June 2011 No.44

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David G. Blanchflower
Dartmouth College, University of Stirling, NBER and IZA

Andrew J. Oswald
University of Warwick, CAGE Centre in the Department of Economics, and IZA Bonn

WORKING PAPER SERIES

Centre for Competitive Advantage in the Global Economy

Department of Economics

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David G. Blanchflower
Dartmouth College, University of Stirling, NBER and IZA

blanchflower@dartmouth.edu

Andrew J. Oswald
University of Warwick, CAGE Centre in the Department of Economics, and IZA Bonn

andrew.oswald@warwick.ac.uk

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Abstract

Antidepressants as a commodity have been remarkably little-studied by economists. This study shows in new data for 27 European countries that 8% of people (and 10% of those middle-aged) take antidepressants each year. The probability of antidepressant use is greatest among those who are middle-aged, female, unemployed, poorly educated, and divorced or separated. A hill-shaped age pattern is found. The adjusted probability of using antidepressants reaches a peak -- approximately doubling -- in people's late 40s. This finding is consistent with, and provides a new and independent form of corroboration of, recent claims in the research literature that human well-being follows a U-shape through life.

Keywords: Well-being; aging; mental health; depression; happiness; Easterlin paradox.
JEL codes: I1; I120; I3; I310.
Corresponding author: andrew.oswald@warwick.ac.uk.
Address: IZA Institute, Schaumburg-Lippe-Str. 5-9, D-53113, Bonn, Germany.
Telephone: (+44) 07876 217 717.
Acknowledgements: This work was supported by the ESRC through the CAGE centre at Warwick. We have had many useful suggestions from colleagues; we thank especially Nikos Askitas, Ian Colman, Amanda Goodall, Jon Skinner, and Peter White.

Antidepressants and Age

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1. Introduction

This paper uses 2010 Eurobarometer data on approximately 27,000 randomly sampled individuals to estimate equations for the probability of the consumption of anti-depressants. Although antidepressants -- medications to alleviate mood disorders -- are in principle a particularly interesting commodity for economists (because in a crude sense people 'buy' happiness, or at least less unhappiness), their consumption has been little-studied in the economics literature. For example, in the history of the Journal of Health Economics, an electronic search reveals that only 2 of approximately 1300 articles mention the word 'antidepressants' in the title, abstract, or key words.[1] The two exceptions are interesting recent papers by Kuhn, Lalive and Zweimuller (2009) and Ludwig, Marcotte and Norberg (2009). The first of these shows that job loss caused by plant closure leads to greater antidepressant consumption; the second argues that an increase in sales of one particular antidepressant -- selective serotonin reuptake inhibitors (SSRIs) -- by 1 pill per capita produces a large reduction (of 5%) in a country's suicide rate. A further exception in the wider literature is Askitas and Zimmermann (2011), which examines data on the timing of people's Google searches on antidepressants' side-effects. An important empirical source for health-economics researchers in Europe is Knapp et al. (2007). The authors document a near-doubling of antidepressant consumption (their Table 7.5 on p. 154) in the ten years from 1990 to 2000. Recent data from the OECD reveal a continuing upward trend: antidepressant consumption in daily-

[1] The count is zero in general journals such as the Economic Journal or American Economic Review.

doses per thousand population rose from 32.4 in 2000 to 52.1 in 2007 (source: OECD 2009).

The background to our study is the growing interest among social scientists in the study of human well-being. Today's inhabitants of the industrialized nations lead what are perhaps the richest, longest, and most comfortable lives in human history. As Offer (2007), Layard (2006, 2010) and others have argued, however, there are reasons to believe that not all is ideal in the industrialized countries. Some citizens display signs of mental turmoil amid the prosperity of modern living (the data in McManus et al. 2009 suggest that at any one time approximately 15% of people in the UK suffer from a mental disorder: their p.11) and Richard Easterlin's seminal doubts (Easterlin 1974, 2003) remain. Such concerns are mirrored in recent work by the 2009 Stiglitz Commission on the Measurement of Economic Performance and Social Progress: the authors argue that traditional ways of measuring social and economic progress are out-of-date (www.stiglitz-sen-fitoussi.fr). In the mental-health literature, too, there have been long-standing worries about the rates of clinical depression in modern society (Paykel 2006). A large related literature, written partly by economists, has recently sprung up. It examines direct survey measures of well-being and mental health (and includes Theodossiou 1998; Frey and Stutzer 2002; Easterlin 2003; Blanchflower and Oswald 2004; Van Praag and Ferrer-I-Carbonell 2004; Graham 2005, 2008; Helliwell and Huang 2008; Clark et al. 2008; Deaton 2008; Dolan et al. 2008; Dolan and Kahneman 2008; Pacek and Radcliff 2008; Biswas-Diener et al. 2010; Oswald and Wu 2010; Powdthavee 2010; Green 2010).

In this study we show that:

(i) One in thirteen European citizens -- and 10% of middle-aged Europeans -- took an antidepressant in the previous twelve months;

(ii) The rates of antidepressant use are greatest in Portugal, Lithuania, France and the UK;

(iii) Adjusting for other characteristics, the probability of taking an antidepressant is greatest among those middle-aged, female, unemployed, poorly educated, and divorced or separated;

(iv) A strong hill-shaped age pattern is found -- both for males and females and in Western and Eastern Europe -- that peaks in people's late 40s.

(v) We argue that this pattern is consistent with, and thus might be seen as a powerful and independent corroboration of, the claim in the well-being literature that happiness and mental health follow an approximate U-shape through life.[2] There has been debate about that claim (Blanchflower and Oswald 2008, 2009; Stone et al. 2010; Easterlin 2006; Glenn 2009; Van Landeghem 2008) and some social scientists continue to wonder whether 'happiness' answers should be treated as meaningful.

One interpretation of the paper, therefore, is that the life cycle U-shape in human well-being -- which emerges in a distinct and new way in data on antidepressant consumption -- urgently requires explanation.

A further potential contribution of the paper is to provide statistically representative estimates for a large number of countries; most previous work, such as Colman et al. (2006), Ohayon and Lader (2002) and Pagura et al. (2011), has had to rely

[2] Many authors in the subjective well-being literature have replicated versions of the U-shape finding. Blanchflower and Oswald (2008) provide a list of such studies.

on single or small numbers of nations, or, like Knapp et al. (2007), on data on actual sales numbers of antidepressants which, while valuable, do not allow researchers to learn about the microeconometric patterns of consumption by different individuals.

2. Empirical Approach

Antidepressants are prescribed by physicians. Hence it is natural to begin by thinking of the probability, *P*, of taking an antidepressant as given by the joint probability of going to a doctor or psychiatric professional for help with a mental health problem, *p*, and being in a nation with a rate-of-prescribing probability, *r*. Assume that *p* is a function of personal characteristics, denoted by a vector *x*, and of national characteristics, denoted by a vector *n*. Assume that the rate-of-prescribing is a national characteristic.

Then

$P = p(x,n).r(n)$

$= P(\text{personal characteristics, country characteristics})$.

Initially, we concentrate on estimation of the reduced-form probability of antidepressant use, which is the function $P(..)$. At the end of the paper, we examine data on the function $p(x,n)$.

The data set is the Eurobarometer survey #73.2, February-March 2010. The data cover the 27 countries listed in Table 1. The exact question (numbered QD5 on page 52 of the questionnaire codebook) to which people responded was:

"*Have you taken any antidepressants in the last 12 months? Yes, regularly for a period of at least 4 weeks. Yes, regularly for a period of less than 4 weeks. Yes, from time to time when I felt the need. No, not at all.*"

Table 1 provides a description of the raw patterns in the data set. It gives the mean figure for each European country's use of antidepressants. For Europe as a whole, approximately 8% of people use antidepressants (within a single year). For those aged in in their 40s and 50s, the figure is approximately 10%.

In Austria, for example, Table 1 shows that 91% of individuals said they had not taken any antidepressant in the previous twelve months; 4% answered "from time to time"; 1% said "regularly, for less than 4 weeks; 3% said "regularly, for more than 4 weeks".

Portugal stands out in the data as the nation with the highest rate of antidepressant consumption (in the sense of the proportion of people taking such medication). Approximately 16% of Portugese citizens took antidepressants in the previous year, and 9% did so for a long period (that is, more than 4 weeks). Other countries with relatively high consumption, according to Table 1's data, are France (9%, with 6% having done so for a long period), Lithuania (11%, with 3% having done so for a long period), Malta (10%, and 4%), and the UK (9%, and 7%). Data on the total prescriptions within some of these nations are given for the year of 2002 in Rose (2007), within Knapp et al. (2007), as Table 7.14 on their page 163. Although many of the patterns are consistent with our Table 1, Belgium tops the Rose (2007) table.

The numbers here in Table 1 are raw means of antidepressant use. Later tables give regression-equation-adjusted rates.

It could be argued that people's memories -- particularly in answering questions of this kind about lengths of time -- are likely to be imperfect. The cell sizes here, for some categories of answer, are also small. For these reasons, the paper's later analysis

chooses not to put a heavy weight on the exact number of weeks the individuals say that they consumed antidepressants. Instead its principal focus is on the distinction between taking any antidepressants and taking none; this is because individuals are likely to have an appreciation for when they were taking no pills at all. There is some loss of efficiency from this approach. As a check, therefore, an ordered logit equation is also estimated.

Bauer et al. (2008) and Sleath and Shih (2003) argue that prescribing norms vary by country -- for what appear to be cultural or sociological reasons -- so it will be necessary in the later analysis to adjust for country dummies. Pagura et al. (2011) find that in the US almost one quarter of antidepressant prescriptions are to people without serious psychiatric conditions.

The characteristics of those in Europe most likely to use antidepressant medication can be seen in Table 2. The table presents three regression equations. In each case, the dependent variable can be thought of as a measure of the probability of antidepressant use. The sample size is 26,611 individuals. Although it is possible here to include independent variables for many demographic and personal characteristics, one notable one is absent. The data set does not contain an income variable (although age-left-school, ALS, a strong correlate with earnings, is available in the data set).

The first column of Table 2 reports the estimates from an OLS linear probability model in which the data are coded 1 for any positive level of antidepressant use and 0 otherwise. Column 2 of Table 2 estimates an otherwise equivalent Probit equation. Column 3 is an Ordered Logit in which the dependent variable can take one of four values (No, not at all, ... Yes, regularly for a period of at least four weeks). The structure of the three equations, however, is in each case similar.

Because of the cardinal nature of the estimator, column 1 of Table 2 is particularly straightforward to interpret. First, a hump-shaped age profile in people's use of antidepressants can be seen in the coefficients on the dummy variables from 'Age 25-34' up to 'Age greater than or equal to 65'. The omitted base category in the regression equation is those people in the survey aged 15-24 years old. In Table 2's column 1, the probability of taking antidepressants rises gradually to reach a high point in the mid-life age band of 45-54. It then falls back, by 65 and above, to approximately the same probability that is found among the youngest group. Experiments with various functional forms -- available upon request -- suggest that the data are fairly well approximated by a simple quadratic equation.[3]

It might be wondered if the mid-life peak in antidepressant use in Table 2 is a result of people in middle age tending disproportionately to have young children. Such an explanation is not supported empirically. When a variable for the number of young children is included in the regression equation, it enters with a very small negative coefficient (the opposite of the sign that might perhaps have been expected) that is never statistically significantly different from zero. These specifications are available on request.

The size of the age pattern is not a negligible one. At its peak, in mid-life, it accounts in this specification for an extra approximately 6.5 percentage points in the probability of using antidepressants. In other words, it nearly doubles the risk. The age

[3] This hill-shaped result appears to be a new one. The closest we have been able to find in the existing literature is in the third column of Table 1 of Olfson and Marcus (2009) on US data. The authors do not discuss the age profile. However, the Olfson-Marcus estimation results are not exactly comparable to ours, because their regression equations hold constant the state of a person's measured mental health.

45-54 coefficient of 0.0652 in column 1 of Table 2 is also slightly larger than that on known stressful life events such as being unemployed or being divorced/separated.

One way to depict the hump-shaped age profile is to do so graphically, as in Charts 1 and 2. To construct these graphs, we use a different and less parametrically restrictive estimation method than in the equations of the Tables. Instead of six age-band variables, a separate dummy variable for (almost) every year of age from 15 up to 90 is now entered in the antidepressant-use regression equation. There is one caveat; because sample sizes become small at higher ages, the exact approach was the following. Above age 80, we grouped together the people aged 82 and 83 and plotted them on the chart as 81.5 years; similarly, we grouped those aged 84 and 85 and plotted them as 84.5; we grouped all individuals from 86-97 and plotted them as a weighted average assigned on the chart axis to age 88. While simple, this method ensures that sample sizes for dots situated along the sparse part of the age range in the graphs are always based on at least a cell-size of 0.5% or N=200. The same independent variables as before, with the exception of the banded age variables, are also included in the regression specifications in the two charts.

Chart 1 gives a plot of the raw data; it is an unadjusted correlation (apart from country dummies). By contrast, Chart 2's scatter is derived from a full regression equation, where each of the dots in the chart corresponds to the probability at that particular age. This has the advantage that it produces in an approximately non-parametric way the same form of age profile as in Table 2's columns. There is strong

evidence in Chart 2 of a peak in antidepressant use in mid-life.[4] As previously in Table 2, the calculation holds constant other factors, so once again is to be viewed as a ceteris-paribus relationship. In the raw unadjusted picture of Chart 1, the turn-down in antidepressant-use probability at higher ages exists, but is less clear in a simple scatter; the standard error bands -- not shown -- are large at higher ages.

Other systematic influences are visible in the data. Men, in Table 2, are less likely than women to take antidepressants. The coefficient on Male in column 1 is -0.0372 with a t-statistic over 11. Antidepressant use is highest among those living in the parental home (coefficient 0.0438), the unemployed (0.0520), the retired (0.0733), and those who are divorced or separated (0.0347). Antidepressant use is low among students (-0.0645) and those married (-0.0254). In column 1 of Table 2 there is a discernible monotonic gradient associated with years of education; ALS is age left schooling. Those people who left school at greater than or equal to age 20 are almost 8 percentage points less likely to be taking an antidepressant (the coefficient on ALS>=20 is -0.0781). There are no statistically significant effects associated with being in the living-together category of marital status or being widowed.

The coefficients on the country dummy variables are listed at the foot of Table 2. The base country, against which others are measured, is Belgium. The positive coefficients are Austria, France, Malta, Portugal, the UK, Latvia, Lithuania, and Slovakia. Of these, however, the only one in column 1 of Table 2 with a coefficient that is significantly different from zero at the 95% confidence level is Portugal. These country-dummy coefficients are not small. They vary, in column 1 of Table 2, from

[4] The intercept on the y-axis in the charts has been normalized by expressing all the plotted probabilities relative to an age-15 probability set to zero. In the raw data, the mean in the probability of antidepressant use in Europe is approximately 0.08.

0.0767 for Portugal to -0.0522 in Greece. This implies a spread of 13 percentage points in the likelihood of antidepressant use.

Columns 2 and 3 of Table 2 reinforce the conclusions from the simple OLS linear-probability estimator. There are only marginal differences, when compared to column 1, in variables' qualitative influence or levels of statistical significance.

One interesting and potentially important distinction is that between Western Europe and Eastern Europe. The transition countries have lower levels of Gross Domestic Product and, especially when compared to the western countries, may have rather different medical-prescribing practices. Table 3 therefore calculates results separately for the set of nations from Western Europe (including East Germany, within the nation Germany). The econometric results -- from now on, for simplicity, only OLS linear probability models are presented -- are similar to those in the full sample. However, the coefficient on being unemployed is now slightly larger (at 0.0713 in column 1 of Table 3) and the education gradient becomes steeper (the coefficient on ALS over 20 is now -0.0980).

Table 3 continues to find a well-defined hump shape in the effect of age on the probability of consuming antidepressants. Compared to the young and the old, people in midlife in Western Europe have an approximately doubled probability of antidepressant use.

The main findings are robust across the genders. Columns 2 and 3 of Table 3 compare the male sub-sample to the female sub-sample. Perhaps the most interesting difference in the size of coefficients is for the ALS age-left-school variable. Men in Western Europe have a more pronounced education gradient in the risk of antidepressant

medication. At a low, in column 2, the coefficient is -0.1605 for males compared to -0.0653 among females. In this correlational sense, it could be said that low qualifications appear to be particularly a danger for the mental health of men. It is also noticeable that the coefficient on the Portugal dummy variable is considerably greater for women.

Eastern Europe is examined in Table 4. There are separate regression equations for the full sample, the males, and the females.

A hump-shaped age pattern is again visible. Both for females and males, antidepressant use is at its greatest in people's midlife. The size of the effect at age 45-54 is similar (0.0597 for men and 0.0470 for women); the null of equality of these coefficients in Table 4 cannot be rejected.

In Table 4, however, there is one striking difference between columns 2 and 3: there is no sign of an education gradient in the females sub-sample. In column 3, the coefficient on ALS>= 20 is only -0.0118 with a t-statistic of just 0.21.

In most countries, part of the process of taking antidepressants is first to visit a doctor or health professional. That information is available in the data set. Therefore Table 5 estimates a different form of equation (the p(..) functional form discussed earlier). Here the dependent variable is no longer antidepressant consumption but rather one for consulting a mental-health specialist. The exact survey question is:

"*In the last 12 months, did you seek help from a professional because of a psychological or emotional problem. Yes or no.*"

The mean of this in the data is 11%, so in 2010 approximately one in nine Europeans consulted a professional about mental health problems.

Table 5 reports zero-one OLS equations for the probability of consulting a mental-health professional. To allow for consistency of interpretation with earlier regressions, the set of independent variables is the same as in Tables 2 to 4. For the full sample of column 1 of Table 5 there continues to be evidence of a well-determined age pattern. The probability of seeking help for a psychological or emotional problem reaches its turning point -- adjusting for other factors -- in the 45-54 age band. Males, students, the married, and those with high levels of education are less likely to see a mental-health professional. Those living at home, the unemployed, the retired, and the divorced or separated are more likely to do so. The t-statistics on the relevant coefficients are typically large in column 1 of Table 5.

Results for the West and East are given separately in columns 2 and 3 of Table 5. Particularly for Eastern Europe, many of the coefficients now become fairly poorly defined. For example, an age pattern is now barely discernible, with large standard errors. The only variables in the Eastern Europe equations with coefficients that are statistically significantly different from zero are Male, Student, and Retired. For Western Europe, nevertheless, the existence of a hump-shaped age profile is still clear in the data. The largest coefficient is 0.0321 (t-statistic 3.46) on age-group 45 to 54. However, for Western Europe there is little sign of an age-left-school effect on the probability of consulting a mental-health professional.

Despite the different dependent variable, the country dummies in Table 5 therefore produce a similar life-cycle pattern to that found in the earlier antidepressant-use equations. The largest positive coefficient in the full sample of column 1 is for Romania at 0.1395 with a t-statistic of 10.08. Slovakia and Portugal also have large

coefficients. The smallest coefficients in Table 5 are found for Bulgaria (-0.0872, t-statistic 6.24), Cyprus and Greece.

3. Arguments and Counter-Arguments

On the hill-shaped distribution with respect to age, it is possible to think of various potential objections (we thank, in particular, Dr Ian Colman for discussions on these). Here we list some, with possible responses.

(i) *Prescribing patterns may differ by country and by age*: *one possibility is that people who are employed may be more likely to be treated (presumably because physicians want to help people get back to work). In principle, that could create a hill-shaped distribution.*

The econometric estimation controls for country dummies and for whether the person is employed, so the hill-shape cannot here be being generated merely by intercept differences in national medical practices. If it were that physicians felt they should encourage workers back into the workplace, it is difficult to see why the hill-shape would be so noticeably peaked in midlife. It might be expected, instead, that the probability would run fairly flat from people's early 20s to their mid-60s (the usual working-career length).

(ii) *This study is unable to follow the same individuals longitudinally through time (as Colman et al. 2006 can), which means that the age variable may be correlated with some form of birth-cohort effect.*

This is a justifiable concern and one common to all studies of our type. Nevertheless, in this case a multi-country cross-sectional design has one important advantage. Through the decades, it may be that sheer antidepressant-prescribing norms by Europe's

physicians have changed (in a way that alters the link between underlying mental distress and observed antidepressant consumption). That potential bias is not present in the present study; the data come from the same year and the equations allow for different intercept shifters in each nation.

(iii) As people age, the presentation of depression might change, such that older individuals become more likely to present with somatic complaints rather than mood complaints. Physicians may be more likely to treat the somatic symptoms without recognizing an episode of depression.

This is a possible interpretation. However, it is a particular theory, it might be said, of the hill-shape, rather than a criticism of the results themselves.

(iv) Treatment-seeking may differ by age. It could be that younger adults are less likely to seek treatment than middle-aged adults.

This is possible, and unfortunately is not easily tested. It cannot, however, account for the drop-off in antidepressant use in older age groups (who presumably are well-informed, when compared to the young, about the concept of antidepressant treatment).

(v) There could be a form of 'survivor' effect -- severe depression is associated with suicide and other chronic diseases that lead to death. The remaining population is therefore healthier and less likely to need antidepressants.

Such an argument seems a good one; presumably the mechanism must play some role. However, the annual risk of suicide per-person in an industrialized country is approximately 1 in 10,000, so quantitatively it is difficult to see how a compositional suicide-survivor theory could explain a large portion of the hill-shape in antidepressant use.

4. Conclusions

This paper studies the patterns of antidepressant use in today's Europe. It draws three main conclusions.

First, despite the evident security and wealth of modern living, 1 in 13 European citizens used antidepressants in the year 2010, and rates of consumption are notably high in Portugal, Lithuania, France and the UK. One interpretation is that this throws a confirming light on the concerns of the Stiglitz Commission.

Second, the probability of taking antidepressants is greatest among those who are middle-aged, female, unemployed, poorly educated, and divorced or separated. The sign on the variable for being unemployed is interestingly consistent with -- though our study's regressor cannot have the same claim to exogeneity as that in -- the study of Austrian data by Kuhn et al. (2009).

Third, a hill-shaped age pattern is found (after adjustment for a standard set of covariates). The concave shape is illustrated in Chart 2. People in mid-life are approximately twice as likely to be taking antidepressants as individuals with the same characteristics who are under the age of 25 or over the age of 65. As experiments in the paper show, this finding is robust to a large number of sub-sample checks, including a division into males and females and into West and East. Very robustly, the regression-adjusted probability of using an antidepressant reaches a maximum in people's late 40s. This pattern is consistent with recent claims in the well-being literature that happiness and mental health follow a U-shape through life. If this paper's evidence is viewed as important corroboration of that U-shape, it makes an explanation of that quadratic lifetime path of human well-being even more pressing.

Appendix

The Stiglitz Report's Formal Recommendations (an abbreviated form of the list in the Executive Summary of the Report)

#1: When evaluating material well-being, look at income and consumption rather than production.

#2: Emphasise the household perspective.

#3: Consider income and consumption jointly with wealth.

#4: Give more prominence to the distribution of income, consumption and wealth.

#5: Broaden income measures to non-market activities

#6: Quality of life depends on people's objective conditions and capabilities. Substantial effort should be devoted to developing and implementing robust, reliable measures of social connections, political voice, and insecurity that can be shown to predict life satisfaction.

#7: Quality-of-life indicators in all the dimensions covered should assess inequalities in a comprehensive way

#8: Surveys should be designed to assess the links between various quality-of-life domains for each person, and this information should be used when designing policies in various fields

#9: Statistical offices should provide the information needed to aggregate across quality-of-life dimensions, allowing the construction of different indexes.

#10: Measures of both objective and subjective well-being provide key information about people's quality of life. Statistical offices should incorporate questions to capture people's life evaluations, hedonic experiences and priorities in their own survey.

#11: Sustainability assessment requires a well-identified dashboard of indicators. The distinctive feature of the components of this dashboard should be that they are interpretable as variations of some underlying "stocks".

#12: There is need for a clear indicator of our proximity to dangerous levels of environmental damage (such as associated with climate change or the depletion of fishing stocks.)

Table 1. The Percentage of Europeans by Nation Who Took Antidepressants Over the Previous 12 months (%)

	Not at all	Time to time	Regularly <4 weeks	Regularly >=4 weeks
Austria	91%	4%	1%	3%
Belgium	91	3	1	5
Bulgaria	96	3	0	1
Cyprus	96	2	1	2
Czech Republic	95	3	0	1
Denmark	93	1	1	5
Estonia	93	2	0	4
Finland	94	1	1	4
France	91	3	1	6
Germany	95	1	1	3
Greece	97	1	0	1
Hungary	93	3	1	3
Ireland	95	2	1	3
Italy	94	4	1	1
Latvia	92	6	1	2
Lithuania	89	6	1	3
Luxembourg	94	1	1	3
Malta	90	4	1	4
Netherlands	94	1	0	4
Poland	94	3	1	2
Portugal	84	5	2	9
Romania	93	5	1	1
Slovakia	91	6	1	2
Slovenia	92	5	0	2
Spain	92	2	1	5
Sweden	92	1	0	7
UK	91	1	1	7

Source: Own calculations using Eurobarometer #73.2, February-March 2010.

Question. Have you taken any antidepressants in the last 12 months? No, not at all; Yes, from time to time when you felt the need to; Yes, regularly for a period of less than four weeks; Yes, regularly for a period of at least four weeks?

Table 2. Regression Equations for the Probability of Taking Anti-depressants

	OLS	Probit	Ordered logit
Age 25-34	.0289 (3.68)	.0374 (3.81)	.5751 (3.76)
Age 35-44	.0501 (6.06)	.0666 (6.14)	.9361 (6.04)
Age 45-54	.0652 (7.81)	.0858 (7.56)	1.1396 (7.42)
Age 55-64	.0450 (5.08)	.0618 (5.51)	.8507 (5.27)
Age ≥65	.0037 (0.37)	.0222 (2.10)	.3881 (2.27)
Male	-.0372 (11.12)	-.0363 (11.63)	-.6099 (11.42)
Home	.0438 (6.71)	.0468 (6.89)	.6558 (7.28)
Student	-.0645 (2.53)	-.0325 (2.05)	-.5851 (1.91)
Unemployed	.0520 (8.52)	.0587 (8.95)	.7834 (9.40)
Retired	.0733 (12.18)	.0695 (11.73)	.9900 (11.86)
Married	-.0254 (4.99)	-.0228 (4.83)	-.3932 (5.10)
Living together	-.0068 (1.05)	-.0047 (0.78)	-.1204 (1.14)
Divorced/separated	.0347 (4.66)	.0231 (3.40)	.3092 (3.22)
Widowed	.0101 (1.32)	.0025 (0.39)	.0051 (0.05)
ALS<16	-.0611 (2.53)	-.0285 (1.87)	-.4615 (1.84)
ALS 16-19	-.0706 (2.93)	-.0381 (2.27)	-.5647 (2.25)
ALS >=20	-.0781 (3.23)	-.0408 (2.67)	-.6908 (2.74)
Austria	.0012 (0.11)	.0021 (0.22)	.0184 (0.11)
Cyprus	-.0352 (2.49)	-.0302 (2.65)	-.6592 (2.60)
Denmark	-.0126 (1.09)	-.0108 (1.12)	-.1385 (0.81)
Finland	-.0310 (2.69)	-.0242 (2.70)	-.4604 (2.56)
France	.0057 (0.50)	.0039 (0.39)	.0997 (0.64)
Germany	-.0422 (4.04)	-.0331 (4.26)	-.6945 (4.15)
Greece	-.0522 (4.51)	-.0441 (5.23)	-1.0909 (4.97)
Ireland	-.0280 (2.42)	-.0232 (2.53)	-.4438 (2.45)
Italy	-.0161 (1.40)	-.0134 (1.40)	-.2608 (1.50)
Luxembourg	-.0265 (1.88)	-.0194 (1.70)	-.3783 (1.70)
Malta	.0267 (1.87)	.0187 (1.43)	.2891 (1.56)
Netherlands	-.0166 (1.45)	-.0154 (1.61)	-.2367 (1.34)
Portugal	.0767 (6.56)	.0625 (5.10)	.7622 (5.19)
Spain	-.0045 (0.39)	-.0040 (0.41)	-.0213 (0.13)
Sweden	-.0100 (0.87)	-.0060 (0.62)	-.0920 (0.54)
UK	.0035 (0.32)	.0013 (0.15)	.0836 (0.56)
Bulgaria	-.0443 (3.83)	-.0348 (4.03)	-.7839 (4.01)
Czech Republic	-.0318 (2.77)	-.0257 (2.84)	-.5482 (2.98)
Estonia	-.0196 (1.70)	-.0160 (1.73)	-.2768 (1.63)
Hungary	-.0225 (1.96)	-.0192 (2.13)	-.3504 (2.10)
Latvia	.0027 (0.24)	.0016 (0.16)	-.0099 (0.06)
Lithuania	.0180 (1.56)	.0120 (1.16)	.1670 (1.08)
Poland	-.0251 (2.18)	-.0202 (2.24)	-.3772 (2.21)
Romania	-.0141 (1.23)	-.0112 (1.16)	-.2356 (1.38)

Slovakia	.0081 (0.71)	.0060 (0.59)	.0712 (0.44)
Slovenia	-.0010 (0.09)	-.0019 (0.20)	-.0544 (0.34)
Constant/cut1	.1218		2.5652
Cut2			3.1669
Cut3			3.3706
Adjusted R^2/Pseudo R^2	.0369	.0712	.0568
N	26,611	26,611	26,611

Source: Eurobarometer #73.2, February-March 2010.

Notes. Base (excluded) categories: age 15-24, Belgium, employed, no fulltime education and single. ALS is age left schooling. t-statistics are given in parentheses. Column 1 is estimated as a linear probability model where the dependent variable is 1 for having taken any level of antidepressants and zero otherwise. Column 2 is estimated as a dprobit using Stata. Column 3 is estimated as an ordered logit using all four possible survey answers.

If a variable for the number of young children is included in these regression equations, its coefficient is small and statistically insignificantly different from zero.

Question. Have you taken any antidepressants in the last 12 months? No, not at all; Yes, from time to time when you felt the need to; Yes, regularly for a period of less than four weeks; Yes, regularly for a period of at least four weeks? In columns 1 and 2 the dependent variable is set to zero if 'no, not at all", zero if otherwise. In column 3 'no, not at all=1; from time to time=2 and so on.

Table 3. Regression Equations for the Probability of Taking Anti-depressants in Western Europe (*Estimated with a linear probability model)*

	Full Sample	Male	Female
Age 25-34	.0333 (3.34)	.0336 (2.72)	.0344 (2.25)
Age 35-44	.0583 (5.56)	.0600 (4.59)	.0561 (3.50)
Age 45-54	.0692 (6.54)	.0522 (3.98)	.0819 (5.04)
Age 55-64	.0461 (4.14)	.0173 (1.23)	.0656 (3.87)
Age ≥65	-.0009 (0.08)	-.0235 (1.47)	.0080 (0.43)
Male	-.0293 (6.83)		
Home	.0581 (7.46)	.1308 (4.45)	.0513 (5.34)
Student	-.0763 (2.52)	-.1603 (3.76)	-.0238 (0.56)
Unemployed	.0713 (8.48)	.0828 (8.09)	.0587 (4.46)
Retired	.0655 (8.65)	.0817 (8.52)	.0586 (5.03)
Married	-.0237 (3.80)	-.0213 (2.81)	-.0246 (2.49)
Living together	-.0108 (1.31)	.0000 (0.01)	-.0214 (1.64)
Divorced/separated	.0481 (5.16)	.0320 (2.62)	.0589 (4.27)
Widowed	.0141 (1.45)	.0022 (0.16)	.0188 (1.36)
ALS<16	-.0754 (2.66)	-.1499 (3.70)	-.0316 (0.81)
ALS 16-19	-.0878 (3.09)	-.1614 (3.98)	-.0436 (1.11)
ALS >=20	-.0980 (3.45)	-.1605 (3.96)	-.0653 (1.65)
Austria	.0018 (0.16)	.0232 (1.61)	-.0171 (0.97)
Cyprus	-.0377 (2.65)	.0016 (0.10)	-.0769 (3.48)
Denmark	-.0092 (0.79)	-.0066 (0.46)	-.0117 (0.65)
Finland	-.0263 (2.27)	-.0211 (1.49)	-.0312 (1.73)
France	.0076 (0.67)	.0075 (0.53)	.0074 (0.43)
Germany	-.0417 (3.97)	-.0237 (1.85)	-.0599 (3.67)
Greece	-.0540 (4.62)	-.0346 (2.42)	-.0739 (4.07)
Ireland	-.0311 (2.66)	-.0200 (1.37)	-.0410 (2.31)
Italy	-.0165 (1.43)	-.0145 (1.01)	-.0191 (1.08)
Luxembourg	-.0254 (1.80)	.0042 (0.24)	-.0508 (2.35)
Malta	.0236 (1.64)	.0242 (1.28)	.0211 (0.99)
Netherlands	-.0145 (1.26)	-.0092 (0.66)	-.0217 (1.21)
Portugal	.0757 (6.39)	.0387 (2.64)	.1054 (5.80)
Spain	-.0087 (0.74)	-.0179 (1.23)	-.0019 (0.11)
Sweden	-.0047 (0.41)	.0033 (0.23)	-.0114 (0.63)
UK	.0054 (0.50)	.0068 (0.51)	.0033 (0.20)
Constant	.0864	.1711	.0920
Adjusted R^2/Pseudo R^2	.0399	.0343	.0392
N	16,512	7713	8799

Source: Eurobarometer #73.2, February-March 2010.
Notes: see Table 2.

Table 4. Regression Equations for the Probability of Taking Anti-depressants in Eastern Europe (*Estimated with a linear probability model)*

	Full Sample	Males	Females
Age 25-34	.0234 (1.83)	.0335 (2.39)	.0122 (0.58)
Age 35-44	.0352 (2.60)	.0391 (2.60)	.0286 (1.31)
Age 45-54	.0552 (4.02)	.0597 (3.90)	.0470 (2.11)
Age 55-64	.0340 (2.28)	.0281 (1.68)	.0391 (1.62)
Age ≥65	.0095 (0.56)	-.0208 (1.05)	.0303 (1.13)
Male	-.0472 (8.80)		
Home	.0061 (0.49)	.0836 (2.78)	-.0025 (0.16)
Student	-.0394 (0.83)	-.1750 (1.73)	-.0192 (0.32)
Unemployed	.0333 (3.75)	.0225 (2.26)	.0484 (3.38)
Retired	.0871 (8.56)	.1146 (9.67)	.0653 (4.12)
Married	-.0263 (2.98)	-.0305 (3.04)	-.0155 (1.10)
Living together	.0010 (0.10)	.0009 (0.09)	.0038 (0.21)
Divorced/separated	.0138 (1.11)	.0015 (0.10)	.0267 (1.46)
Widowed	.0000 (0.01)	-.0184 (1.00)	.0088 (0.50)
ALS<16	-.0317 (0.68)	-.1970 (1.95)	.0078 (0.14)
ALS 16-19	-.0347 (0.76)	-.1798 (1.79)	-.0059 (0.11)
ALS >=20	-.0386 (0.84)	-.1829 (1.82)	-.0118 (0.21)
Bulgaria	-.0496 (4.24)	-.0230 (1.65)	-.0692 (3.87)
Czech Republic	-.0365 (3.12)	-.0050 (0.37)	-.0620 (3.41)
Estonia	-.0257 (2.20)	.0051 (0.37)	-.0485 (2.75)
Hungary	-.0286 (2.45)	-.0164 (1.21)	-.0394 (2.18)
Lithuania	.0166 (1.43)	.0053 (0.40)	.0285 (1.57)
Poland	-.0298 (2.53)	-.0087 (0.63)	-.0449 (2.49)
Romania	-.0170 (1.46)	-.0063 (0.48)	-.0264 (1.41)
Slovakia	.0040 (0.35)	.0056 (0.42)	.0040 (0.23)
Slovenia	-.0100 (0.86)	.0061 (0.45)	-.0237 (1.33)
Constant/cut1	.1038	.1878	.0831
Adjusted R^2/Pseudo R^2	.0372	.0352	.0269
N	10,099	4,478	5,621

Source: Eurobarometer #73.2, February-March 2010.
Notes: see Table 2. Excluded category – Latvia.

Table 5. Regression Equations for the Probability of Seeing a Mental-Health Professional (*Estimated with a linear probability model)*

	Full Sample	Western Europe	Eastern Europe
Age 25-34	.0084 (0.88)	.0179 (2.05)	-.0130 (0.82)
Age 35-44	.0153 (1.53)	.0285 (3.11)	-.0098 (0.58)
Age 45-54	.0310 (3.07)	.0321 (3.46)	.0035 (0.21)
Age 55-64	.0259 (2.41)	.0024 (0.25)	.0103 (0.56)
Age ≥65	.0192 (1.59)	-.0310 (2.83)	.0395 (1.87)
Male	-.0304 (7.49)	-.0198 (5.28)	-.0303 (4.53)
Home	.0296 (3.74)	.0303 (4.45)	-.0023 (0.15)
Student	-.1699 (5.50)	-.0320 (1.21)	-.1218 (2.04)
Unemployed	.0290 (3.93)	.0506 (6.87)	.0122 (1.11)
Retired	.0438 (6.00)	.0437 (6.57)	.0496 (3.91)
Married	-.0170 (2.75)	-.0328 (6.00)	.0021 (0.19)
Living together	-.0109 (1.37)	-.0127 (1.76)	-.0015 (0.11)
Divorced/separated	.0293 (3.24)	.0263 (3.22)	.0222 (1.43)
Widowed	.0056 (0.60)	-.0109 (1.29)	.0102 (0.65)
ALS<16	-.1278 (4.36)	-.0433 (1.75)	-.0732 (1.26)
ALS 16-19	-.1535 (5.25)	-.0457 (1.84)	-.1025 (1.78)
ALS >=20	-.1622 (5.54)	-.0293 (1.18)	-.1071 (1.86)
Austria	-.0037 (0.27)	-.0290 (2.86)	
Cyprus	-.0757 (4.40)	.0087 (0.70)	
Denmark	-.0090 (0.64)	-.0082 (0.80)	
Finland	-.0515 (3.68)	-.0308 (3.03)	
France	-.0068 (0.49)	.0018 (0.18)	
Germany	-.0473 (3.75)	-.0237 (2.59)	
Greece	-.0863 (6.13)	-.0302 (2.95)	
Ireland	-.0168 (1.20)	-.0297 (2.92)	
Italy	-.0249 (1.79)	.0087 (0.86)	
Luxembourg	-.0503 (2.94)	-.0069 (0.56)	
Malta	-.0166 (0.96)	-.0242 (1.92)	
Netherlands	-.0225 (1.61)	.0271 (2.68)	
Portugal	.0323 (2.28)	-.0125 (1.21)	
Spain	-.0230 (1.63)	-.0081 (0.79)	
Sweden	-.0336 (2.40)	-.0205 (2.01)	
UK	-.0242 (1.85)	-.0469 (0.70)	
Bulgaria	-.0872 (6.24)		-.0894 (6.13)
Czech Republic	-.0209 (1.50)		-.0206 (1.41)
Estonia	-.0132 (0.95)		-.0128 (0.88)
Hungary	-.0445 (3.20)		-.0457 (3.13)
Latvia	-.0040 (0.29)		
Lithuania	.0036 (0.26)		.0077 (0.53)
Poland	-.0676 (4.82)		-.0681 (4.64)
Romania	.1395 (10.08)		.1390 (9.58)
Slovakia	.0513 (3.68)		.0534 (3.67)
Slovenia	-.0421 (3.01)		-.0463 (3.19)
Constant	.2717	.1118	.2208

Adjusted R^2/Pseudo R^2	.0326	.0220	.0515
N	26,800	16618	10182

Source: Eurobarometer #73.2, February-March 2010.
Notes: Base (excluded) categories: Belgium in columns 1 and 2, and Latvia in column 3.
Question. In the last 12 months, did you seek help from a professional because of a psychological or emotional problem?

References

Askitas, N., Zimmermann, K.F. (2011). Health and well-being in the crisis. IZA discussion paper 5601.

Bauer, M., Monz, B.U., Montejo, A.L. et al. (2008). Prescribing patterns in Europe: Results from the factors influencing depression endpoints research (FINDER) study. European Psychiatry, 23, 66-73.

Biswas-Diener, R., Vitterso, J., Diener, E. (2010). The Danish effect: Beginning to explain high well-being in Denmark. Social Indicators Research, 97, 229-246.

Blanchflower, D.G., Oswald, A.J. (2004). Well-being over time in Britain and the USA. Journal of Public Economics, 88, 1359-1386.

Blanchflower, D.G., Oswald, A.J. (2008). Is well-being U-shaped over the life cycle? Social Science & Medicine, 66, 1733-1749.

Blanchflower, D.G., Oswald, A.J. (2009). The U-shape without controls: A response to Glenn. Social Science & Medicine, 69, 486-488.

Clark, A.E., Frijters, P., Shields, M.A. (2008). Relative income, happiness, and utility: An explanation for the Easterlin paradox and other puzzles. Journal of Economic Literature, 46, 95-144.

Colman, I., Wadsworth, M.E.J., Croudace, T.J., Jones, P.B. (2006). Three decades of antidepressant, anxiolytic and hypnotic use in a national population birth cohort. British Journal of Psychiatry, 189, 156-160.

Deaton, A. (2008). Income, health, and well-being around the world: Evidence from the Gallup World Poll. Journal of Economic Perspectives, 22, 53-72.

Dolan, P., Peasgood, T., White, M. (2008). Do we really know what makes us happy? A review of the economic literature on the factors associated with subjective well-being. Journal of Economic Psychology, 29, 94-122.

Dolan, P., Kahneman, D. (2008). Interpretations of utility and their implications for the valuation of health. Economic Journal, 118, 215-234.

Easterlin, R.A. (1974). Does economic growth improve the human lot? Some empirical evidence. In: David PA, Reder MW (Eds.), Nations and households in economic growth: Essays in honor of Moses Abramowitz. Academic Press: New York; p. 89-125.

Easterlin, R.A. (2003). Explaining happiness. Proceedings of the National Academy of Sciences of the USA, 100, 11176-11183.

Easterlin, R. (2006). Life cycle happiness and its sources. Intersections of psychology, economics, and demography. Journal of Economic Psychology, 27, 463-482.

Frey, B.S., Stutzer, A. (2002). Happiness and economics. Princeton University Press: Princeton.

Glenn, N. (2009). Is the apparent U-shape of well-being over the life course a result of inappropriate use of control variables? A commentary on Blanchflower and Oswald. Social Science & Medicine, 69, 481-485.

Graham, C. (2005). Insights on development from the economics of happiness. World Bank Research Observer, 20: 201-231.

Graham, C. (2008). Happiness and health: Lessons – and questions – for public policy. Health Affairs, 27, 72-87.

Green, F. (2010). Unpacking the misery multiplier: How employability modifies the impacts of unemployment and job insecurity on life satisfaction and mental health. Journal of Health Economics, 30, 265-276.

Helliwell, J., Huang, H.F. (2008). How's your government? International evidence linking good government and well-being. British Journal of Political Science, 38, 595-619.

Knapp, M., McDaid, D., Mossialios, E., Thornicroft, G. (Eds.) (2007). Mental health policy and practice across Europe. Open University Press and McGraw-Hill Education: Maidenhead.

Kuhn, A., Lalive, R., Zweimuller, J. (2009). The public health costs of job loss. Journal of Health Economics, 28, 1099-1115.

Layard, R. (2006). Happiness: Lessons from a new science. Penguin: London.

Layard, R. (2010). Measuring subjective well-being. Science, 327, 534-535.

Ludwig, J., Marcotte, D.E., Norberg, K. (2009). Anti-depressants and suicide. Journal of Health Economics, 28, 659-676.

McManus, S., Meltzer, H., Brugha, T., Bebbington, P., Jenkins, R. (Eds.) (2009). Adult psychiatry morbidity in England, 2007: Results of a household survey. NHS Information Centre, and Department of Health Sciences, University of Leicester.

OECD (2009). OECD Health Data: OECD Indicators. OECD: Paris.

Offer, A. (2007). The challenge of affluence: Self-control and well-being in the United States and Britain since 1950. Oxford University Press: Oxford.

Ohayon, M.M., Lader, M.H. (2002). Use of psychotropic medication in the general population of France, Germany, Italy, and the United Kingdom. Journal of Clinical Psychiatry, 63, 817-825.

Olfson, M., Marcus, S.C. (2009). National patterns in antidepressant medication treatment. Archives of General Psychiatry, 66, 848-856.

Oswald, A.J., Wu, S. (2010). Objective confirmation of subjective measures of human well-being: Evidence from the USA. Science, 327, 576-579.

Pacek, A.C., Radcliff, B. (2008). Welfare policy and subjective well-being across nations: An individual-level assessment. Social Indicators Research, 89, 179-191.

Pagura, J., Katz, L.Y., Mojtabai, R. et al. (2011). Antidepressant use in the absence of common mental disorders in the general population. Journal of Clinical Psychiatry, 72, 494-501.

Paykel, E.S. (2006). Depression: Major problem for public health. Epidemiologica E Psichiatria Sociale, 15, 4-10.

Powdthavee, N. (2010). The happiness equation: The surprising economics of our most valuable asset. Icon Books: UK.

Rose, N. (2007). Psychopharmaceuticals in Europe. Chapter 7 of Knapp et al. (2007). 146-187.

Sleath, B., Shih, Y.C.T. (2003). Sociological influences on antidepressant prescribing. Social Science & Medicine, 56, 1335-1344.

Stone, A.A., Schwartz, J.E., Broderick J.E., et al. (2010). A snapshot of the age distribution of psychological well-being in the United States. Proceedings of the National Academy of Sciences of the USA, 107, 9985-9990.

Theodossiou, I. (1998). The effects of low-pay and unemployment on psychological well-being: A logistic regression approach. Journal of Health Economics, 17, 85-104.

Van Landeghem, B. (2008). Human well-being over the life cycle: Longitudinal evidence from a 20-year panel. Working paper, University of Leuven.

Van Praag, B., Ferrer-I-Carbonell, A. (2004). Happiness quantified: A satisfaction calculus approach. Oxford University Press: Oxford; 2004.

Chart 1. The Unadjusted Relationship Between the Probability of Antidepressant Use and Age (only country dummies)

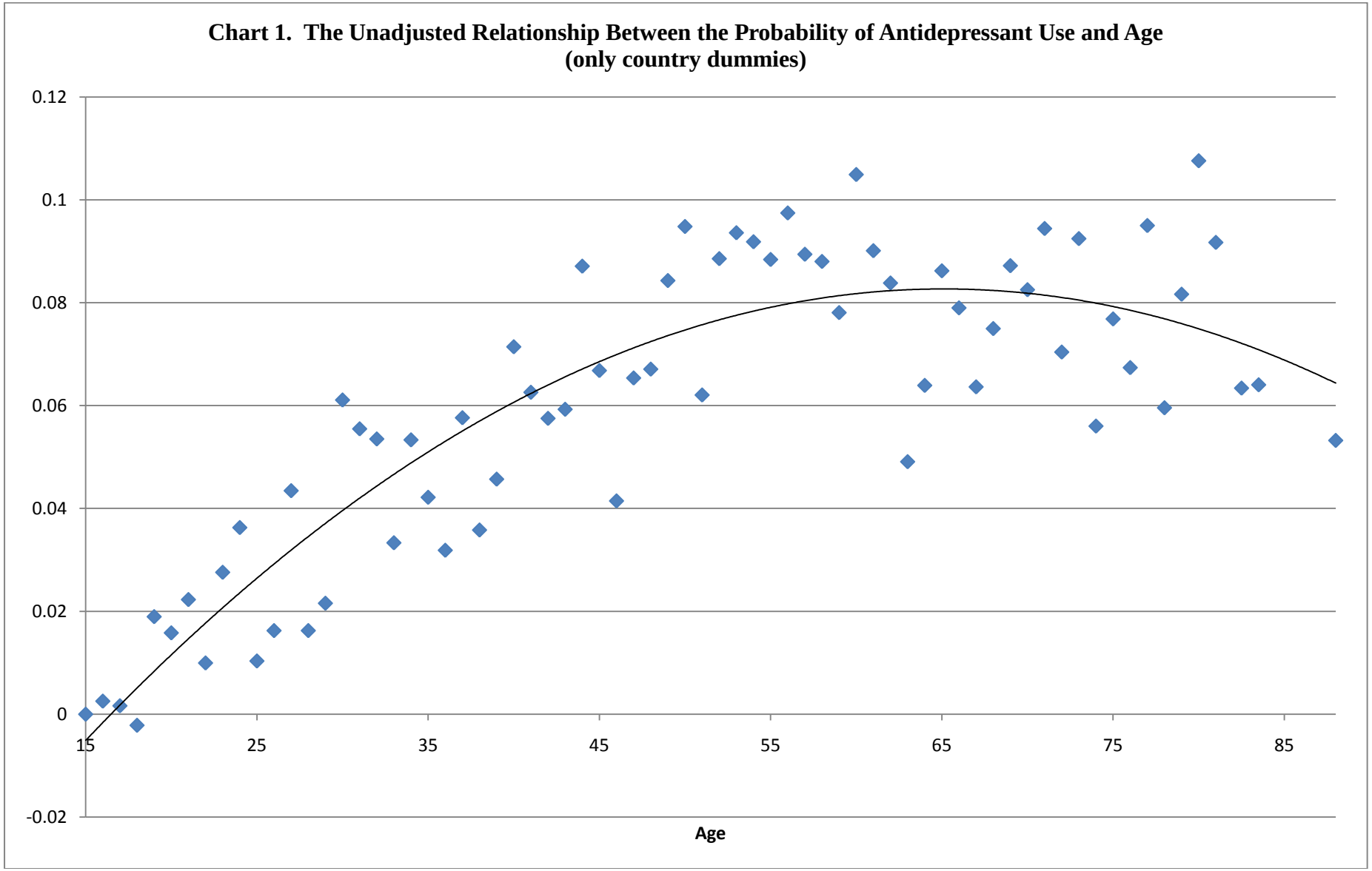

Chart 2. The Regression-Adjusted Relationship Between the Probability of Antidepressant Use and Age (full set of controls, as in Column 1 of Table 2)