Aid and happiness: untangling the causal relationship in nine European donor countries

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Abstract: The goal of this paper is to use a simple causality test in the spirit of Granger to answer three questions on the relationship between the foreign aid disbursements of a donor country and its level of happiness. First, do higher aid flows make a donor happier? Second, does a happier donor give more aid? Third, does causality proceed in both directions simultaneously? Using data for nine European donors, we find that the answers to these questions are not uniform. In particular, causal relationships exist for France and the UK, but not for other countries.

Keywords: happiness; foreign aid; causal relationship; European donors.

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1 Introduction

Politicians and the general public have always regarded foreign aid flows as essential to promoting better living conditions in less developed parts of the world and more recently in contributing towards achieving the UN millennium development goals. In light of this, it is not surprising that the magnitude of aid flows has increased remarkably over time and especially in recent years – reaching US$120 billion annually from OECD donors alone. However, development aid has not been without controversy, be it in allocation or efficacy.

Since the 1960s, there has been considerable growth in empirical research on foreign aid. One strand in this body of literature analyses motivations for donors to supply aid. Two broad motives have been put forward. The recipient need motive emphasises the need of a poor country based on the deficiency of its domestic resources and identifies variables such as per capita GDP, life expectancy, literacy rate, and so on as key determinants of aid allocation among recipient countries. The donor interest motive, on the other hand, concentrates on commercial and political imperatives and maintains that donors provide aid to promote their own trade and investment opportunities or to gain politically from such an action. The conclusion of most of the early studies is that aid is allocated solely to advance donor interest. More recent studies surmise that although donor interest remains the key element, recipient need matters too [see, for example, Mavrotas and McGillivray (2009) for a good summary of this subject].

Recipient need and donor interest motives identify a host of factors that prompt aid flows. These factors (e.g., eradication of poverty, increase in donor exports, etc.) in turn influence the well-being of the donor, the recipient, or both. However, the general degree of happiness of rich and poor countries may also induce the disbursement of aid; and the assistance that is given may in turn have a bearing on the level of happiness of the two sides. In light of this, it is surprising that the foreign aid literature has not yet considered the general level of donor or recipient happiness as a factor in the disbursement of aid.[1]

Research on happiness in economics has seen substantial growth in recent years and newly available data on happiness has provided researchers some basis for inquiring into the determinants of happiness. Recent studies have identified a number of variables, which appear to be linked to happiness. Surveying these is beyond the scope of this paper;[2] however, it suffices to say that happiness appears to bear some connection to income, age, health, marital status, work behaviour, individual freedom and democracy, and even television watching – as well as to inflation and unemployment. Missing from this vast literature is a discussion of the role that foreign aid plays in generating happiness for the donor or recipient country – or conversely, the role of happiness in stimulating the giving or receiving of aid.

This paper looks at the relationship between the disbursement of foreign aid and happiness for *donors*.[3] Although Arvin and Lew (2009) use aggregate aid data to establish a correlation between these variables, the biggest challenge is going beyond documenting correlations to demonstrating causation – i.e., not just that happiness goes hand-in-hand with the act of giving aid, but causes it. Furthermore, since causation may proceed in both directions simultaneously, we ask not only whether giving foreign aid makes donors happy, but also whether happier donors give more aid. Although the possibility of the existence of bi-directional causality has been examined in a number of papers analysing the relationship between foreign aid and other variables,[4] it has only recently been discussed in the happiness literature by asking whether marriage makes

people happy or whether happy people get married [see, for example, Frey and Stutzer (2005)].

The rest of this paper is organised as follows. Section 2 presents a summary of the notion of causality and the testing procedure used in this paper. Section 3 provides the foundation for our hypotheses and reveals the empirical findings, and it is followed by a brief conclusion in Section 4.

2 Causality test procedure

In this paper, we use the concept of causality as described by Granger (1969, 1980).[5] This notion is based on the principle that if, after conditioning a variable on its own past values, the addition of another variable's current and past values further reduces the prediction error variance, then the additional variable is said to Granger cause the first. Hence, according to this definition, X causes Y if the precision of the estimated current value of Y (denoted by Y_t) is improved by controlling for current and past values of X. That is, the use of temporal information enables one to say something about the direction of causality. A symmetric statement can be made for Y causing X.[6] The regressions for Y and X are:

$$Y_t = a + \sum_{i=1}^{I} b_i Y_{t-i} + \sum_{j=0}^{J} c_j X_{t-j} + \psi_t \tag{1}$$

$$X_t = d + \sum_{k=1}^{K} e_k X_{t-k} + \sum_{l=0}^{L} f_l Y_{t-l} + \varepsilon_t \tag{2}$$

where a and d are constants and ψ_t and ε_t are serially uncorrelated zero mean stochastic error terms. By considering the statistical significance of the c_j and f_l coefficients, one can determine causality in the Granger sense. Specifically, if the results of a standard F-test indicate that the c_j's are jointly significant, then X_t can be said to Granger-cause Y_t. Analogously, if f_l's are jointly significant, then Y can be said to Granger-cause X. If both are significantly different from zero, then there is evidence of feedback or bidirectional causality. In our investigation, different patterns of causality may be identified by estimating regressions of X (per capita foreign aid given by a donor) and Y (happiness of a donor).

However, Lutkepohl (1982) has demonstrated that Granger causality is severely affected by a bias due to the omission of other relevant variables. Therefore, a bivariate test may not reveal the true nature of causality given that both variables may be simultaneously influenced by a third, omitted variable. For this reason, the core of the empirical analysis of this study considers a trivariate Granger causal structure which avoids this potential bias by introducing, in turn, per capita income and the unemployment rate of the donor as third variables.

A brief justification for inclusion of these variables seems in order. It is reasonable to expect that richer countries (those with higher per capita income) have citizens that not only enjoy higher life satisfaction but are also financially more able to send aid to poorer countries. Obversely, countries that suffer from high unemployment rate are less likely to have content citizens. Indeed, the happiness literature [see, for example, Frey (2008)]

identifies unemployment as a key variable in life satisfaction of individuals. Furthermore, citizens of countries with a higher unemployment rate may feel less of an obligation to send aid overseas since many may feel that charity and assistance should begin at home.

Since a trivariate Granger causality test examines the joint influence of two variables on the third, the structure of the model in a trivariate setting, with Z (per capita income *or* unemployment rate) as the third variable, consists of the following regressions:

$$Y_t = a + \sum_{i=1}^{I} b_i Y_{t-i} + \sum_{j=0}^{J} c_j X_{t-j} + \sum_{k=0}^{K} d_k Z_{t-k} + \xi_t \tag{3}$$

$$X_t = e + \sum_{l=1}^{L} f_l X_{t-l} + \sum_{m=0}^{M} g_m Y_{t-m} + \sum_{n=0}^{N} h_n Z_{t-n} + \zeta_t \tag{4}$$

where a and e are constants, ξ_t and ζ_t represent mutually uncorrelated white noise series. The hypotheses being tested with equations (3) and (4) are: First, whether X and Z jointly cause Y after controlling for Y's own lags; and second, whether Y and Z jointly cause X after controlling for X's own lags. The null hypothesis that X does not Granger cause Y, conditional on Z, is rejected if the c_j's are jointly significantly different from zero, based on a standard F-test. Similarly, if the g_m's are jointly significantly different than zero, then Y Granger-causes X, conditional on Z.[7]

Results of the Granger causality test critically depend on the choice of lag lengths. This is demonstrated through a number of studies, including Guilkey and Salemi (1982) and Thornton and Batten (1985). Maddala (1992, p.393) claims that the chosen lag length is 'to some extent, arbitrary'. Armah (1997, p.96) points out that the arbitrariness in the choice of lags is a 'major shortcoming' of the Granger test. Lee (1997) argues that choosing the lag length in an arbitrary *ad hoc* manner makes the model susceptible to misspecifications. Specifically, if the number of lags used exceeds the true order, the power of the test is likely to be reduced. If, on the other hand, the number of lags used is smaller than the optimal number of lags, the regression estimates will be biased and the residuals will be serially correlated. The present study conducts Hsiao's version of the Granger causality test by determining the pattern of the lag structure statistically. Thus, the study follows Hsiao (1979, 1981, 1982) in choosing lag lengths to minimise Akaike's (1969a, 1969b) final prediction error (FPE).[8] The procedure is to examine each of the series for its optimal lag length using the regression:

$$Y_t = \alpha_o + \sum_{p=1}^{P} \alpha_p Y_{t-p} + e_t \tag{5}$$

where e_t is a serially uncorrelated zero mean stochastic error term. The procedure involves estimating equation (5) using OLS, allowing different values for P, and computing FPE as:

$$FPE = \frac{(SER)^2 (N + k)}{N} \tag{6}$$

where SER is the standard error of the regression and k is the lag length used in the regression. The optimal lag length corresponds to that value of P that minimises the FPE in equation (6). The advantage of using FPE is that it balances the risk of the bias from

choosing a lower lag against the risk of an increased variance when a higher order is chosen [see Islam (1998)]. Moreover, choosing the lag optimally does not constrain the number of lags to be the same for every regression.

3 Is happiness a cause or an effect?

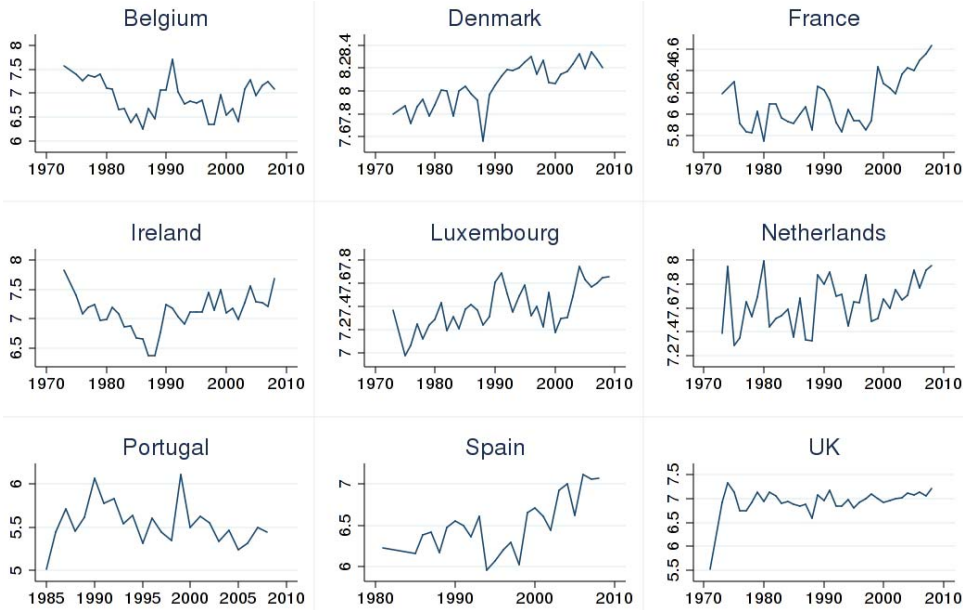
The basis for the hypothesis that donor happiness influences aid disbursements is rather simple: Happier nations are often characterised by high life expectancy, superior access to healthcare, social security, education, and infrastructure, elevated levels of freedom and democracy, more equitable distribution of income and wealth, more green space, more moderate climate, less traffic congestion, less crime, and less vulnerability to natural disasters. Consequently, these happier nations may be predisposed to supply a higher level of aid than those that are less happy. After all, nations, like individuals, are more likely to turn their benevolent gaze outward once their own internal needs are satisfied or surpassed. Once this point is reached, resources can be directed to providing aid (or charity) to others outside of the unit, whether a family or a nation. Indeed, many psychological studies find that happy people are more likely to act pro-socially like to help others (Frey and Stutzer, 2005). Moreover, happier donors are more likely to give aid to a recipient country if it further improves their own societies. In the same vein psychologists Fishbach and Labroo (2007) find that happy (vs. unhappy) people would be more likely to donate to a charitable cause if a self-improvement goal was made salient.

Looking at the other side of the coin, it is conceivable that the act of giving aid leads to donor happiness. The argument for this hypothesis is straightforward: The prospect of assisting a recipient country to break its cycle of poverty and reduce its subsequent aid-dependency provides satisfaction for a donor. Needless to say, it is possible for causation to run in both directions simultaneously.

Aid in this paper is the official development assistance (ODA) given by a donor. Data on the aid disbursements of nine European donors, as well their GDP's, are obtained from OECD (2009).[9] Unemployment data is also from OECD, specifically from their annual labour force statistics database. Data on the level of happiness of the same donors, based on summaries of surveys on happiness, are obtained from the 'World Database of Happiness' (Veenhoven, 2009). The data series for each donor extends back at least to 1985 and covers years through to 2007 (see the second column of Table 1). The happiness measure used in this study is referred to as 'life satisfaction' on a scale from 0 to 10. The source ('World Database of Happiness', Veenhoven, 2009) compiles measures from numerous studies across many nations. Subjects are asked questions with the common theme 'satisfaction with life.' Since various studies use different scales, the 'World Database of Happiness' rescales the results onto a standardised scale ranging from 0–10. Figure 1 shows how happiness varies through time for countries in our sample. Table 1 provides summary statistics for variables used in the study.

Our regressions use the natural logarithm of happiness, which is on an 11-point index. Aid is defined as per capita aid, which is ODA deflated by GDP deflator, base year 2000, divided by population. Just as with happiness, we use the natural logarithm of this variable in our regressions. GDP per capita is real GDP (year 2000 base) divided by population; again, natural logarithms are used in the regressions.

Figure 1 Happiness on a 0–10 scale through time for different countries (see online version for colours)



Note: Years in sample vary for each country.

Table 1 Descriptive statistics

	Years in sample	*N*	*Mean*	*Standard deviation*	*Minimum*	*Maximum*	*Coefficient of variation*
Belgium	1975–2007						
Happiness		33	6.90	.371	6.25	7.70	.054
Aid per capita		33	82.9	18.2	59.0	138.1	.219
GDP per capita		33	18,915	3414	134,22	24,889	.181
Unemployment rate		33	9.72	2.49	4.56	13.51	.257
Denmark	1975–2007						
Happiness		33	8.06	.191	7.56	8.34	.024
Aid per capita		33	207.9	65.9	90.3	311.8	.317
GDP per capita		33	24,975	4569	17,417	32,927	.183
Unemployment rate		33	6.99	2.08	4.01	11.55	.297
France	1975–2007						
Happiness		33	6.09	.224	5.75	6.56	.037
Aid per capita		33	90.2	19.8	53.9	121.9	.219
GDP per capita		33	19,138	3097	13,808	24,318	.162
Unemployment rate		33	8.29	2.02	3.69	10.97	.244

Notes: Happiness is an 11-point index on scale 0 to 10. Aid per capita is aid deflated by the GDP deflator divided by population. GDP per capita is real GDP divided by population. Unemployment expressed as percentage of labour force.

Table 1 Descriptive statistics (continued)

	Years in sample	*N*	*Mean*	*Standard deviation*	*Minimum*	*Maximum*	*Coefficient of variation*
Ireland	1975–2007						
Happiness		33	7.07	.278	6.37	7.57	.039
Aid per capita		33	42.2	38.5	7.0	147.9	.913
GDP per capita		33	16,810	7713	8513	31,636	.459
Unemployment rate		33	10.30	4.65	3.68	17.15	.451
Luxembourg	1980–2007						
Happiness		28	7.41	.160	7.17	7.75	.022
Aid per capita		28	162.6	133.4	17.6	426.8	.820
GDP per capita		28	36,220	10,907	20,807	54,482	.301
Unemployment rate		28	1.89	.677	.69	3.10	.358
Netherlands	1973–2007						
Happiness		35	7.63	.199	7.28	8.00	.026
Aid per capita		35	155.0	33.6	68.5	218.8	.217
GDP per capita		35	19,297	3870	14,157	26,511	.201
Unemployment rate		35	6.32	2.90	2.12	12.15	.459
Portugal	1985–2007						
Happiness		23	5.54	.250	5.01	6.11	.045
Aid per capita		23	21.7	11.8	2.5	63.9	.542
GDP per capita		23	9515	1571	6424	11,388	.165
Unemployment rate		23	6.11	1.52	3.95	8.67	.249
Spain	1985–2007						
Happiness		23	6.49	.327	5.95	7.12	.050
Aid per capita		23	28.3	13.3	7.1	58.8	.470
GDP per capita		23	12,829	2188	9207	16,354	.171
Unemployment rate		23	16.63	5.11	8.29	24.17	.307
UK	1973–2007						
Happiness		35	6.97	.143	6.60	7.33	.021
Aid per capita		35	68.8	21.5	50.4	144.7	.312
GDP per capita		35	19,949	4368	14,309	28,235	.219
Unemployment rate		35	7.03	2.73	2.08	11.88	.389

Notes: Happiness is an 11-point index on scale 0 to 10. Aid per capita is aid deflated by the GDP deflator divided by population. GDP per capita is real GDP divided by population. Unemployment is expressed as percentage of labour force.

The Granger causality test requires the data series to be stationary. However, many economic time series are non-stationary. Thus, they have to be differenced in order to become stationary. Series that are stationary fluctuate around a mean, with a tendency to converge to the mean. On the other hand, non-stationary series wander widely without any tendency to converge to the mean. To avoid the possibility of obtaining spurious causality results, the data are often differenced until they become stationary. Here we test for stationarity using the Dickey-Fuller GLS test, available in Stata (the statistical package that we use).

Table 2 Granger causality results

	Bivariate Granger model		*Trivariate Granger model using:*			
			GDP per capita		*Unemployment Rate*	
	$X=f(Y)$	$Y=f(X)$	$X=f(Y, Z_1)$	$Y=f(X, Z_1)$	$X=f(Y, Z_2)$	$Y=f(X, Z_2)$
Belgium	2.25 (0.13)	0.96 (0.47)	1.07 (0.37)	1.57 (0.22)	2.47 (0.11)	0.64 (0.67)
Denmark	0.6 (0.56) Y → X(+)***	0.92 (0.49) X → Y(+)**	0.47 (0.63) Y → X(+)***	0.94 (0.48) X → Y(+)**	0.48 (0.62) Y → X(+)***	0.92 (0.49) X → Y(+)**
France	10.00 (0.00)	2.91 (0.04)	7.39 (0.00)	3.15 (0.03)	9.92 (0.00)	3.91 (0.02)
Ireland	0.60 (0.56)	0.78 (0.52)	0.37 (0.69)	1.78 (0.18)	0.59 (0.57)	0.72 (0.55)
Luxembourg	0.16 (0.85)	0.19 (0.94)	0.15 (0.86)	0.17 (0.95)	.0.04 (0.96)	0.33 (0.85)
Netherlands	1.09 (0.37)	1.07 (0.36)	0.66 (0.58)	0.41 (0.67)	0.70 (0.56)	0.92 (0.41)
Portugal	0.48 (0.70)	0.95 (0.41)	1.19 (0.36)	0.45 (0.65)	0.97 (0.44)	0.93 (0.43)
Spain	0.05 (0.95)	0.21 (0.81)	0.48 (0.63)	0.66 (0.54)	0.24 (0.79) Y → X(+)*	0.44 (0.65)
United Kingdom	1.60 (0.22)	0.55 (0.58)	1.81 (0.19)	0.60 (0.56)	2.49 (0.10)	0.78 (0.47)

Notes: X is ODA per capita, Y is happiness, Z_1 is per capita GDP and Z_2 is the unemployment rate. Natural logs of per capita aid, happiness and per capita GDP are used in regressions. → indicates Granger causality (with the sign of the impact noted). ***, ** and * denote, respectively, significance at the 1%, 5% and 10% levels. Numbers are F-statistics (probability of null hypothesis of no-causality in parentheses).

The findings from both the bivariate and trivariate specifications are reported in Table 2, with the sign of the causal impact noted in parentheses. (Appendix Tables A1 through A3 record various regression coefficients.) As noted above, the bivariate specification has the potential to give a misleading picture of the relationship between aid and happiness. Hence, apart from noting that most of the bivariate results are in line with their trivariate counterparts, we choose to discuss only the latter.

The results indicate that for many European countries there is not much evidence that aid Granger-causes happiness or vice versa. However, in the case of the UK there is evidence supporting the notion that donor happiness has a positive causal effect on aid disbursements. The latter result, however, is not robust. As is evident from Table 2, when we use per capita income as a control variable, there is no evidence of causality for the UK. However, when we control for unemployment, there is causality from happiness to aid for the UK at the 10% significance level.

A different picture, however, emerges for France where there is clear and strong support for existence of bidirectional causality: French happiness has a positive causal influence on French aid flows; and aid disbursements by France have a positive effect on French happiness. Still, as is clear, the evidence that aid flows *in general* are conducive to donor happiness is rather weak for the group of European countries studied in this paper. Nonetheless, we suspect the findings of causality between aid and happiness will be reinforced by other studies looking at other aid donors – though the results will likely not be uniform.

The fact that the countries in our sample exhibit different patterns of causality should not be surprising given the heterogeneity in preferences and attitudes towards foreign aid – as well as existence of different institutions – across countries.[10] For example, (happier) citizens of some countries with relatively smaller public sectors (e.g., Ireland, Luxembourg, Portugal, and Spain) may choose to donate funds through private channels. However, In the case of France, which has a centuries-long tradition of centralised government,[11] (happier) citizens are content to donate 'public' funds through its relatively large and robust system of public administration. Put differently, citizens of some countries may prefer to rely more on their government for the disbursement of 'public' assistance to the needy in order to make themselves happier. Obversely, the happier the citizens are, the more readily this is manifested through the supply of higher aid to poorer nations by the country's public aid agency. Of course, we are not suggesting that this is the *only* possible explanation for the remarkable French result, but it may be at least part of the explanation.

Our results, therefore, suggest that there may be important and complex country-specific links between happiness and aid. Hence, the findings of this paper identify a new element at play in the aid disbursements of one, and probably two, European donors that happen to be the largest contributors of aid (in dollar terms) in our sample – and possibly more countries around the globe. Needless to say, this area remains an open field for future investigation.

Finally, lack of a uniform causal relationship between happiness and aid amongst donor countries should not be taken as evidence that assistance lacks the capacity to improve welfare in poor countries. After all, happiness research in economics suggests that happiness in rich countries does not necessarily increase over time with their economic prosperity either.

4 Conclusions

This paper adds to a growing body of literature in the economics of happiness. We use a standard causality test to ask fairly simple questions on the relationship between foreign aid given to poor countries and the life satisfaction expressed by the citizens of a donor country. The causality test used in this paper relies on the passage of time. The test is straightforward: if *X* tends to happen after *Y*, there is a good chance that *X* is caused by *Y*. Hence, to find out if happiness affects aid we test whether information about past levels of happiness helps predict future disbursements of aid. In a multivariate setting, a conditioning variable is also used to test for causality. Our results reveal that for two important European donors, France and the UK, the aid-happiness link is a positive causal relationship from happiness to aid. In addition, for France, there is also a positive causal connection from aid to happiness. This leads us to suspect that aid and happiness are likely both endogenous – at least for some countries. Thus, future studies estimating aid's impact on happiness may lead to erroneous conclusions unless they entertain such a possibility.

Given the paucity of high quality data on happiness, our results pertained to only nine donors. While we discovered evidence of a causal bond in only two, it should be borne in mind that our sample was not entirely random: it was driven by availability of long-enough time series for us to conduct a causal investigation. There is no reason why there would not be evidence of a causal link between aid and happiness for more donors once data availability opens up the possibility of investigation into additional countries, in both Europe and elsewhere. Lastly, given the dearth of long time series data on the happiness of the *recipients* of aid, conducting a Granger test for the latter group appears an impossible matter, at least for now.

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References

Akaike, H. (1969a) 'Statistical predictor identification', *Annals of the Institute of Statistical Mathematics,* Vol. 21, pp.201–217.

Akaike, H. (1969b) 'Fitting autoregressions for prediction', *Annals of the Institute of Statistical Mathematics,* Vol. 21, pp.243–247.

Alesina, A., Di Tella, R. and MacCulloch, R. (2001) 'Inequality and happiness: are Europeans and Americans different?', NBER Working Paper 8198, National Bureau of Economic Research, Cambridge, MA.

Armah, B. (1997) 'Trade liberalization and growth in developing countries, 1950–1988', in Gupta, S. (Ed.): *Globalization, Growth and Sustainability*, Kluwer, Boston.

Arvin, B.M. and Barillas, F. (2002) 'Foreign aid, poverty reduction, and democracy', *Applied Economics,* Vol. 34, pp.2151–2156.

Arvin, B.M. and Lew, B. (2009) 'Happiness and foreign aid', *Atlantic Economic Journal,* Vol. 37, pp.325–326.

Arvin, B.M., Cater, B. and Choudhry, S. (2000) 'A causality analysis of untied foreign assistance and export performance', *Applied Economics Letters*, Vol. 7, pp.315–319.

Arvin, B.M., Dabir-Alai, P. and Lew, B. (2006) 'Does foreign aid affect the environment in developing countries?', *Journal of Economic Development*, Vol. 31, pp.63–87.

Fishbach, A. and Labroo, A.A. (2007) 'Be better or be merry: how mood affects self-control', *Journal of Personality and Social Psychology*, Vol. 93, pp.158–173.

Frey, B.S. (2008) *Happiness: A Revolution in Economics*, MIT Press, Cambridge, MA.

Frey, B.S. and Stutzer, A. (2005) 'Happiness research: state and prospects', *Review of Social Economy*, Vol. 62, pp.207–228.

Geweke, J., Meese, R. and Dent, W. (1983) 'Comparing alternative tests of causality in temporal systems: analytic results and experimental evidence', *Journal of Econometrics*, Vol. 21, pp.161–194.

Granger, C. (1969) 'Investigating causal relations by econometric models and cross-spectral methods', *Econometrica*, Vol. 37, pp.424–438.

Granger, C. (1980) 'Testing for causality: a personal viewpoint', *Journal of Economic Dynamics and Control*, Vol. 2, pp.329–352.

Guilkey, D. and Salemi, M. (1982) 'Small sample properties of three tests for Granger-causal ordering in a bivariate stochastic system', *Review of Economics and Statistics*, Vol. 64, pp.668–680.

Hamouda, O. and Rowley, J. (1997) *Time Series Models, Causality and Exogeneity*, Edward Elgar, Cheltenham.

Hsiao, C. (1979) 'Autoregressive modelling of Canadian money and income data', *Journal of the American Statistical Association*, Vol. 74, pp.553–560.

Hsiao, C. (1981) 'Autoregressive modelling and money-income causality detection', *Journal of Monetary Economics*, Vol. 7, pp.85–106.

Hsiao, C. (1982) 'Autoregressive modelling and causal ordering of economic variables', *Journal of Economic Dynamics and Control*, Vol. 4, pp.243–259.

Islam, M. (1998) 'Export expansion and economic growth: testing for cointegration and causality', *Applied Economics*, Vol. 30, pp.415–425.

Jones, J. (1989) 'A comparison of lag-length selection techniques in tests of Granger causality between money growth and inflation: evidence from the US, 1959–1986', *Applied Economics*, Vol. 21, pp.809–822.

Lee, J. (1997) 'Money, income and dynamic lag pattern', *Southern Economic Journal*, Vol. 64, pp.97–103.

Lutkepohl, H. (1982) 'Non-causality due to omitted variables', *Journal of Econometrics*, Vol. 19, pp.367–378.

Maddala, G. (1992) *Introduction to Econometrics*, 2nd ed., MacMillan, New York.

Mavrotas, G. and McGillivray, M. (Eds.) (2009) 'Development aid: expectations, effectiveness and allocation', in *Development Aid: A Fresh Look*, Palgrave Macmillan, Basingstoke.

OECD (2009) OECD.stat Online Database, OECD, Paris, available at www.oecd.org/dac/stats/idsonline (access by subscription).

Pierce, D. and Haugh, L. (1977) 'Causality in temporal systems: characterizations and a survey', *Journal of Econometrics*, Vol. 5, pp.265–293.

Roodman, D. (2008) 'Through the looking glass, and what OLS found there: on growth, foreign aid, and reverse causality', Working Paper No. 137, Centre for Global Development, Washington, DC.

Thornton, D. and Batten, D. (1985) 'Lag-length selection and tests of Granger causality between money and income', *Journal of Money, Credit, and Banking*, Vol. 17, pp.164–178.

Veenhoven, R. (2009) *World Database of Happiness*, Erasmus University, Rotterdam, available at http://www.worlddatabaseofhappiness.eur.nl.

Notes

1 Arvin and Lew (2009) is the only published paper to date that considers the role of happiness in foreign aid disbursements. However, the paper tests only for evidence of a *correlation* between aid flows and happiness. Using cross-country regressions over a period of five non-contiguous years (when happiness surveys were conducted for many donors and recipients), Arvin and Lew discover existence of different types of correlation between aid flows and happiness – for both donors and recipients.

2 Interested readers may refer to Frey (2008) for a good survey of the literature.

3 Lack of adequate time series data on happiness for aid *recipients* precludes us from examining the nexus between aid and happiness for poor countries.

4 For instance, Arvin et al. (2000) look at the issue of causality between foreign aid and exports, while Arvin and Barillas (2002) concentrate on foreign aid, poverty reduction, and democracy. See also Arvin et al. (2006) for a discussion of whether foreign aid has a causal impact on the state of the environment in developing countries and Roodman (2008) for an examination of causality between foreign aid and economic growth.

5 Readers should be aware that in the present study, causality is defined in a statistical sense, using the definition advanced by Granger (1969). The use of the Granger methodology is justified by the finding that it is more powerful than alternative tests [see, for example, Geweke et al. (1983)].

6 See, for example, Pierce and Haugh (1977) and Hamouda and Rowley (1997) for a discussion of various issues concerning Granger causality.

7 In this study, we use Z as the conditioning variable. Hence, the study does not include a third possible regression to determine the causal impact of X and/or Y on Z.

8 The reader should be cautioned that there is no universal agreement on whether lag lengths should be chosen to minimise FPE. For example, Jones (1989) demonstrates that lag lengths based on an arbitrary *ad hoc* procedure may be preferred under certain circumstances.

9 We use the OECD definition of ODA. This aid, of course, excludes private charitable donations as well as aid given through private and volunteer aid agencies.

10 Countries around the globe, including those in Europe, clearly have different degrees of tolerances towards inequality both at home and abroad. For instance, Alesina et al. (2001) find that Americans and Europeans have different degrees of preferences towards 'more equal societies.'

11 France's long tradition of centralised government dates back to the reigns of Henri IV (1589–1610) and Louis XIV (1643–1715).

Appendix

Table A1 Bivariate regressions

	Belgium		*Denmark*		*France*	
	Happiness	*ODA*	*Happiness*	*ODA*	*Happiness*	*ODA*
*l*odapc	0.0733		0.0551		0.126*	
	[0.0846]		[0.0564]		[0.0621]	
L1.*l*odapc	0.207*	–1.128***	–0.0369	–0.753***	0.0917	–0.2890
	[0.118]	[0.210]	[0.0731]	[0.230]	[0.0624]	[0.206]
L2.*l*odapc	0.1960	–0.672*	–0.0367	–0.1900	0.155**	–0.3870
	[0.131]	[0.324]	[0.0616]	[0.237]	[0.0656]	[0.227]
L3.*l*odapc	0.0707	–0.1570	0.0435	–0.407*	–0.0369	0.467**
	[0.112]	[0.292]	[0.0613]	[0.223]	[0.0743]	[0.222]
L4.*l*odapc	0.0491	–0.382*	–0.0228	–0.1990	–0.0993*	0.1490
	[0.0873]	[0.212]	[0.0560]	[0.213]	[0.0534]	[0.187]
*l*hap		0.4930		0.8270		1.357*
		[0.569]		[0.847]		[0.667]
L1.*l*hap	–0.384*	–0.7970	–0.1700	–0.2820	–0.0045	–2.0160
	[0.222]	[0.590]	[0.231]	[0.907]	[0.241]	[0.648]
Constant	0.0004	0.0016	0.0019	–0.0048	0.0063	–0.0112
	[0.00981]	[0.0254]	[0.00367]	[0.0143]	[0.00462]	[0.0156]
Adj R^2	*0.10*	*0.75*	*0.06*	*0.55*	*0.31*	*0.54*
	Ireland		*Luxembourg*		*Netherlands*	
	Happiness	*ODA*	*Happiness*	*ODA*	*Happiness*	*ODA*
*l*odapc	0.0222		–0.0166		0.0857	
	[0.0291]		[0.0315]		[0.0619]	
L1.*l*odapc	–0.0105	–0.773***	0.0091	–0.3100	–0.0159	–0.112
	[0.0317]	[0.154]	[0.0331]	[0.235]	[0.0578]	[0.173]
L2.*l*odapc	–0.0090	–0.369**	–0.0099	–0.380*		
	[0.0241]	[0.150]	[0.0317]	[0.219]		
L3.*l*odapc			–0.0077	0.0153		
			[0.0305]	[0.227]		
*l*hap		1.0670		–0.9170		0.772
		[1.399]		[1.736]		[0.558]
L1.*l*hap	–0.1510	1.2310	–0.2930	0.0714	–0.509***	0.179
	[0.203]	[1.401]	[0.223]	[1.732]	[0.161]	[0.566]
L2.*l*hap					–0.358**	0.570
					[0.152]	[0.489]
Constant	0.0007	–0.0193	0.0054	0.213***	0.0013	0.0261*
	[0.00626]	[0.0433]	[0.0119]	[0.0734]	[0.00529]	[0.0151]
Adj R^2	*–0.03*	*0.48*	*–0.10*	*0.01*	*0.23*	*0.00*

Notes: Dependent variables: happiness and ODA per capita.
Standard errors in brackets; *$p < 0.10$, **$p < 0.05$ and ***$p < 0.01$.
Odapc is aid per capita, hap is happiness, 'Li'.'*l*' in front of an independent variable denotes the following: 'Li' represents *i* lags and '*l*' is natural log of the variable. Lag lengths vary by variable; chosen to minimise FPE.

Table A1 Bivariate regressions (continued)

	Portugal		*Spain*		*UK*	
	Happiness	*ODA*	*Happiness*	*ODA*	*Happiness*	*ODA*
*l*odapc	–0.0205 [0.0392]		0.0138 [0.0448]		0.0260 [0.0307]	
L1.*l*odapc	–0.0497 [0.0362]	–0.470* [0.228]	–0.0202 [0.0450]	–0.2970 [0.241]	0.0273 [0.0330]	–0.310 [0.191]
*l*hap		–0.9350 [1.786]		0.4280 [1.388]		0.924 [1.095]
L1.*l*hap	–1.153*** [0.185]	–2.2230 [2.352]	–0.397* [0.227]	0.0954 [1.380]	–0.328* [0.169]	–1.188 [1.050]
L2.*l*hap	–0.676*** [0.188]	–1.8530 [1.690]				
Constant	0.0019 [0.0130]	0.0574 [0.0865]	0.0070 [0.0107]	0.0127 [0.0603]	–0.0021 [0.00436]	0.0288 [0.0256]
Adj R^2	*0.68*	*0.06*	*0.04*	*–0.07*	*0.08*	*0.11*

Notes: Dependent variables: happiness and ODA per capita.
Standard errors in brackets; *$p < 0.10$, **$p < 0.05$ and ***$p < 0.01$.
Odapc is aid per capita, hap is happiness, 'Li'.'*l*' in front of an independent variable denotes the following: 'Li' represents *i* lags and '*l*' is natural log of the variable. Lag lengths vary by variable; chosen to minimise FPE.

Table A2 Trivariate regressions – with GDP per capita

	Belgium		*Denmark*		*France*	
	Happiness	*ODA*	*Happiness*	*ODA*	*Happiness*	*ODA*
*l*odapc	0.0689 [0.0895]		0.0383 [0.0626]		0.129* [0.0647]	
L1.*l*odapc	0.236* [0.117]	–1.070*** [0.221]	–0.0550 [0.0794]	–0.689** [0.252]	0.141* [0.0725]	–0.290 [0.261]
L2.*l*odapc	0.2150 [0.133]	–0.779** [0.321]	–0.0309 [0.0651]	–0.1010 [0.243]	0.212** [0.0736]	–0.469 [0.281]
L3.*l*odapc	0.1050 [0.123]	–0.4060 [0.310]	0.0703 [0.0696]	–0.2140 [0.262]	0.0217 [0.0831]	0.375 [0.266]
L4.*l*odapc	0.0978 [0.103]	–0.582** [0.236]	–0.0003 [0.0626]	–0.0992 [0.232]	–0.0620 [0.0601]	0.0474 [0.209]
*l*hap		0.4620 [0.601]		0.5330 [0.870]		1.469* [0.737]
L1.*l*hap	–0.375* [0.215]	–0.4700 [0.592]	–0.2110 [0.243]	–0.5440 [0.918]	–0.1780 [0.269]	–1.706* [0.822]
*l*gdppc	0.6510 [0.785]	–3.475* [1.904]	0.1660 [0.244]	1.3340 [0.865]	0.5250 [0.459]	–2.089 [1.525]

Notes: Dependent variables: happiness and ODA per capita; control variable: GDP per capita.
Standard errors in brackets; *$p < 0.10$, **$p < 0.05$ and ***$p < 0.01$.
Odapc is aid per capita, hap is happiness, gdppc is GDP per capita, 'Li'.'*l*' in front of an independent variable denotes the following: 'Li' represents *i* lags and '*l*' is natural log of the variable. Lag lengths vary by variable; chosen to minimise FPE.

Table A2 Trivariate regressions – with GDP per capita (continued)

	Belgium		*Denmark*		*France*	
	Happiness	*ODA*	*Happiness*	*ODA*	*Happiness*	*ODA*
L1.*l*gdppc	1.311* [0.671]	–0.5110 [1.910]	0.1940 [0.234]	0.4200 [0.884]	0.5600 [0.455]	–0.481 [1.598]
L2.*l*gdppc					0.5750 [0.427]	–0.320 [1.514]
Constant	0.0004 [0.00939]	0.0004 [0.0243]	0.0021 [0.00379]	–0.0026 [0.0142]	0.0072 [0.00467]	–0.0119 [0.0166]
Adj R^2	*0.17*	*0.77*	*0.00*	*0.56*	*0.31*	*0.51*
	Ireland		*Luxembourg*		*Netherlands*	
	Happiness	*ODA*	*Happiness*	*ODA*	*Happiness*	*ODA*
*l*odapc	0.0200 [0.0279]		–0.0159 [0.0338]		0.0733 [0.0814]	
L1.*l*odapc	–0.0376 [0.0342]	–0.779*** [0.212]	0.0199 [0.0334]	–0.1700 [0.244]	0.0194 [0.0774]	–0.295 [0.189]
L2.*l*odapc	–0.0259 [0.0244]	–0.323* [0.180]				
*l*hap		1.1910 [1.666]		–0.8580 [1.826]		0.485 [0.539]
L1.*l*hap	–0.0761 [0.191]	0.7800 [1.473]	–0.2930 [0.234]	–0.5340 [1.799]	–0.552** [0.210]	–0.00449 [0.619]
L2.*l*hap					–0.2440 [0.213]	0.400 [0.557]
*l*gdppc	0.2600 [0.252]	–0.8870 [1.988]	–0.0066 [0.237]	2.2790 [1.644]	0.4310 [0.574]	–1.989 [1.434]
L1.*l*gdppc	0.0800 [0.269]	2.2810 [2.026]				
L2.*l*gdppc	0.618** [0.249]	0.2540 [2.185]	0.1290 [0.233]	0.0284 [1.730]	–0.2600 [0.560]	–1.739 [1.400]
L3.*l*gdppc			–0.0468 [0.214]	–1.1010 [1.548]	0.2320 [0.456]	–0.621 [1.174]
Constant	0.000598 [0.00577]	–0.017500 [0.0444]	–0.000014 [0.0144]	0.15800 [0.0984]	–0.00937 [0.0114]	0.0250 [0.0293]
Adj R^2	*0.13*	*0.46*	*–0.23*	*0.15*	*0.19*	*0.17*

Notes: Dependent variables: happiness and ODA per capita; control variable: GDP per capita.
Standard errors in brackets; *$p < 0.10$, **$p < 0.05$ and ***$p < 0.01$.
Odapc is aid per capita, hap is happiness, gdppc is GDP per capita, 'Li'.'*l*' in front of an independent variable denotes the following: 'Li' represents *i* lags and '*l*' is natural log of the variable. Lag lengths vary by variable; chosen to minimise FPE.

Table A2 Trivariate regressions – with GDP per capita (continued)

	Portugal		*Spain*		*UK*	
	Happiness	*ODA*	*Happiness*	*ODA*	*Happiness*	*ODA*
*l*odapc	–0.0151 [0.0652]		–0.0256 [0.0784]		0.0258 [0.0324]	
L1.*l*odapc	–0.0573 [0.0608]	–0.3310 [0.289]	–0.0630 [0.0572]	–0.419* [0.204]	0.0338 [0.0366]	–0.306 [0.223]
*l*hap		–0.3550 [1.526]		–0.4130 [1.262]		0.998 [1.253]
L1.*l*hap	–1.145*** [0.247]	–2.2610 [1.996]	–0.3930 [0.282]	0.8300 [1.207]	–0.442** [0.193]	–1.470 [1.293]
L2.*l*hap	–0.689** [0.238]	–1.8580 [1.449]				
*l*gdppc	0.4000 [1.410]	13.18** [5.439]	–0.8500 [0.988]	1.9750 [4.061]	–0.2540 [0.365]	3.625 [2.173]
L1.*l*gdppc	0.5310 [2.174]	–16.84* [9.107]	0.7120 [1.115]	5.3950 [4.234]	0.3330 [0.738]	–6.527 [4.412]
L2.*l*gdppc	–0.6560 [2.043]	10.8000 [9.331]	1.0080 [0.983]	0.8910 [4.138]	0.4730 [0.755]	4.606 [4.644]
L3.*l*gdppc	0.0530 [1.317]	2.5090 [6.324]	1.1530 [0.952]	2.2230 [4.031]	–0.5530 [0.374]	–1.564 [2.409]
Constant	–0.00281 [0.0290]	–0.1870 [0.127]	0.0105 [0.0122]	–0.0169 [0.0504]	0.000663 [0.230]	–1.404 [1.403]
Adj R^2	*0.60*	*0.39*	*0.00*	*–0.04*	*0.14*	*0.12*

Notes: Dependent variables: happiness and ODA per capita; control variable: GDP per capita.
Standard errors in brackets; *$p < 0.10$, **$p < 0.05$ and ***$p < 0.01$.
Odapc is aid per capita, hap is happiness, gdppc is GDP per capita, 'Li'.'*l*' in front of an independent variable denotes the following: 'Li' represents *i* lags and '*l*' is natural log of the variable. Lag lengths vary by variable; chosen to minimise FPE.

Table A3 Trivariate regressions – with unemployment rate

	Belgium		*Denmark*		*France*	
	Happiness	*ODA*	*Happiness*	*ODA*	*Happiness*	*ODA*
*l*odapc	0.0508 [0.0911]		0.0379 [0.0741]		0.176** [0.0687]	
L1.*l*odapc	0.1730 [0.128]	–1.159*** [0.220]	–0.0712 [0.0848]	–0.613** [0.238]	0.172** [0.0719]	–0.376 [0.232]
L2.*l*odapc	0.2060 [0.140]	–0.764** [0.347]	–0.0734 [0.0835]	–0.3260 [0.266]	0.195*** [0.0636]	–0.459** [0.210]
L3.*l*odapc	0.1150 [0.121]	–0.2620 [0.323]	0.0460 [0.0823]	–0.4220 [0.249]	0.0005 [0.0839]	0.393 [0.233]

Notes: Dependent variables: happiness and ODA per capita; control variable: unemployment rate.
Standard errors in brackets; *$p < 0.10$, **$p < 0.05$ and ***$p < 0.01$.
Odapc is aid per capita, hap is happiness, unemp is unemployment arte, 'Li'.'*l*' in front of an independent variable denotes the following: 'Li' represents *i* lags and '*l*' is natural log of the variable. Lag lengths vary by variable; chosen to minimise FPE.

Table A3 Trivariate regressions – with unemployment rate (continued)

	Belgium		*Denmark*		*France*	
	Happiness	*ODA*	*Happiness*	*ODA*	*Happiness*	*ODA*
L4.*l*odapc	0.0669 [0.0915]	–0.412* [0.224]	–0.0019 [0.0669]	–0.2130 [0.211]	–0.0978* [0.0511]	0.203 [0.162]
*l*hap		0.3540 [0.634]		0.4000 [0.782]		1.584** [0.617]
L1.*l*hap	–0.477* [0.235]	–0.9970 [0.648]	–0.2160 [0.255]	–0.5840 [0.832]	–0.0996 [0.300]	–1.729** [0.798]
Unemp	–0.0206 [0.0136]	0.0115 [0.0381]	–0.0025 [0.00333]	–0.0191* [0.00997]	–0.0112 [0.0109]	0.0171 [0.0335]
L1.unemp	0.0070 [0.0182]	–0.0342 [0.0474]	–0.0030 [0.00346]	0.0011 [0.0115]	0.0058 [0.0120]	–0.0534 [0.0339]
L2.unemp	–0.0029 [0.0138]	–0.0143 [0.0362]	–0.0010 [0.00317]	–0.0164 [0.00954]	0.0165 [0.0102]	–0.0291 [0.0321]
Constant	–0.000244 [0.00973]	0.00254 [0.0257]	0.00174 [0.00391]	–0.00611 [0.0127]	0.00470 [0.00451]	–0.00340 [0.0139]
Adj R^2	*0.11*	*0.75*	*0.31*	*0.65*	*0.40*	*0.66*
	Ireland		*Luxembourg*		*Netherlands*	
	Happiness	*ODA*	*Happiness*	*ODA*	*Happiness*	*ODA*
*l*odapc	0.0228 [0.0306]		–0.0096 [0.0376]		0.0966 [0.0712]	
L1.*l*odapc	–0.0095 [0.0346]	–0.816*** [0.167]	0.0093 [0.0411]	–0.490* [0.253]	0.0167 [0.0674]	–0.163 [0.191]
L2.*l*odapc	–0.0097 [0.0261]	–0.398** [0.163]	–0.0147 [0.0406]	–0.499* [0.248]		
L3.*l*odapc			–0.0302 [0.0392]	0.0358 [0.274]		
*l*hap		1.1330 [1.518]		–0.4500 [1.766]		0.799 [0.589]
L1.*l*hap	–0.1220 [0.207]	1.2370 [1.447]	–0.2700 [0.241]	–0.2550 [1.715]	–0.558*** [0.192]	0.252 [0.647]
L2.*l*hap					–0.2050 [0.196]	0.228 [0.575]
Unemp	–0.00270 [0.00525]	–0.0330 [0.0365]	0.0268 [0.0322]	–0.3310 [0.209]	–0.0105 [0.00824]	0.0289 [0.0238]
L1.unemp	–0.00139 [0.00525]	0.0107 [0.0370]	–0.0541 [0.0538]	0.4050 [0.366]	0.00253 [0.0106]	–0.0513* [0.0284]
L2.unemp	–0.00728 [0.00495]	0.0226 [0.0363]	0.0254 [0.0323]	–0.1870 [0.221]	0.00639 [0.00885]	0.0262 [0.0251]

Notes: Dependent variables: happiness and ODA per capita; control variable: unemployment rate. Standard errors in brackets; *$p < 0.10$, **$p < 0.05$ and ***$p < 0.01$.
Odapc is aid per capita, hap is happiness, unemp is unemployment arte, 'Li'.'*l*' in front of an independent variable denotes the following: 'Li' represents *i* lags and '*l*' is natural log of the variable. Lag lengths vary by variable; chosen to minimise FPE.

Table A3 Trivariate regressions – with unemployment rate (continued)

	Ireland		*Luxembourg*		*Netherlands*	
	Happiness	*ODA*	*Happiness*	*ODA*	*Happiness*	*ODA*
L3.unemp					–0.00637	0.00557
					[0.00691]	[0.0202]
Constant	0.0008	–0.0181	0.0117	0.474**	0.000317	0.0221
	[0.00635]	[0.0446]	[0.0321]	[0.184]	[0.00546]	[0.0150]
Adj R^2	*–0.06*	*0.45*	*–0.22*	*0.06*	*0.22*	*0.00*
	Portugal		*Spain*		*UK*	
	Happiness	*ODA*	*Happiness*	*ODA*	*Happiness*	*ODA*
*l*odapc	0.00399		0.0360		0.0346	
	[0.0544]		[0.0532]		[0.0305]	
L1.*l*odapc	–0.0551	–0.3680	–0.0279	–0.1580	0.0282	–0.356*
	[0.0463]	[0.263]	[0.0546]	[0.290]	[0.0335]	[0.205]
*l*hap		0.1350		1.0200		1.414
		[1.836]		[1.508]		[1.247]
L1.*l*hap	–1.070***	–1.3060	–0.4170	0.5770	–0.2920	–1.664
	[0.219]	[2.305]	[0.240]	[1.420]	[0.190]	[1.224]
L2.*l*hap	–0.572**	–2.0830				
	[0.248]	[1.655]				
Unemp	0.00659	–0.267*	0.00793	–0.0788*	0.00468	–0.0522
	[0.0286]	[0.143]	[0.00777]	[0.0366]	[0.00528]	[0.0326]
L1.unemp	–0.0332	0.2440	–0.00344	0.00100	–0.0146**	0.0587
	[0.0331]	[0.186]	[0.00784]	[0.0421]	[0.00582]	[0.0399]
L2.unemp	0.0274	–0.1340	–0.00650	–0.0131	0.00526	–0.0442
	[0.0269]	[0.159]	[0.00680]	[0.0373]	[0.00521]	[0.0328]
L3.unemp	0.00157	–0.1140				
	[0.0229]	[0.128]				
Constant	0.00398	0.0517	0.00855	0.00485	–0.0012	0.0290
	[0.0145]	[0.0828]	[0.0112]	[0.0612]	[0.00422]	[0.0264]
Adj R^2	*0.63*	*0.18*	*0.00*	*0.04*	*0.18*	*0.12*

Notes: Dependent variables: happiness and ODA per capita; control variable: unemployment rate. Standard errors in brackets; *$p < 0.10$, **$p < 0.05$ and ***$p < 0.01$.
Odapc is aid per capita, hap is happiness, unemp is unemployment arte, 'Li'.'*l*' in front of an independent variable denotes the following: 'Li' represents *i* lags and '*l*' is natural log of the variable. Lag lengths vary by variable; chosen to minimise FPE.