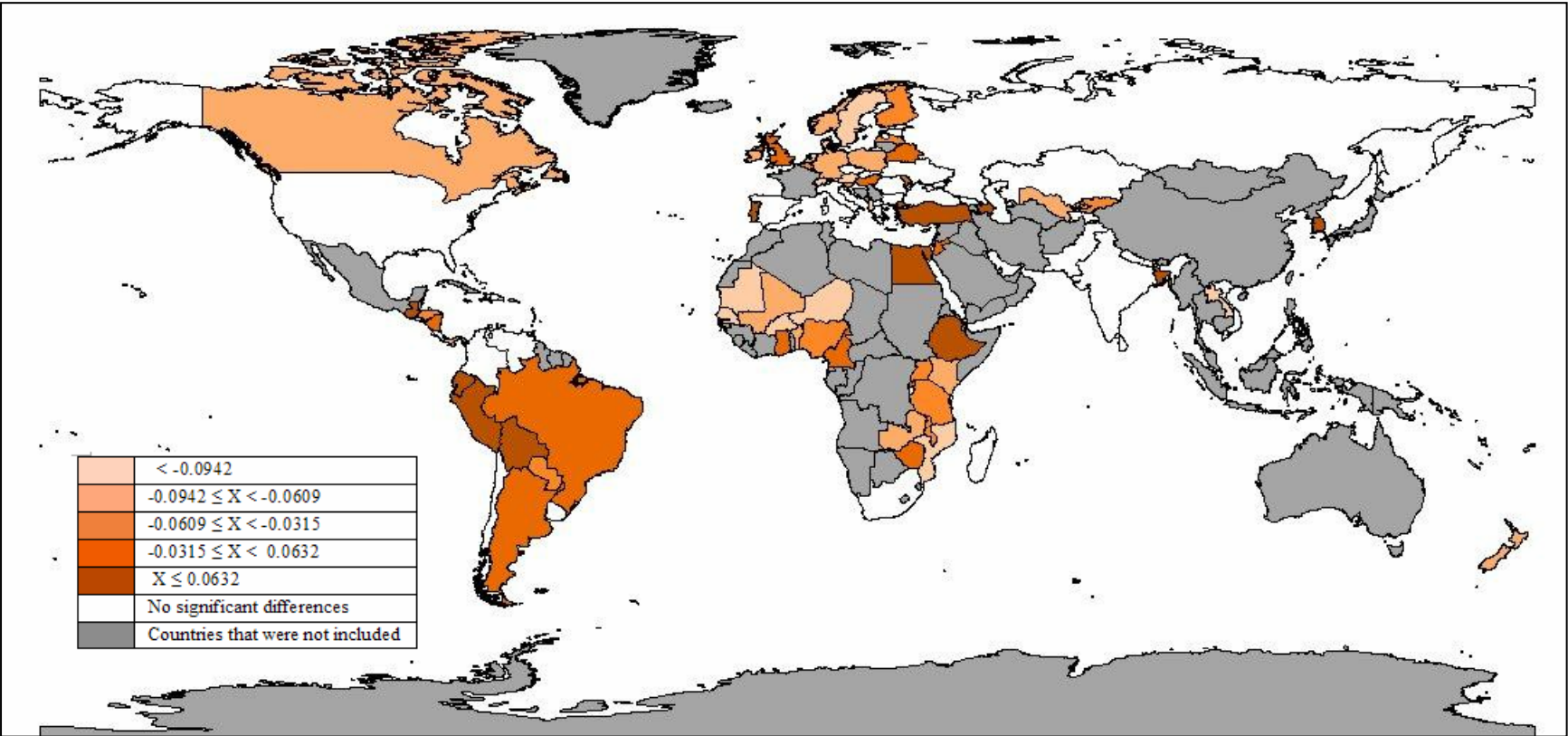


FIGURE 2 - Relationship between GDP per capita and the marginal effects on depression

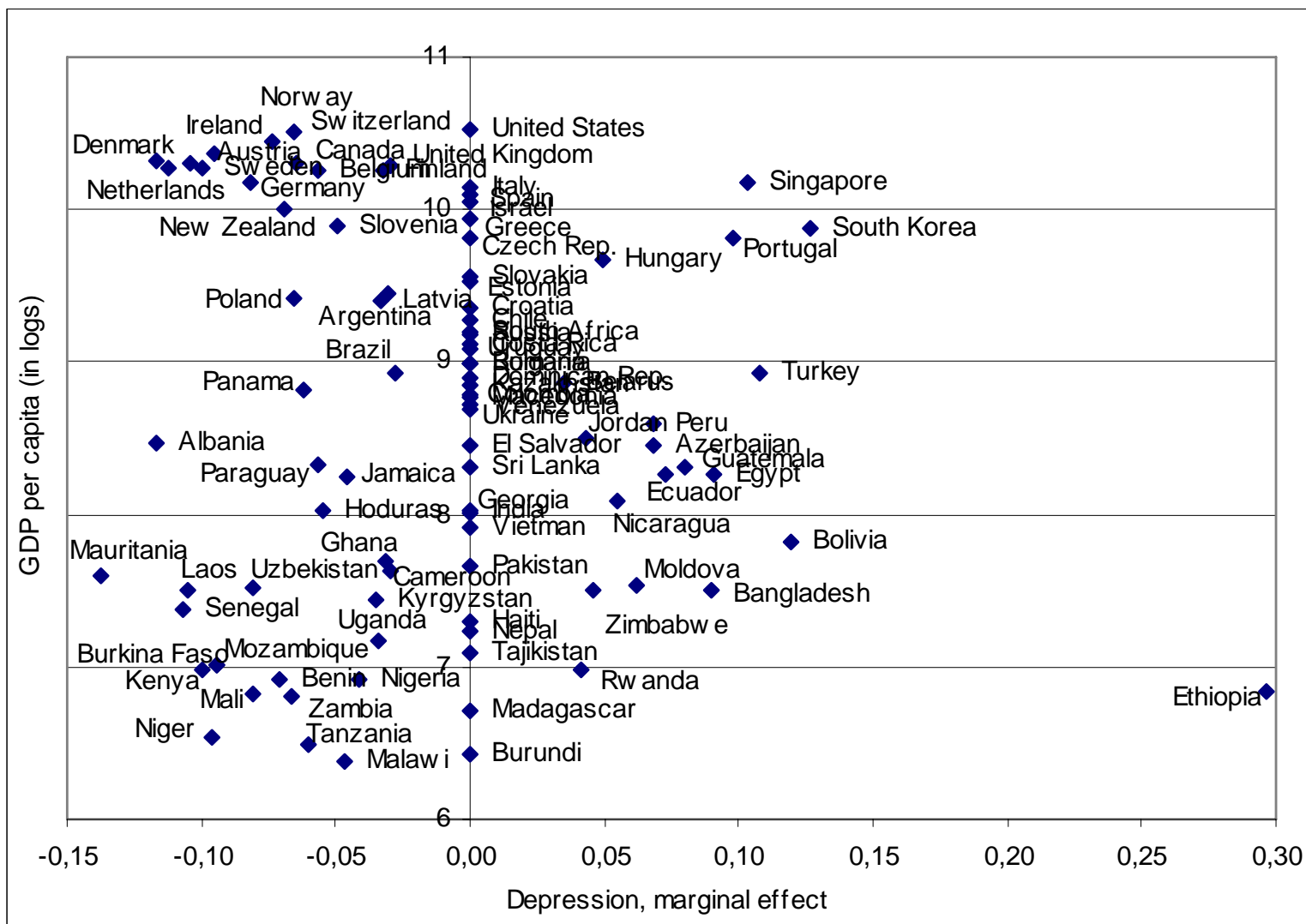


FIGURE 3 - Relationship between GINI index and the marginal effects on depression

