Tol, Richard S.J.; Bigano, Andrea; Hamilton, Jacqueline M.

Working Paper

The Impact of Climate on Holiday Destination Choice

Nota di Lavoro, Fondazione Eni Enrico Mattei, No. 4.2005

Provided in Cooperation with:
Fondazione Eni Enrico Mattei (FEEM)

This Version is available at:
http://hdl.handle.net/10419/74115

The Impact of Climate on
Holiday Destination Choice

Andrea Bigano, Jacqueline M. Hamilton
and Richard S.J. Tol

NOTA DI LAVORO 4.2005

JANUARY 2005

CCMP – Climate Change Modelling and Policy

Andrea Bigano, *Fondazione Eni Enrico Mattei, International Centre for Theoretical Physics, Centre for Economic Studies, Catholic University of Leuven*
Jacqueline M. Hamilton, *Research unit Sustainability and Global Change, Hamburg University and Centre for Marine and Atmospheric Science*
Richard S.J. Tol*, Research unit Sustainability and Global Change, Hamburg University and Centre for Marine and Atmospheric Science, Institute for Environmental Studies, Vrije Universiteit, Engineering and Public Policy, Carnegie Mellon University*

The Impact of Climate on Holiday Destination Choice

Summary

The holiday destination choice is analysed for tourists from 45 countries, representing all continents and all climates. Tourists are deterred by distance, political instability and poverty, and attracted to coasts. Tourists prefer countries with a sunny yet mild climate, shun climes that are too hot or too cold. A country's tourists' aversion for poverty and distance can be predicted by that country's average per capita income. The preferred holiday climate is the same for all tourists, independent of the home climate. However, tourists from hotter climates have more pronounced preferences.

Keywords: Climate change, Impacts, Adaptation, Acclimatisation, Domestic tourism, International tourism

 JEL Classification: L83, Q25

Address for correspondence:

Richard S.J. Tol
Hamburg University
Bundesstrasse 55
20146 Hamburg
Germany
Phone: +49 40 428387007/8
Fax: +49 40 428387009
E-mail: tol@dkrz.de

1.   Introduction

Tourism is one of the largest economic sectors in the world. Tourists are sensitive to climate and to climate change (Maddison, 2001; Lise and Tol, 2002 and Hamilton, 2003). This combination makes tourism potentially one of the largest market impacts of climate change. Indeed, Berritella *et al.* (2004) find large impacts of climate change on tourism already by 2050. However, previous estimates of the relationship between climate and tourist destination choice suffer from two major drawbacks. Firstly, tourists from only a few countries are analysed. This potentially biases the results. Secondly, domestic tourism is not explicitly included. The potential bias of this is larger, as domestic tourism is about 5 times as large as international tourism. This paper seeks to overcome these two drawbacks by looking at the destination choice of tourists from 45 countries from all levels of development and all climates. The tourists travel to 200-odd countries, including the home country.

Previous papers on climate change and tourism have focussed on biophysically constructed comfort indices (see, for example, Scott and McBoyle, 2001; and Amelung and Viner, in press), and on potential impacts and adaptation of particular tourism resorts (see, for example, Gable, 1997; Harrison *et al.,* 1999; Perry, 2000; Lohmann, 2001; and Elsasser and Bürki, 2002). Other papers, which include destination characteristics, are closer to the analysis presented here. Maddison (2001), Lise and Tol (2002), and Hamilton (2003) use micro-data of UK, Dutch and German tourists, respectively, to statistically estimate the relationship between destination choice, various climate indices and a range of other explanatory variables. In the paper by Hamilton, the origin country, Germany, was included in the destination choice set. See Hamilton and Tol (2004) for an extensive review of the literature on the impacts of climate change on tourism.

Compared to international tourism, there are relatively few studies on domestic tourism. There are some studies, however, that examine the trends in domestic tourism for particular countries: for example, Australia (Faulkner, 1988), China (Wen, 1997) and Germany (Coles, 2003). In some developing countries, domestic tourism has been increasing rapidly (Wen, 1997 and Ghimire, 2001), whereas in developed countries such as Australia and Germany domestic tourism is relatively stable. The geographical spread of domestic tourists is different from international tourists and domestic tourists and from domestic holidaymakers and those visiting friends and relatives (see, for example, Seaton and Palmer, 1997 and Seckelmann, 2002). Some studies argue that tourists behave differently on a domestic holiday compared to an international holiday (see Carr, 2002). Few attempts have been made to estimate demand functions for domestic tourism. In a study carried out for the North East of England, the demand function is restricted to the price of tourism in the region, the price of substitutes and the income of tourists (Seddighi and Shearing, 1997). Typically, demand estimation studies do not include destination characteristics (Morley, 1992).

Besides a detailed analysis of Dutch tourists, Lise and Tol (2002) also report a statistical analysis of aggregate data of tourism flows between selected OECD countries. It is this analysis that we extend here to include more origin countries and many more destination countries. As the analysis is at the aggregate level, many details are lost. In return, we obtain comprehensiveness.

The paper proceeds as follows. Section 2 presents the data. Section 3 shows the results for the 45 countries, as well as the consolidated results. Section 4 discusses and concludes.

2.   The data

International tourism

International tourism data for each country are taken from the World Tourism Organisation (WTO) (2003). Where available, we use Table 1: international arrivals of tourists by *country of residence*. If not available, we use the alternative Table 1: international arrivals of tourists by *nationality*. If this is also not available, we instead use Table 4: international arrivals of tourists in *all establishments*. In the current study, no distinction is made between residence and nationality. If there is no Table 4 either, we use Table 3: international arrivals of tourists in *hotels*.

WTO (2003) reports the annual number of tourist arrivals for 1997-2001. We use the average of these five years, smoothing out annual variability.

Germany generates the most international tourists (72 mln), followed by the USA (57 mln), the UK (53 mln), the Netherlands (24 mln) and France (22 mln). These numbers are not in proportion to population size, nor to per capita income. The high numbers for the three northwest European countries probably has to do with the unreliable summer weather and, for the Netherlands, the small country size.

France is the most popular destination for international tourists (72 mln), followed by the USA (48 mln), Spain (40 mln), Italy (37 mln) and Mexico (20 mln). The popularity of France, Spain and Italy is explained by their proximity to Germany, the UK and the Netherlands, while Mexico profits from being close to the USA.

Domestic Tourism

For most countries, the volume of domestic tourist flows is derived using 1997 data contained in the Euromonitor (2002) database. For some other countries, we rely upon data from alternative sources, such as national statistical offices, other governmental institutions or trade associations. For some very small states (mostly city states[1]), we assumed that the number of domestic tourists is zero. Data are mostly in the form of number of trips to destinations beyond a non-negligible distance from the place of residence, and involving at least one overnight stay. For some countries, data in such a format was not available, and we resorted to using either the number of registered guests in hotels, campsites, hostels etc., or the ratio ofthe number of overnight stays to the average length of stay. The latter formats underestimate domestic tourism by excluding trips to friends and relatives; nevertheless, we included such data for completeness, relying on the fact that dropping them did not lead to any dramatic change. See Bigano *et al.* (2004) for a more extensive discussion and listing of sources.

In general, the number of domestic tourists is less than the national population; however, in 22 countries, residents took a holiday within their national borders more than once per year. Many factors may concur to explain this behaviour and a systematic analysis of them falls into the scope of the next sections. However, a preliminary look at the characteristics of countries, which display a marked domestic tourist activity, shows that these are in general rich countries, large (or at least medium-sized), and endowed with plenty of opportunities for domestic tourism. This definition fits in particular to the Scandinavian countries (4.8 domestic tourists per resident in Sweden) but also Canada, Australia, and the USA.[2]

---

[1] Andorra, Malta, Monaco and San Marino. Data were available for Hong Kong, Macau, Singapore and Liechtenstein.

[2] Poland, ranking 8th, is particularly active notwithstanding substantially lower per capita income than the rest of the top 10 countries.

In the USA, the combination of a large national area, a large number of tourist sites, high income per capita and the willingness to travel long distances contribute to explain why, on average, each American took a domestic holiday 3.67 times in 1997. The distance from the rest of the world is also important, and this is most probably the case for Australia and New Zealand, where there are plenty of opportunities for domestic tourism and it may take a very long journey to reach almost every international tourist destination. Table 1 shows the 10 most active and the 10 least active countries in terms of domestic tourism, for which we were able to collect data. For the 10 least active countries, the poverty of the vast majority of the population, probably combined with the lack of infrastructure and perhaps with cultural factors, make tourist travel a luxury for the lucky few.

Other data

A number of explanatory variables are used in the regressions reported below. Per capita income is taken from WRI (2002), temperature from New *et al.* (1999), world heritage sites from UNESCO (2004), area and coastline length from the CIA (2004) and the index of political stability from Kaufmann et al. (1999). The distance between countries is calculated from the great circles distance between the capital cities, the longitude and latitude of which were taken from the Times Atlas (1994).

3.   Results

Preliminary findings

We estimate the following relationship for all countries of origin:

$$(1) \quad \begin{aligned} \ln(A_i^j) &= c^j + \delta_d^j + \delta_h^j + \delta_a^j + \\ &\quad \alpha_1^j(1 - I_{i=j})\ln(D_i^j) + \alpha_2^j \ln(y_i) + \alpha_3^j T_i + \alpha_4^j T_i^2 + \alpha_5^j H_i + \alpha_6^j C_i + \alpha_7^j A_i + \alpha_8^j S_i \end{aligned}$$

where A_i^i denotes the arrivals in country i from country j; D_i^j is the distance between the two countries (the range of t-statistics for the 45 regressions is –8.96 to 1.29); y_i is per capita income in the destination country (range of t-statistics 0.09 to 4.90); T_i is the annual average temperature in the destination country (range of t-statistics, linear –2.10 to 4.61, quadratic –4.36 to 2.16); H_i is the number of world heritage sites per million square kilometers in the destination country (range of t-statistics –2.57 to 2.30); C_i is the length of the coast line of the destination country (range of t-statistics –2.36 to 3.31); A_i is the land area of the destination country (range of t-statistics –0.91 to 3.77); and S_i is an index of the political stability of the destination country (range of t-statistics -0.49 to 3.00); besides the constant c, we also estimate three dummies, viz. whether the tourists stay in their home country ($i=j$) (range of t-statistics –5.66 to 4.59), whether the destination country reports only tourists arriving in hotels (range of t-statistics -2.38 to 2.15), or in all tourism establishments (range of t-statistics –3.01 to 0.57); the default reporting is for tourists arriving at the border.

Table A1 shows the results. Distance has a clear negative effect: destinations that are further away are less popular. Distance is significant at the 5% for all countries except Brazil, Switzerland and the USA. Per capita income in the destination country has a positive effect; tourists, particularly tourists from richer countries, do not like to witness poverty. Per capita income is significant at the 5% level for the Americas and Europe, except the Czech Republic, Germany, Hungary, and the Netherlands but is not significant for Africa, Asia and Australasia, except for Australia, China, India, Japan, and the Philippines. Temperature has a significant effect. The temperature parameters are jointly significant at the 5% level in all countries except Congo, Germany and Russia and the relationship, between temperature and

the number of tourists, has the expected inverted-U shape in all countries except Germany and the Netherlands. Coast length has a positive effect or has no effect on tourist numbers; the coast length parameter is positive and significant in about half of the countries, without a pattern that can be easily interpreted. The Netherlands is the only country with a negative and significant relationship. The number of world heritage sites has a *negative* effect or has no effect, depending on the country of origin. The parameter is positive and significant for Indonesia and the Netherlands but it is negative and significant for Algeria, China, Germany, Saudi Arabia, Tunisia, and the USA. Area has a positive effect: larger countries attract more tourists. This parameter is insignificant for Argentina, New Zealand and the countries of Europe, apart from Greece, Poland and Russia. Political stability has a positive effect: the more stable the country, the more tourists it attracts. Stability is significant at the 5% level for Canada, the Czech Republic, Egypt, Hungary, Indonesia, Kenya, Malaysia, Mexico, South Africa, Sweden, Thailand and Turkey.

The regression results conform to our expectations, with two exceptions. The attitude of tourists from the Netherlands towards climate and coast is peculiar. It is odd that the world heritage sites appear to deter tourists. However, some peculiarities are to be expected with one standard regression for 45 different countries.

Interpretation

Figure 1 shows the relationship between the optimal holiday temperature and the temperature in the country of origin. This relationship is largely absent. This is confirmed by a regression analysis. Figure 2 shows the relationship between α_4, the parameter of the temperature squared in Equation (1), and the temperature in the country of origin. Here, there is a clear relationship. Weighted least squares, using the inverse of the standard error of the parameter estimates as weights, shows that this parameter falls by 2.5 (0.9) 10^{-4} for every degree increase in temperature.[3] Although people from hot countries prefer the same climate as people from cold countries, they are much more particular about their preferences, and have a greater dislike of tourist destinations that are too hot or too cold.

The distance elasticity of arrivals falls with per capita income in the country of origin, with 5.4 (1.2) 10^{-5} per additional dollar. This is as expected: travel expenses are less relevant to the better-off. Poverty aversion, α_2 in Equation (1), increase with per capita income in the home country, with 1.3 (0.5) 10^{-5} per additional dollar. This is as expected: people from poor countries are less deterred by poverty.

Consolidated results

We separately estimate the relationships that describe the behaviour of tourists from 45 countries. We find that there is a meta-structure in the parameters. That is, additional information, that is not considered in the first regressions. In order to use this information, we run the following procedure: One by one, we omit each country from the analysis above. Based on the original parameter estimates for the remaining 44 countries, we predict the parameter value for the 45th country. We combine this prior information with the likelihood information of the original regression of the 45th country to form the posterior for the 45th country. The equations are

(2) $\Sigma = (T^{-1} + \Upsilon^{-1})^{-1}$

---

[3] Figure 2 suggests that the relationship is quadratic, that is, the parameter first falls and then rises. However, temperature squared does not significantly affect the parameter (and its coefficient is in fact of the wrong sign).

and

(3) $\qquad \beta = \Sigma(T^{-1}\alpha + \Upsilon^{-1}\gamma)$

where β is the new vector of parameter estimates for Equation (1) and Σ is its covariance matrix; α is the original vector of parameter estimates for Equation (1) and T is its covariance matrix; and γ is the vector of predicted parameter values and Y is its covariance matrix. For γ, we use a zero if no prediction is available; the corresponding diagonal element in Y is set to infinity. The off-diagonal elements of Y are all set to zero. The classical equivalent of this Bayesian procedure is mixed estimation by Theil and Goldberger (1961). If we just use the average of the parameter values of the other countries (rather than the average adjusted for temperature or per capita income), this procedure would correspond to a panel data analysis with random effects. With the adjustments for temperature and per capita income, this corresponds to a panel data analysis with cross-terms and random effects.

Table 2 shows the results for adding information on the optimal holiday temperature, the curvature of the temperature/attractiveness curve (the temperature squared parameter), the distance elasticity, and the poverty aversion. Results are as expected. The estimated optimal holiday temperature per country are shrunk to the global mean optimal holiday temperature, which is 16.2 (0.5)°C. This is no surprise, as the uncertainty about the global mean optimal holiday temperature is much smaller than the typical uncertainty about the country optimal holiday temperature. The standard deviations of the latter vary between 0.8°C and 11.4°C.

Similar things happen with the other parameters, but in these cases, the estimates are not shrunk to the global mean, but rather to the predicted value, conditional on per capita income or temperature. With regard to the curvature of the temperature / attractiveness relationship, the predictions dominate the initial estimate. As a result, the noise of Figure 2 is considerably reduced, both in terms of country-to-country comparisons, and in terms of uncertainty about the estimated parameters. Germany and the Netherlands initially had positive estimates; the consolidated estimates are negative, as expected.

For the distance elasticity, the predicted parameter values are less dominant, but nonetheless do reduce both types of noise. For poverty aversion, the predicted parameter values dominate.

4.   Discussion and conclusion

The following results emerge from the above analysis. People from any country prefer the same climate for their holidays. The optimal holiday destination has an average annual temperature of 16.2±2·0.5°C. Mediterranean countries fall in this range. This conclusion is remarkable. People from Canada, Russia and Sweden prefer to be in the same climate as do people from Bangladesh, Brazil and Nigeria. This suggests that people's climate preferences are driven by basic biological processes, with limited or no acclimatisation to the climates in which they live.

However, this conclusion does not carry over to the second moment. People from warmer climes have sharper preferences, are more particular about their choices than are people from colder climes. For example, a Swede would prefer to spend her holiday in the Provence, but would not really object to a holiday in Denmark; an Italian would similarly prefer the Provence, but would feel bad if he ends up in Denmark instead. This result is as remarkable as the first one. As preferences are assumed to be symmetrical around the optimum climate, it suggests that people from colder climes have got used to unpleasant weather, and therefore think less of it. The surprising part is not that they do not mind the cold, but they also do not mind heat. People from hot places avoid cold places for their holidays, as expected, but similarly avoid places that are too hot. Perhaps people from cold climes know they can handle

cold but cannot imagine heat, while people from hot places can imagine cold. Another explanation is that the assumed symmetry is not real. Introducing asymmetries into the analysis is not trivial, however, and would require a larger number of observations.

The wider implications for adaptation to climate and climate change readily follow. It has long been argued that people adapt to extreme rather than mean weather. Here, we find that there is evidence of adaptation in the extremes of behaviour, but not in the mean.

The implications for the impacts of climate change on tourism are also clear. Climate change would drive tourists up the mountains and towards the poles. Although not analysed here, climate change would also induce people to avoid July and August, and have holidays in June and September instead (in the Northern Hemisphere). Tourists from warmer climates would respond more strongly than tourists from colder places. This implies that tourist resorts in places that are likely to become too hot, should strengthen the loyalty of their visitors from cold places but not from hot places. Potential tourist resorts that are likely to become sufficiently warm, should also target tourists from cold countries. Only resorts with a near perfect climate should target tourists from hotter places. Another implication, as the bulk of the future growth of tourism is bound to originate from hotter countries, is that tourism as a whole is likely to become more sensitive to climate change as time passes.

Future research should look into the asymmetries sketched above. It should also study tourist destination choice paying greater attention to spatial and temporal resolution (national and annual is probably not good enough) and to tourist characteristics. A crude study such as this one yields sufficiently interesting results to warrant further research.

References

Amelung, B. and D. Viner, in press. The vulnerability to climate change of the Mediterranean as a tourist destination. In: *Climate Change and Tourism: Assessment and Coping Strategies* [Amelung, B., K. Blazejczyk, A. Matzarakis and D.Viner (eds.)]. Kluwer Academic Publishers, Dordrecht, the Netherlands.

Berritella, M., A. Bigano, R. Roson and R.S.J. Tol, 2004: A general equilibrium analysis of climate change impacts on tourism. Research Unit Sustainability and Global Change Working Paper FNU-49, Hamburg University and Centre for Marine and Atmospheric Science, Hamburg, Germany.

Bigano, A., J.M. Hamilton, M. Lau, R.S.J. Tol and Y. Zhou (2004), *A global database of domestic and international tourist numbers at national and subnational level*, Research unit Sustainability and Global Change **FNU-54**, Hamburg University and Centre for Marine and Atmospheric Science, Hamburg.

Carr, N., 2002: A comparative analysis of the behaviour of domestic and international young tourists. *Tourism Management,* **23**, 321-325

CIA, 2002: *The World Factbook 2002*. Central Intelligence Agency, Washington, D.C., USA. Retrieved from http://www.cia.gov/cia/publications/factbookColes, T., 2003: The emergent tourism industry in eastern Germany a decade after unification. *Tourism Management*, **24**, 217-226

Elsasser, H. and R. Bürki, 2002: Climate change as a threat to tourism in the Alps. *Climate Research*, **20**, 253-257.

Euromonitor 2002: Global Market Information Database, http://www.euromonitor.com/gmid/default.asp

Faulkner, B., 1988: Tourism demand patterns-Australia. *International Journal of Hospitality Management*, **7(4),** 333-341

Gable, F. J., 1997: Climate change impacts on Caribbean coastal areas and tourism. *Journal of Coastal Research,* **27**, 49-70.

Ghimire, K.B. 2001: *The Native Tourist*. Earthscan, London, UK

Hamilton, J.M., 2003: Climate and the destination choice of German tourists. Research Unit Sustainability and Global Change Working Paper FNU-15 (revised), Centre for Marine and Climate Research, Hamburg University, Germany.

Hamilton, J.M. and R.S.J. Tol (2004), *The Impacts of Climate Change on Tourism and Recreation,* Research Unit Sustainability and Global Change **FNU-52**, Hamburg University and Centre for Marine and Atmospheric Science, Hamburg.

Harrison, S.J., S.J. Winterbottom and C. Shephard, 1999: The potential effects of climate change on the Scottish tourist industry. *Tourism Management*, **20**, 203-211.

Kaufmann, D., A. Kraay & P. Zoido-Lobaton, 1999: Governance Matters. Policy Research Working Paper 2196. World Bank, Washington, USA.

Lise, W. and R.S.J. Tol, 2002: Impact of climate on tourism demand. *Climatic Change*, **55(4)**, 429-449.

Lohmann, M., 2001: Coastal resorts and climate change. In: *Tourism and Hospitality in the 21st Century*, [Lockwood, A. and S. Medlik (eds.)]. Butterworth-Heinemann, Oxford, UK, pp. 284 – 295.

Maddison, D., 2001: In search of warmer climates? The impact of climate change on flows of British tourists. In: *The Amenity Value of the Global Climate*, [Maddison, D. (ed)]. Earthscan, London, UK, pp. 53-76.

Morley, C.L., 1992: A microeconomic theory of international tourism demand. *Annals of Tourism Research*, **19**, 250-267.

Nakicenovic, N. and R.J. Swart, 2001: *IPCC Special Report on Emissions Scenarios*. Cambridge University Press, Cambridge, UK.

New, M., Hulme, M. and P.D. Jones, 1999: Representing Twentieth Century Space-Time Climate Variability, Part I: Development of a 1961-1990 Mean Monthly Terrestrial Climatology. *Journal of Climate*, **12**, 829-856.

Perry, A., 2000: Impacts of climate change on tourism in the Mediterranean: Adaptive responses. Nota di Lavoro 35.2000, Fondazione Eni Enrico Mattei, Milan, Italy.

Scott, D. and G. McBoyle, 2001: Using a "Tourism Climate Index" to examine the implications of climate change for Climate as a Tourism Resource. In: *International Society of Biometeorology Proceedings of the First International Workshop on Climate, Tourism and Recreation*. [Matzarakis, A. and C. de Freitas (eds.)]. Retrieved from http://www.mif.uni-freiburg.de/isb/ws/report.htm

Seaton, A.V. and C. Palmer, 1997: Understanding VFR tourism behaviour: the first five years of the United Kingdom tourism survey. *Tourism Management,* **18(6)**, 345-355.

Seckelmann, A., 2002: Domestic tourism – a chance for regional development in Turkey. *Tourism Management,* **23**, 85-92.

Seddighi, H.R. and D.F. Shearing, 1997: The demand for tourism in North East England with special reference to Northumbria: an empirical analysis. *Tourism Management*, **18(8),** 499-511.

Smith, J.B., H.-J. Schellnhuber, M.M.Q. Mirza, S. Fankhauser, R. Leemans, E. Lin, L. Ogallo, B. Pittock, R.G. Richels, C. Rosenzweig, R.S.J. Tol, J.P. Weyant and G.W. Yohe , 2001: Vulnerability to climate change and reasons for concern: a synthesis. In: *Climate Change 2001: Impacts, Adaptation, and Vulnerability* [J.J. McCarthy, O.F. Canziani, N.A. Leary, D.J. Dokken and K.S. White (eds.)]. Cambridge University Press, Cambridge, UK, Chapter 19, pp. 913-967.

The Times Atlas of the World (1994), 9th Comprehensive Edition, Harper Collins, London.

UNESCO, 2004: *World Heritage List*. UNESCO, Paris, France. Retrieved from http://whc.unesco.org.

Wen, Z., 1997: China's domestic tourism: impetus development and trends. *Tourism Management*, **18(8),** 565-571.

WRI, 2002: *World Resources Database 2002-2003*. World Resources Institute, Washington, D.C., USA

WTO, 2003: *Yearbook of Tourism Statistics*. World Tourism Organization, Madrid, Spain.

Table 1. Domestic tourism in the 10 most active and in the 10 least active countries[4]

Least active countries	Domestic tourists / residents	GDP per Capita 1997	Area (sq km)	Most active countries	Domestic tourists /residents	GDP per capita 1997	Area (sq km)
Congo	0.00778	815	342000	Sweden	4.79903	26766	449964
Togo	0.00406	349	56785	Finland	4.41692	26888	337030
Nicaragua	0.00399	521	129494	New Zealand	4.12968	16834	268680
Albania	0.00362	785	28748	United States	3.67587	28651	9629091
El Salvador	0.00318	1702	21040	Australia	3.52266	20843	7686859
Senegal	0.00285	570	196190	Canada	2.67469	20225	9976140
Kenya	0.00231	338	582650	United Kingdom	2.28203	20025	244820
Mali	0.00224	262	1240000	Poland	2.24071	3482	312685
Niger	0.00037	206	1267000	Ireland	1.87281	21083	70280
Chad	0.00014	224	1284000	Norway	1.42087	36389	324220

---

[4] GDP per Capita is expressed in 1995 constant US Dollars. The entry for Nicaragua refers to 1996.

Table 2. Consolidated regression results (standard deviations in brackets).

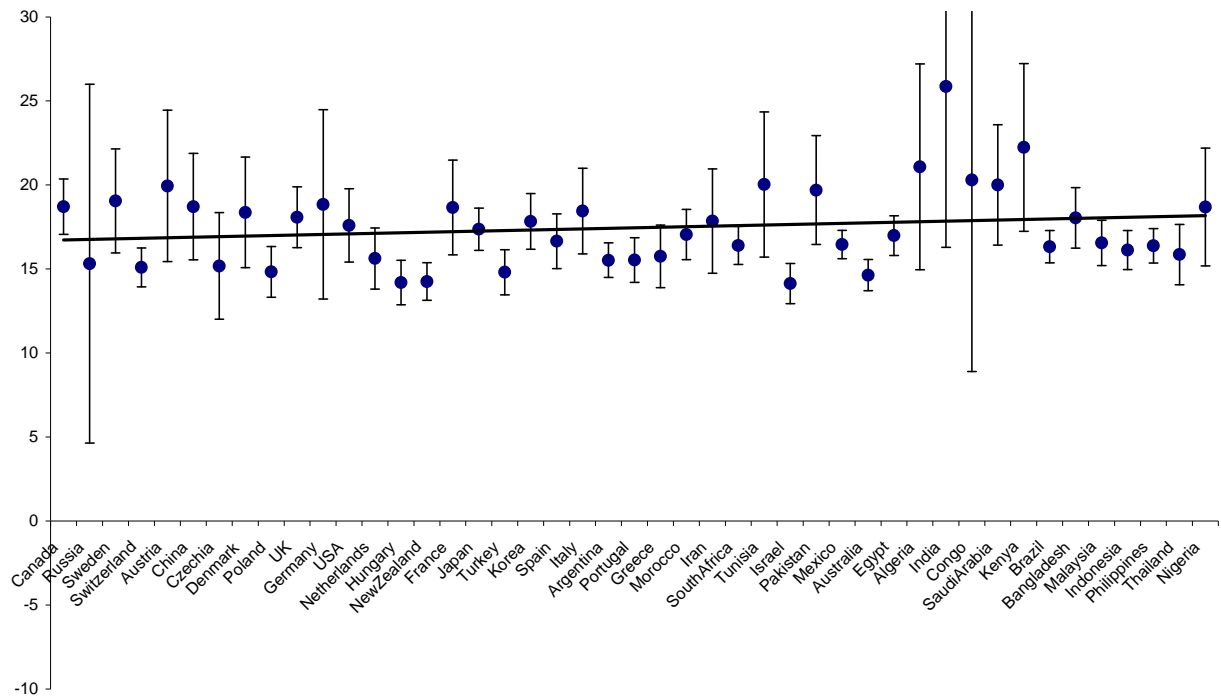|	Optimal temperature		Temperature squared		Distance		Per capita income	
Kenya	16.2	(0.5)	-0.0141	(0.0014)	-2.3232	(0.2158)	0.5565	(0.0908)
Congo	16.2	(0.5)	-0.0142	(0.0014)	-2.2678	(0.2361)	0.5572	(0.0926)
Algeria	16.2	(0.5)	-0.0138	(0.0014)	-2.1888	(0.2350)	0.5997	(0.0955)
Morocco	16.3	(0.5)	-0.0129	(0.0014)	-2.2289	(0.2372)	0.5754	(0.0933)
Tunisia	16.2	(0.5)	-0.0130	(0.0014)	-2.1186	(0.2390)	0.6176	(0.0967)
South Africa	16.2	(0.5)	-0.0130	(0.0013)	-1.8102	(0.2032)	0.6500	(0.0984)
Nigeria	16.2	(0.5)	-0.0147	(0.0014)	-2.2784	(0.2210)	0.5400	(0.0914)
Canada	16.4	(0.5)	-0.0074	(0.0013)	-0.9420	(0.2419)	0.7975	(0.1254)
Mexico	16.2	(0.4)	-0.0141	(0.0013)	-1.7785	(0.2066)	0.6985	(0.0991)
USA	16.2	(0.5)	-0.0099	(0.0013)	-0.2168	(0.1568)	1.0695	(0.1520)
Argentina	16.0	(0.5)	-0.0124	(0.0014)	-1.7020	(0.2538)	0.7279	(0.1094)
Brazil	16.2	(0.5)	-0.0149	(0.0014)	-0.6997	(0.1688)	0.6797	(0.0959)
China	16.2	(0.5)	-0.0098	(0.0013)	-2.2219	(0.2114)	0.6063	(0.0920)
Japan	16.3	(0.5)	-0.0113	(0.0013)	-2.0108	(0.2999)	0.9763	(0.1315)
Korea	16.3	(0.5)	-0.0114	(0.0014)	-1.8209	(0.2795)	0.7645	(0.1194)
Indonesia	16.2	(0.5)	-0.0149	(0.0014)	-2.3915	(0.2178)	0.5660	(0.0924)
Malaysia	16.2	(0.5)	-0.0146	(0.0013)	-2.3561	(0.2226)	0.6675	(0.1027)
Philippines	16.2	(0.5)	-0.0147	(0.0013)	-2.2751	(0.2009)	0.6051	(0.0919)
Thailand	16.1	(0.5)	-0.0147	(0.0014)	-2.3322	(0.2205)	0.6345	(0.0969)
Australia	15.8	(0.5)	-0.0139	(0.0013)	-1.8335	(0.3240)	0.8106	(0.1305)
New Zealand	15.8	(0.5)	-0.0114	(0.0013)	-1.6265	(0.3081)	0.7441	(0.1205)
Czechia	16.1	(0.5)	-0.0100	(0.0015)	-1.8838	(0.2416)	0.7009	(0.1088)
Hungary	15.9	(0.5)	-0.0110	(0.0014)	-1.8694	(0.2223)	0.6770	(0.1041)
Poland	16.0	(0.5)	-0.0106	(0.0013)	-1.9749	(0.2141)	0.6599	(0.0976)
Russia	16.2	(0.5)	-0.0066	(0.0015)	-2.0755	(0.2337)	0.6529	(0.0972)
Denmark	16.2	(0.5)	-0.0098	(0.0013)	-1.1639	(0.2800)	0.8624	(0.1393)
Sweden	16.2	(0.5)	-0.0087	(0.0013)	-1.2839	(0.2708)	0.8280	(0.1300)
UK	16.3	(0.5)	-0.0102	(0.0013)	-1.0734	(0.2157)	0.8674	(0.1210)
Greece	16.1	(0.5)	-0.0121	(0.0014)	-1.5406	(0.2477)	0.7737	(0.1182)
Italy	16.3	(0.5)	-0.0113	(0.0013)	-1.1965	(0.2317)	0.8901	(0.1235)
Portugal	16.1	(0.5)	-0.0122	(0.0013)	-1.3620	(0.2464)	0.7877	(0.1153)
Spain	16.2	(0.5)	-0.0116	(0.0013)	-1.0104	(0.1712)	0.8113	(0.1202)
Austria	16.2	(0.5)	-0.0097	(0.0014)	-1.3686	(0.2641)	0.8710	(0.1400)
France	16.2	(0.5)	-0.0106	(0.0013)	-1.1833	(0.2460)	0.8213	(0.1311)
Germany	16.2	(0.5)	-0.0097	(0.0014)	-1.6439	(0.2880)	0.7688	(0.1387)
Netherlands	16.1	(0.5)	-0.0096	(0.0014)	-1.4463	(0.2857)	0.8296	(0.1443)
Switzerland	16.0	(0.5)	-0.0101	(0.0013)	-0.1217	(0.2189)	0.9372	(0.1473)
Israel	15.8	(0.5)	-0.0133	(0.0014)	-1.0848	(0.2326)	0.8203	(0.1256)
Turkey	16.0	(0.5)	-0.0114	(0.0014)	-2.0203	(0.2187)	0.6057	(0.0959)
Saudi Arabia	16.2	(0.5)	-0.0144	(0.0014)	-1.9063	(0.2590)	0.6697	(0.1041)
Egypt	16.3	(0.5)	-0.0142	(0.0014)	-2.0963	(0.2130)	0.5667	(0.0925)
Bangladesh	16.3	(0.5)	-0.0144	(0.0014)	-2.5053	(0.2086)	0.5722	(0.0915)
India	16.2	(0.5)	-0.0133	(0.0014)	-2.2618	(0.2080)	0.6032	(0.0903)
Iran	16.2	(0.5)	-0.0126	(0.0014)	-2.1556	(0.2352)	0.6145	(0.0967)
Pakistan	16.3	(0.5)	-0.0131	(0.0014)	-2.2949	(0.2175)	0.5810	(0.0919)

Figure 1. The optimal temperature for all countries of origin in the sample; the countries of origin are ranked according to their temperature.
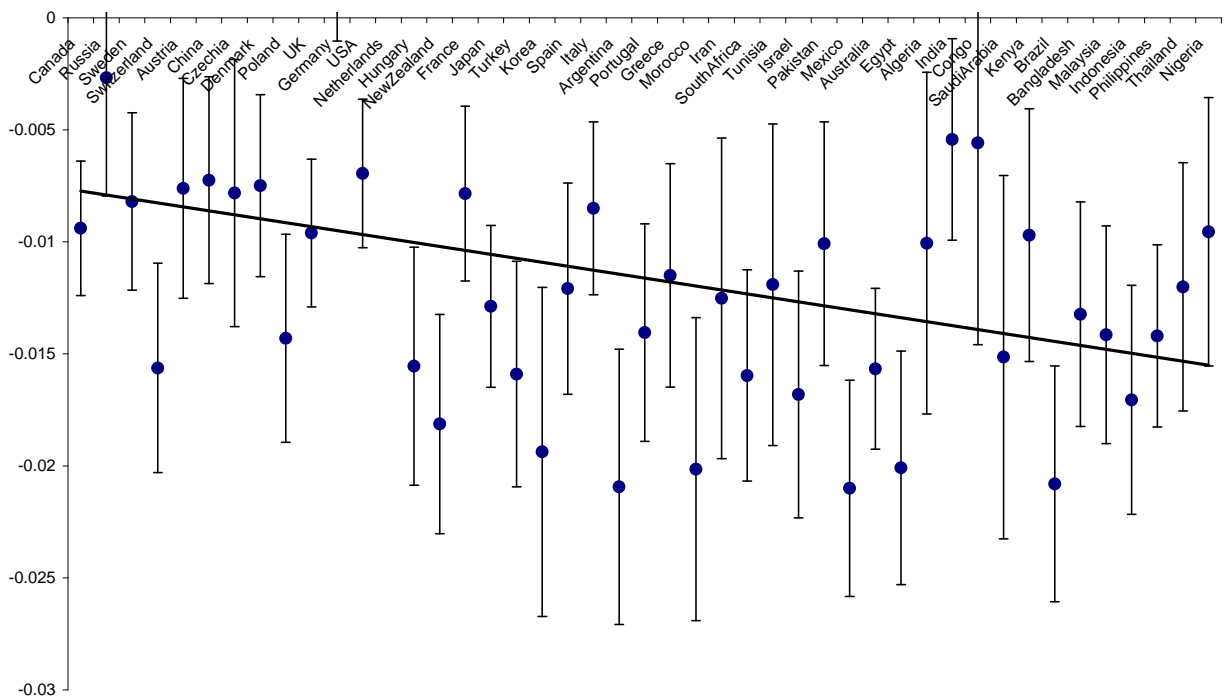

Figure 2. The coefficient of temperature squared in Equation (1) for all countries of origin in the sample; the countries of origin are ranked according to their temperature.

Table A1a. Regression results per country (standard deviations in brackets).

	Optimal temperature		Temperature squared		Distance		Income per capita	
Kenya	22.2	(5.0)	-0.0097	(0.0056)	-2.45	(0.45)	0.45	(0.38)
Congo	20.3	(11.4)	-0.0056	(0.0090)	-1.76	(0.87)	0.52	(0.75)
Algeria	21.1	(6.1)	-0.0101	(0.0076)	-2.89	(0.62)	0.05	(0.56)
Morocco	17.1	(1.5)	-0.0201	(0.0068)	-2.74	(0.79)	0.11	(0.54)
Tunisia	20.0	(4.3)	-0.0119	(0.0072)	-2.75	(0.64)	0.28	(0.53)
South Africa	16.4	(1.1)	-0.0160	(0.0047)	-1.68	(0.31)	0.57	(0.38)
Nigeria	18.7	(3.5)	-0.0096	(0.0060)	-2.11	(0.51)	0.17	(0.45)
Canada	18.7	(1.6)	-0.0094	(0.0030)	-0.89	(0.31)	0.64	(0.22)
Mexico	16.5	(0.8)	-0.0210	(0.0048)	-1.64	(0.32)	1.13	(0.36)
USA	17.6	(2.2)	-0.0070	(0.0033)	-0.20	(0.16)	1.14	(0.24)
Argentina	15.5	(1.0)	-0.0209	(0.0061)	-1.81	(0.51)	1.00	(0.50)
Brazil	16.3	(1.0)	-0.0208	(0.0053)	0.29	(0.22)	1.65	(0.43)
China	18.7	(3.2)	-0.0072	(0.0046)	-2.35	(0.40)	0.85	(0.38)
Japan	17.4	(1.3)	-0.0129	(0.0036)	-3.41	(0.47)	1.28	(0.26)
Korea	17.8	(1.7)	-0.0194	(0.0073)	-3.03	(0.61)	1.00	(0.66)
Indonesia	16.1	(1.2)	-0.0171	(0.0051)	-3.01	(0.46)	0.18	(0.47)
Malaysia	16.6	(1.3)	-0.0141	(0.0049)	-3.38	(0.38)	0.45	(0.44)
Philippines	16.4	(1.0)	-0.0142	(0.0041)	-2.48	(0.34)	0.77	(0.36)
Thailand	15.9	(1.8)	-0.0120	(0.0055)	-3.21	(0.42)	0.70	(0.52)
Australia	14.6	(0.9)	-0.0157	(0.0036)	-3.91	(0.64)	0.65	(0.29)
New Zealand	14.3	(1.1)	-0.0181	(0.0049)	-3.28	(0.90)	0.41	(0.39)
Czech Rep.	15.2	(3.2)	-0.0078	(0.0060)	-2.35	(0.43)	0.49	(0.45)
Hungary	14.2	(1.3)	-0.0155	(0.0053)	-2.05	(0.36)	0.47	(0.40)
Poland	14.8	(1.5)	-0.0143	(0.0046)	-2.10	(0.36)	0.71	(0.34)
Russia	15.3	(10.7)	-0.0027	(0.0053)	-2.55	(0.51)	0.77	(0.39)
Denmark	18.4	(3.3)	-0.0075	(0.0041)	-1.34	(0.39)	0.78	(0.32)
Sweden	19.1	(3.1)	-0.0082	(0.0040)	-1.43	(0.40)	0.78	(0.32)
UK	18.1	(1.8)	-0.0096	(0.0033)	-1.04	(0.26)	0.92	(0.22)
Greece	15.8	(1.9)	-0.0115	(0.0050)	-1.69	(0.38)	0.79	(0.37)
Italy	18.4	(2.5)	-0.0085	(0.0039)	-1.22	(0.30)	1.06	(0.25)
Portugal	15.5	(1.3)	-0.0140	(0.0049)	-1.12	(0.40)	1.17	(0.40)
Spain	16.7	(1.6)	-0.0121	(0.0047)	-0.87	(0.20)	1.05	(0.36)
Austria	19.9	(4.5)	-0.0076	(0.0049)	-1.66	(0.36)	0.85	(0.35)
France	18.7	(2.8)	-0.0078	(0.0039)	-1.28	(0.32)	0.68	(0.27)
Germany	18.8	(5.6)	0.0060	(0.0070)	-2.40	(0.44)	0.04	(0.43)
Netherlands	15.6	(1.8)	0.0159	(0.0073)	-1.93	(0.42)	0.39	(0.52)
Switzerland	15.1	(1.2)	-0.0156	(0.0047)	0.12	(0.25)	0.99	(0.31)
Israel	14.1	(1.2)	-0.0168	(0.0055)	-0.85	(0.32)	1.16	(0.47)
Turkey	14.8	(1.3)	-0.0159	(0.0050)	-2.07	(0.41)	0.16	(0.40)
Saudi Arabia	20.0	(3.6)	-0.0151	(0.0081)	-2.66	(0.73)	0.35	(0.53)
Egypt	17.0	(1.2)	-0.0201	(0.0052)	-1.89	(0.41)	0.09	(0.42)
Bangladesh	18.0	(1.8)	-0.0132	(0.0050)	-3.08	(0.39)	0.75	(0.44)
India	25.9	(9.6)	-0.0054	(0.0045)	-2.29	(0.39)	1.00	(0.34)
Iran	17.9	(3.1)	-0.0125	(0.0072)	-2.82	(0.58)	0.18	(0.59)
Pakistan	19.7	(3.2)	-0.0101	(0.0054)	-2.42	(0.46)	0.87	(0.47)

Table A1b. Regression results per country (continued).

	Coast		Area		Stability		World heritage		R^2	N
Kenya	1.1E-05	(1.2E-05)	5.3E-07	(1.5E-07)	1.08	(0.54)	0.00	(0.00)	0.68	32
Congo	1.9E-06	(1.9E-05)	5.3E-07	(2.2E-07)	-0.16	(1.11)	-0.64	(0.53)	0.23	26
Algeria	1.7E-05	(1.6E-05)	4.7E-07	(2.0E-07)	0.96	(0.71)	-2.57	(0.02)	0.57	31
Morocco	3.0E-05	(1.5E-05)	4.2E-07	(1.9E-07)	1.05	(0.68)	-1.57	(0.13)	0.68	33
Tunisia	2.2E-05	(1.5E-05)	5.1E-07	(1.9E-07)	0.81	(0.69)	-2.25	(0.04)	0.62	30
South Africa	2.5E-05	(1.0E-05)	2.4E-07	(1.0E-07)	0.99	(0.43)	-1.89	(0.07)	0.63	46
Nigeria	1.4E-05	(1.2E-05)	4.5E-07	(1.3E-07)	0.51	(0.71)	-1.34	(0.19)	0.47	34
Canada	5.5E-05	(1.8E-05)	1.6E-07	(7.7E-08)	0.60	(0.26)	-1.68	(0.10)	0.68	82
Mexico	2.5E-05	(1.0E-05)	3.3E-07	(9.8E-08)	0.90	(0.43)	0.65	(0.52)	0.78	50
USA	2.1E-05	(8.4E-06)	1.8E-07	(9.5E-08)	0.13	(0.29)	-1.97	(0.05)	0.64	85
Argentina	2.4E-05	(1.4E-05)	2.2E-07	(1.3E-07)	0.44	(0.62)	-1.72	(0.09)	0.58	49
Brazil	2.4E-05	(1.2E-05)	3.4E-07	(1.5E-07)	-0.24	(0.49)	0.06	(0.95)	0.68	50
China	1.1E-05	(1.0E-05)	2.7E-07	(1.1E-07)	0.52	(0.43)	-2.06	(0.05)	0.73	52
Japan	2.4E-05	(8.8E-06)	2.4E-07	(8.3E-08)	0.47	(0.33)	-1.71	(0.09)	0.73	76
Korea	4.1E-05	(1.5E-05)	2.7E-07	(1.4E-07)	0.33	(0.73)	0.60	(0.55)	0.52	48
Indonesia	2.6E-05	(1.1E-05)	4.0E-07	(1.1E-07)	1.57	(0.59)	2.23	(0.03)	0.83	38
Malaysia	2.8E-05	(1.0E-05)	3.3E-07	(1.1E-07)	1.00	(0.49)	0.86	(0.40)	0.80	42
Philippines	2.6E-05	(8.7E-06)	2.6E-07	(8.7E-08)	0.15	(0.44)	0.70	(0.49)	0.80	41
Thailand	2.2E-05	(1.1E-05)	2.9E-07	(1.2E-07)	1.33	(0.60)	1.57	(0.13)	0.81	37
Australia	2.8E-05	(8.3E-06)	1.5E-07	(8.0E-08)	0.61	(0.34)	-0.38	(0.70)	0.64	56
New Zealand	2.9E-05	(1.1E-05)	1.4E-07	(1.1E-07)	0.85	(0.50)	-0.79	(0.43)	0.50	53
Czech Rep.	8.2E-06	(1.2E-05)	2.9E-07	(1.6E-07)	1.24	(0.56)	-1.50	(0.14)	0.71	41
Hungary	2.1E-05	(1.1E-05)	2.0E-07	(1.2E-07)	1.23	(0.52)	-1.59	(0.12)	0.77	48
Poland	1.5E-05	(1.0E-05)	3.3E-07	(1.4E-07)	0.69	(0.44)	-1.57	(0.12)	0.80	52
Russia	-1.3E-05	(1.2E-05)	6.1E-07	(1.6E-07)	0.08	(0.49)	-0.16	(0.88)	0.62	47
Denmark	1.5E-05	(9.5E-06)	1.5E-07	(1.0E-07)	0.57	(0.38)	-1.03	(0.31)	0.59	68
Sweden	1.8E-05	(9.6E-06)	9.9E-08	(9.6E-08)	0.76	(0.39)	0.00	(0.00)	0.55	69
UK	2.3E-05	(8.0E-06)	9.9E-08	(8.0E-08)	0.42	(0.27)	-0.50	(0.62)	0.64	83
Greece	1.1E-05	(1.0E-05)	4.1E-07	(1.2E-07)	0.61	(0.47)	-1.53	(0.13)	0.69	55
Italy	1.9E-05	(9.1E-06)	9.9E-08	(9.2E-08)	0.25	(0.33)	-1.36	(0.18)	0.60	84
Portugal	1.5E-05	(1.1E-05)	3.2E-07	(1.1E-07)	0.10	(0.47)	-0.78	(0.44)	0.64	60
Spain	1.4E-05	(1.1E-05)	1.7E-07	(1.1E-07)	0.45	(0.43)	-1.78	(0.08)	0.54	71
Austria	1.7E-05	(1.0E-05)	2.0E-07	(1.1E-07)	0.56	(0.42)	-1.29	(0.20)	0.60	66
France	2.4E-05	(9.6E-06)	9.9E-08	(9.6E-08)	0.18	(0.34)	-0.80	(0.43)	0.51	86
Germany	-1.4E-05	(1.7E-05)	-1.5E-07	(1.6E-07)	0.96	(0.56)	-1.98	(0.05)	0.51	86
Netherlands	-6.4E-05	(2.7E-05)	1.0E-06	(5.9E-07)	0.23	(0.59)	2.30	(0.03)	0.36	66
Switzerland	2.7E-05	(1.1E-05)	-7.4E-08	(1.1E-07)	0.58	(0.43)	0.00	(0.34)	0.51	75
Israel	1.7E-05	(1.2E-05)	3.3E-07	(1.3E-07)	0.14	(0.55)	0.00	(0.23)	0.60	52
Turkey	1.4E-05	(1.1E-05)	3.4E-07	(1.5E-07)	1.62	(0.54)	0.00	(0.06)	0.74	51
Saudi Arabia	3.8E-05	(1.6E-05)	3.9E-07	(1.8E-07)	1.29	(0.74)	0.00	(0.05)	0.48	40
Egypt	3.4E-05	(1.1E-05)	4.0E-07	(1.4E-07)	1.34	(0.54)	0.00	(0.08)	0.66	42
Bangladesh	2.4E-05	(1.1E-05)	4.0E-07	(1.4E-07)	0.51	(0.48)	-1.52	(0.00)	0.75	35
India	1.3E-05	(1.1E-05)	4.1E-07	(1.4E-07)	0.70	(0.42)	-1.93	(0.00)	0.74	46
Iran	2.4E-05	(1.5E-05)	4.3E-07	(1.9E-07)	0.98	(0.72)	-1.72	(0.00)	0.50	38
Pakistan	8.0E-06	(1.2E-05)	4.8E-07	(1.5E-07)	0.06	(0.52)	-1.10	(0.00)	0.64	40

NOTE DI LAVORO DELLA FONDAZIONE ENI ENRICO MATTEI

Fondazione Eni Enrico Mattei Working Paper Series

Our Note di Lavoro are available on the Internet at the following addresses:

http://www.feem.it/Feem/Pub/Publications/WPapers/default.html

http://www.ssrn.com/link/feem.html

NOTE DI LAVORO PUBLISHED IN 2004

IEM	1.2004	*Anil MARKANDYA, Suzette PEDROSO and Alexander GOLUB*: Empirical Analysis of National Income and So2 Emissions in Selected European Countries
ETA	2.2004	*Masahisa FUJITA and Shlomo WEBER:* Strategic Immigration Policies and Welfare in Heterogeneous Countries
PRA	3.2004	*Adolfo DI CARLUCCIO, Giovanni FERRI, Cecilia FRALE and Ottavio RICCHI:* Do Privatizations Boost Household Shareholding? Evidence from Italy
ETA	4.2004	*Victor GINSBURGH and Shlomo WEBER:* Languages Disenfranchisement in the European Union
ETA	5.2004	*Romano PIRAS:* Growth, Congestion of Public Goods, and Second-Best Optimal Policy
CCMP	6.2004	*Herman R.J. VOLLEBERGH:* Lessons from the Polder: Is Dutch CO2-Taxation Optimal
PRA	7.2004	*Sandro BRUSCO, Giuseppe LOPOMO and S. VISWANATHAN* (lxv): Merger Mechanisms
PRA	8.2004	*Wolfgang AUSSENEGG, Pegaret PICHLER and Alex STOMPER* (lxv): IPO Pricing with Bookbuilding, and a When-Issued Market
PRA	9.2004	*Pegaret PICHLER and Alex STOMPER* (lxv): Primary Market Design: Direct Mechanisms and Markets
PRA	10.2004	*Florian ENGLMAIER, Pablo GUILLEN, Loreto LLORENTE, Sander ONDERSTAL and Rupert SAUSGRUBER* (lxv): The Chopstick Auction: A Study of the Exposure Problem in Multi-Unit Auctions
PRA	11.2004	*Bjarne BRENDSTRUP and Harry J. PAARSCH* (lxv): Nonparametric Identification and Estimation of Multi-Unit, Sequential, Oral, Ascending-Price Auctions With Asymmetric Bidders
PRA	12.2004	*Ohad KADAN* (lxv): Equilibrium in the Two Player, k-Double Auction with Affiliated Private Values
PRA	13.2004	*Maarten C.W. JANSSEN* (lxv): Auctions as Coordination Devices
PRA	14.2004	*Gadi FIBICH, Arieh GAVIOUS and Aner SELA* (lxv): All-Pay Auctions with Weakly Risk-Averse Buyers
PRA	15.2004	*Orly SADE, Charles SCHNITZLEIN and Jaime F. ZENDER* (lxv): Competition and Cooperation in Divisible Good Auctions: An Experimental Examination
PRA	16.2004	*Marta STRYSZOWSKA* (lxv): Late and Multiple Bidding in Competing Second Price Internet Auctions
CCMP	17.2004	*Slim Ben YOUSSEF:* R&D in Cleaner Technology and International Trade
NRM	18.2004	*Angelo ANTOCI, Simone BORGHESI and Paolo RUSSU* (lxvi): Biodiversity and Economic Growth: Stabilization Versus Preservation of the Ecological Dynamics
SIEV	19.2004	*Anna ALBERINI, Paolo ROSATO, Alberto LONGO and Valentina ZANATTA:* Information and Willingness to Pay in a Contingent Valuation Study: The Value of S. Erasmo in the Lagoon of Venice
NRM	20.2004	*Guido CANDELA and Roberto CELLINI* (lxvii): Investment in Tourism Market: A Dynamic Model of Differentiated Oligopoly
NRM	21.2004	*Jacqueline M. HAMILTON* (lxvii): Climate and the Destination Choice of German Tourists
NRM	22.2004	*Javier Rey-MAQUIEIRA PALMER, Javier LOZANO IBÁÑEZ and Carlos Mario GÓMEZ GÓMEZ* (lxvii): Land, Environmental Externalities and Tourism Development
NRM	23.2004	*Pius ODUNGA and Henk FOLMER* (lxvii): Profiling Tourists for Balanced Utilization of Tourism-Based Resources in Kenya
NRM	24.2004	*Jean-Jacques NOWAK, Mondher SAHLI and Pasquale M. SGRO* (lxvii):Tourism, Trade and Domestic Welfare
NRM	25.2004	*Riaz SHAREEF* (lxvii): Country Risk Ratings of Small Island Tourism Economies
NRM	26.2004	*Juan Luis EUGENIO-MARTÍN, Noelia MARTÍN MORALES and Riccardo SCARPA* (lxvii): Tourism and Economic Growth in Latin American Countries: A Panel Data Approach
NRM	27.2004	*Raúl Hernández MARTÍN* (lxvii): Impact of Tourism Consumption on GDP. The Role of Imports
CSRM	28.2004	*Nicoletta FERRO:* Cross-Country Ethical Dilemmas in Business: A Descriptive Framework
NRM	29.2004	*Marian WEBER* (lxvi): Assessing the Effectiveness of Tradable Landuse Rights for Biodiversity Conservation: an Application to Canada's Boreal Mixedwood Forest
NRM	30.2004	*Trond BJORNDAL, Phoebe KOUNDOURI and Sean PASCOE* (lxvi): Output Substitution in Multi-Species Trawl Fisheries: Implications for Quota Setting
CCMP	31.2004	*Marzio GALEOTTI, Alessandra GORIA, Paolo MOMBRINI and Evi SPANTIDAKI:* Weather Impacts on Natural, Social and Economic Systems (WISE) Part I: Sectoral Analysis of Climate Impacts in Italy
CCMP	32.2004	*Marzio GALEOTTI, Alessandra GORIA ,Paolo MOMBRINI and Evi SPANTIDAKI:* Weather Impacts on Natural, Social and Economic Systems (WISE) Part II: Individual Perception of Climate Extremes in Italy
CTN	33.2004	*Wilson PEREZ:* Divide and Conquer: Noisy Communication in Networks, Power, and Wealth Distribution
KTHC	34.2004	*Gianmarco I.P. OTTAVIANO and Giovanni PERI* (lxviii): The Economic Value of Cultural Diversity: Evidence from US Cities
KTHC	35.2004	*Linda CHAIB* (lxviii): Immigration and Local Urban Participatory Democracy: A Boston-Paris Comparison

CCMP	74.2004	*Rob DELLINK and Ekko van IERLAND*: Pollution Abatement in the Netherlands: A Dynamic Applied General Equilibrium Assessment
ETA	75.2004	*Rosella LEVAGGI and Michele MORETTO*: Investment in Hospital Care Technology under Different Purchasing Rules: A Real Option Approach
CTN	76.2004	*Salvador BARBERÀ and Matthew O. JACKSON* (lxx): On the Weights of Nations: Assigning Voting Weights in a Heterogeneous Union
CTN	77.2004	*Àlex ARENAS, Antonio CABRALES, Albert DÍAZ-GUILERA, Roger GUIMERÀ and Fernando VEGA-REDONDO* (lxx): Optimal Information Transmission in Organizations: Search and Congestion
CTN	78.2004	*Francis BLOCH and Armando GOMES* (lxx): Contracting with Externalities and Outside Options
CTN	79.2004	*Rabah AMIR, Effrosyni DIAMANTOUDI and Licun XUE* (lxx): Merger Performance under Uncertain Efficiency Gains
CTN	80.2004	*Francis BLOCH and Matthew O. JACKSON* (lxx): The Formation of Networks with Transfers among Players
CTN	81.2004	*Daniel DIERMEIER, Hülya ERASLAN and Antonio MERLO* (lxx): Bicameralism and Government Formation
CTN	82.2004	*Rod GARRATT, James E. PARCO, Cheng-ZHONG QIN and Amnon RAPOPORT* (lxx): Potential Maximization and Coalition Government Formation
CTN	83.2004	*Kfir ELIAZ, Debraj RAY and Ronny RAZIN* (lxx): Group Decision-Making in the Shadow of Disagreement
CTN	84.2004	*Sanjeev GOYAL, Marco van der LEIJ and José Luis MORAGA-GONZÁLEZ* (lxx): Economics: An Emerging Small World?
CTN	85.2004	*Edward CARTWRIGHT* (lxx): Learning to Play Approximate Nash Equilibria in Games with Many Players
IEM	86.2004	*Finn R. FØRSUND and Michael HOEL*: Properties of a Non-Competitive Electricity Market Dominated by Hydroelectric Power
KTHC	87.2004	*Elissaios PAPYRAKIS and Reyer GERLAGH*: Natural Resources, Investment and Long-Term Income
CCMP	88.2004	*Marzio GALEOTTI and Claudia KEMFERT*: Interactions between Climate and Trade Policies: A Survey
IEM	89.2004	*A. MARKANDYA, S. PEDROSO and D. STREIMIKIENE*: Energy Efficiency in Transition Economies: Is There Convergence Towards the EU Average?
GG	90.2004	*Rolf GOLOMBEK and Michael HOEL* : Climate Agreements and Technology Policy
PRA	91.2004	*Sergei IZMALKOV* (lxv): Multi-Unit Open Ascending Price Efficient Auction
KTHC	92.2004	*Gianmarco I.P. OTTAVIANO and Giovanni PERI*: Cities and Cultures
KTHC	93.2004	*Massimo DEL GATTO*: Agglomeration, Integration, and Territorial Authority Scale in a System of Trading Cities. Centralisation versus devolution
CCMP	94.2004	*Pierre-André JOUVET, Philippe MICHEL and Gilles ROTILLON*: Equilibrium with a Market of Permits
CCMP	95.2004	*Bob van der ZWAAN and Reyer GERLAGH*: Climate Uncertainty and the Necessity to Transform Global Energy Supply
CCMP	96.2004	*Francesco BOSELLO, Marco LAZZARIN, Roberto ROSON and Richard S.J. TOL*: Economy-Wide Estimates of the Implications of Climate Change: Sea Level Rise
CTN	97.2004	*Gustavo BERGANTIÑOS and Juan J. VIDAL-PUGA*: Defining Rules in Cost Spanning Tree Problems Through the Canonical Form
CTN	98.2004	*Siddhartha BANDYOPADHYAY and Mandar OAK*: Party Formation and Coalitional Bargaining in a Model of Proportional Representation
GG	99.2004	*Hans-Peter WEIKARD, Michael FINUS and Juan-Carlos ALTAMIRANO-CABRERA*: The Impact of Surplus Sharing on the Stability of International Climate Agreements
SIEV	100.2004	*Chiara M. TRAVISI and Peter NIJKAMP*: Willingness to Pay for Agricultural Environmental Safety: Evidence from a Survey of Milan, Italy, Residents
SIEV	101.2004	*Chiara M. TRAVISI, Raymond J. G. M. FLORAX and Peter NIJKAMP*: A Meta-Analysis of the Willingness to Pay for Reductions in Pesticide Risk Exposure
NRM	102.2004	*Valentina BOSETTI and David TOMBERLIN:* Real Options Analysis of Fishing Fleet Dynamics: A Test
CCMP	103.2004	*Alessandra GORIA e Gretel GAMBARELLI:* Economic Evaluation of Climate Change Impacts and Adaptability in Italy
PRA	104.2004	*Massimo FLORIO and Mara GRASSENI*: The Missing Shock: The Macroeconomic Impact of British Privatisation
PRA	105.2004	*John BENNETT, Saul ESTRIN, James MAW and Giovanni URGA*: Privatisation Methods and Economic Growth in Transition Economies
PRA	106.2004	*Kira BÖRNER*: The Political Economy of Privatization: Why Do Governments Want Reforms?
PRA	107.2004	*Pehr-Johan NORBÄCK and Lars PERSSON*: Privatization and Restructuring in Concentrated Markets
SIEV	108.2004	*Angela GRANZOTTO, Fabio PRANOVI, Simone LIBRALATO, Patrizia TORRICELLI and Danilo MAINARDI*: Comparison between Artisanal Fishery and Manila Clam Harvesting in the Venice Lagoon by Using Ecosystem Indicators: An Ecological Economics Perspective
CTN	109.2004	*Somdeb LAHIRI*: The Cooperative Theory of Two Sided Matching Problems: A Re-examination of Some Results
NRM	110.2004	*Giuseppe DI VITA*: Natural Resources Dynamics: Another Look
SIEV	111.2004	*Anna ALBERINI, Alistair HUNT and Anil MARKANDYA*: Willingness to Pay to Reduce Mortality Risks: Evidence from a Three-Country Contingent Valuation Study
KTHC	112.2004	*Valeria PAPPONETTI and Dino PINELLI*: Scientific Advice to Public Policy-Making
SIEV	113.2004	*Paulo A.L.D. NUNES and Laura ONOFRI*: The Economics of Warm Glow: A Note on Consumer's Behavior and Public Policy Implications
IEM	114.2004	*Patrick CAYRADE*: Investments in Gas Pipelines and Liquefied Natural Gas Infrastructure What is the Impact on the Security of Supply?
IEM	115.2004	*Valeria COSTANTINI and Francesco GRACCEVA:* Oil Security. Short- and Long-Term Policies

IEM	116.2004	*Valeria COSTANTINI and Francesco GRACCEVA:* Social Costs of Energy Disruptions
IEM	117.2004	*Christian EGENHOFER, Kyriakos GIALOGLOU, Giacomo LUCIANI, Maroeska BOOTS, Martin SCHEEPERS, Valeria COSTANTINI, Francesco GRACCEVA, Anil MARKANDYA and Giorgio VICINI*: Market-Based Options for Security of Energy Supply
IEM	118.2004	*David FISK*: Transport Energy Security. The Unseen Risk?
IEM	119.2004	*Giacomo LUCIANI*: Security of Supply for Natural Gas Markets. What is it and What is it not?
IEM	120.2004	*L.J. de VRIES and R.A. HAKVOORT*: The Question of Generation Adequacy in Liberalised Electricity Markets
KTHC	121.2004	*Alberto PETRUCCI*: Asset Accumulation, Fertility Choice and Nondegenerate Dynamics in a Small Open Economy
NRM	122.2004	*Carlo GIUPPONI, Jaroslaw MYSIAK and Anita FASSIO*: An Integrated Assessment Framework for Water Resources Management: A DSS Tool and a Pilot Study Application
NRM	123.2004	*Margaretha BREIL, Anita FASSIO, Carlo GIUPPONI and Paolo ROSATO*: Evaluation of Urban Improvement on the Islands of the Venice Lagoon: A Spatially-Distributed Hedonic-Hierarchical Approach
ETA	124.2004	*Paul MENSINK*: Instant Efficient Pollution Abatement Under Non-Linear Taxation and Asymmetric Information: The Differential Tax Revisited
NRM	125.2004	*Mauro FABIANO, Gabriella CAMARSA, Rosanna DURSI, Roberta IVALDI, Valentina MARIN and Francesca PALMISANI*: Integrated Environmental Study for Beach Management:A Methodological Approach
PRA	126.2004	*Irena GROSFELD and Iraj HASHI*: The Emergence of Large Shareholders in Mass Privatized Firms: Evidence from Poland and the Czech Republic
CCMP	127.2004	*Maria BERRITTELLA, Andrea BIGANO, Roberto ROSON and Richard S.J. TOL*: A General Equilibrium Analysis of Climate Change Impacts on Tourism
CCMP	128.2004	*Reyer GERLAGH*: A Climate-Change Policy Induced Shift from Innovations in Energy Production to Energy Savings
NRM	129.2004	*Elissaios PAPYRAKIS and Reyer GERLAGH*: Natural Resources, Innovation, and Growth
PRA	130.2004	*Bernardo BORTOLOTTI and Mara FACCIO*: Reluctant Privatization
SIEV	131.2004	*Riccardo SCARPA and Mara THIENE*: Destination Choice Models for Rock Climbing in the Northeast Alps: A Latent-Class Approach Based on Intensity of Participation
SIEV	132.2004	*Riccardo SCARPA Kenneth G. WILLIS and Melinda ACUTT*: Comparing Individual-Specific Benefit Estimates for Public Goods: Finite Versus Continuous Mixing in Logit Models
IEM	133.2004	*Santiago J. RUBIO*: On Capturing Oil Rents with a National Excise Tax Revisited
ETA	134.2004	*Ascensión ANDINA DÍAZ*: Political Competition when Media Create Candidates' Charisma
SIEV	135.2004	*Anna ALBERINI*: Robustness of VSL Values from Contingent Valuation Surveys
CCMP	136.2004	*Gernot KLEPPER and Sonja PETERSON*: Marginal Abatement Cost Curves in General Equilibrium: The Influence of World Energy Prices
ETA	137.2004	*Herbert DAWID, Christophe DEISSENBERG and Pavel ŠEVČIK*: Cheap Talk, Gullibility, and Welfare in an Environmental Taxation Game
CCMP	138.2004	*ZhongXiang ZHANG*: The World Bank's Prototype Carbon Fund and China
CCMP	139.2004	*Reyer GERLAGH and Marjan W. HOFKES*: Time Profile of Climate Change Stabilization Policy
NRM	140.2004	*Chiara D'ALPAOS and Michele MORETTO*: The Value of Flexibility in the Italian Water Service Sector: A Real Option Analysis
PRA	141.2004	*Patrick BAJARI, Stephanie HOUGHTON and Steven TADELIS* (lxxi): Bidding for Incompete Contracts
PRA	142.2004	*Susan ATHEY, Jonathan LEVIN and Enrique SEIRA* (lxxi): Comparing Open and Sealed Bid Auctions: Theory and Evidence from Timber Auctions
PRA	143.2004	*David GOLDREICH* (lxxi): Behavioral Biases of Dealers in U.S. Treasury Auctions
PRA	144.2004	*Roberto BURGUET* (lxxi): Optimal Procurement Auction for a Buyer with Downward Sloping Demand: More Simple Economics
PRA	145.2004	*Ali HORTACSU and Samita SAREEN* (lxxi): Order Flow and the Formation of Dealer Bids: An Analysis of Information and Strategic Behavior in the Government of Canada Securities Auctions
PRA	146.2004	*Victor GINSBURGH, Patrick LEGROS and Nicolas SAHUGUET* (lxxi): How to Win Twice at an Auction. On the Incidence of Commissions in Auction Markets
PRA	147.2004	*Claudio MEZZETTI, Aleksandar PEKEČ and Ilia TSETLIN* (lxxi): Sequential vs. Single-Round Uniform-Price Auctions
PRA	148.2004	*John ASKER and Estelle CANTILLON* (lxxi): Equilibrium of Scoring Auctions
PRA	149.2004	*Philip A. HAILE, Han HONG and Matthew SHUM* (lxxi): Nonparametric Tests for Common Values in First-Price Sealed-Bid Auctions
PRA	150.2004	*François DEGEORGE, François DERRIEN and Kent L. WOMACK* (lxxi): Quid Pro Quo in IPOs: Why Bookbuilding is Dominating Auctions
CCMP	151.2004	*Barbara BUCHNER and Silvia DALL'OLIO*: Russia: The Long Road to Ratification. Internal Institution and Pressure Groups in the Kyoto Protocol's Adoption Process
CCMP	152.2004	*Carlo CARRARO and Marzio GALEOTTI*: Does Endogenous Technical Change Make a Difference in Climate Policy Analysis? A Robustness Exercise with the FEEM-RICE Model
PRA	153.2004	*Alejandro M. MANELLI and Daniel R. VINCENT* (lxxi): Multidimensional Mechanism Design: Revenue Maximization and the Multiple-Good Monopoly
ETA	154.2004	*Nicola ACOCELLA, Giovanni Di BARTOLOMEO and Wilfried PAUWELS*: Is there any Scope for Corporatism in Stabilization Policies?
CTN	154.2004	*Johan EYCKMANS and Michael FINUS*: An Almost Ideal Sharing Scheme for Coalition Games with Externalities
CCMP	156.2004	*Cesare DOSI and Michele MORETTO*: Environmental Innovation, War of Attrition and Investment Grants

CCMP	157.2004	*Valentina BOSETTI, Marzio GALEOTTI and Alessandro LANZA*: <u>How Consistent are Alternative Short-Term Climate Policies with Long-Term Goals?</u>
ETA	158.2004	*Y. Hossein FARZIN and Ken-Ichi AKAO*: <u>Non-pecuniary Value of Employment and Individual Labor Supply</u>
ETA	159.2004	*William BROCK and Anastasios XEPAPADEAS*: <u>Spatial Analysis: Development of Descriptive and Normative Methods with Applications to Economic-Ecological Modelling</u>
KTHC	160.2004	*Alberto PETRUCCI*: <u>On the Incidence of a Tax on PureRent with Infinite Horizons</u>
IEM	161.2004	*Xavier LABANDEIRA, José M. LABEAGA and Miguel RODRÍGUEZ*: <u>Microsimulating the Effects of Household Energy Price Changes in Spain</u>

NOTE DI LAVORO PUBLISHED IN 2005

CCMP	1.2005	*Stéphane HALLEGATTE*: <u>Accounting for Extreme Events in the Economic Assessment of Climate Change</u>
CCMP	2.2005	*Qiang WU and Paulo Augusto NUNES*: <u>Application of Technological Control Measures on Vehicle Pollution: A Cost-Benefit Analysis in China</u>
CCMP	3.2005	*Andrea BIGANO, Jacqueline M. HAMILTON, Maren LAU, Richard S.J. TOL and Yuan ZHOU*: <u>A Global Database of Domestic and International Tourist Numbers at National and Subnational Level</u>
CCMP	4.2005	*Andrea BIGANO, Jacqueline M. HAMILTON and Richard S.J. TOL*: <u>The Impact of Climate on Holiday Destination Choice</u>

(lxv) This paper was presented at the EuroConference on "Auctions and Market Design: Theory, Evidence and Applications" organised by Fondazione Eni Enrico Mattei and sponsored by the EU, Milan, September 25-27, 2003

(lxvi) This paper has been presented at the 4th BioEcon Workshop on "Economic Analysis of Policies for Biodiversity Conservation" organised on behalf of the BIOECON Network by Fondazione Eni Enrico Mattei, Venice International University (VIU) and University College London (UCL) , Venice, August 28-29, 2003

(lxvii) This paper has been presented at the international conference on "Tourism and Sustainable Economic Development – Macro and Micro Economic Issues" jointly organised by CRENoS (Università di Cagliari e Sassari, Italy) and Fondazione Eni Enrico Mattei, and supported by the World Bank, Sardinia, September 19-20, 2003

(lxviii) This paper was presented at the ENGIME Workshop on "Governance and Policies in Multicultural Cities", Rome, June 5-6, 2003

(lxix) This paper was presented at the Fourth EEP Plenary Workshop and EEP Conference "The Future of Climate Policy", Cagliari, Italy, 27-28 March 2003

(lxx) This paper was presented at the 9th Coalition Theory Workshop on "Collective Decisions and Institutional Design" organised by the Universitat Autònoma de Barcelona and held in Barcelona, Spain, January 30-31, 2004

(lxxi) This paper was presented at the EuroConference on "Auctions and Market Design: Theory, Evidence and Applications", organised by Fondazione Eni Enrico Mattei and Consip and sponsored by the EU, Rome, September 23-25, 2004