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# Exploring the Unknown: Predicting the Responses of Publics not yet Surveyed

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*This article argues that cultural change is roughly predictable: to a large extent, it is shaped by a few variables included in a model of cultural modernization that is presented here. The beliefs and values of a society's people are also affected by unique world events and country-specific factors that would not fit into a general model, such as a given society's political parties and leaders, so our predictions will not be precisely accurate. Nevertheless, in this article we will stick our necks out and predict the locations on two major cultural dimensions of all the countries likely to be included in the next wave of the World Values Survey, to be carried out in 2005–2006. Using a simple predictive model based on our revised version of modernization theory, we first 'predict' and test the positions that 80 societies should have on a two major dimensions of cross-cultural variation in the most recent wave of surveys (carried out in 1999–2001); we find that our predictions are surprisingly accurate: the average prediction for a given country falls within a small radius of the location that is actually observed on the cross-cultural map (specifically: the average prediction and the actual location fall within a circle that occupies less than two percent of the map's area). We then use this same model to predict the survey responses that we expect to find for 120 countries that are most likely to be surveyed in the next wave of surveys, in 2005–2006. Almost half of these countries have not been included in our previous surveys (and a number have never been covered in any survey of which we are aware). These are genuine blind predictions – which we believe is an important challenge for social scientists. Our predictions will not be exactly correct; in some cases, they will not even be in the right ballpark. But we are confident that in the great majority of cases, they will come much closer to the observed results than would random guesses. We are confident that these a priori predictions will be reasonably close to the results obtained from actual fieldwork, because analysis of data from more than 60*

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*societies surveyed in previous waves of the World Values Surveys and European Values Surveys indicates that cross-cultural differences in basic values have a surprisingly consistent relationship with economic development. The values and beliefs of mass publics vary a great deal cross-nationally, but they tend to vary in a roughly predictable way that can be derived from a revised version of modernization theory.*

## Introduction

Cultural change is roughly predictable. To a large extent, it is shaped by the factors in a cultural modernization model that was proposed by and is developed further here. But it is also affected by other factors such as wars, national events and a society's political parties and leaders, so any predictions based on modernization theory alone will not be  precisely accurate. Nevertheless, in this article, we will predict the locations on two major dimensions of cross-cultural variation, of all countries that are reasonably likely to be included the next wave of the Values Surveys, in 2005–2006.[1]

Inglehart (1997) found that two main dimensions accounted for over half of the cross-national variance in more than a score of variables tapping basic values across a wide range of domains ranging from politics to economic life and sexual behavior. These dimensions of cross-cultural variation seem robust; when the 1990–1991 factor analysis was replicated with the data from the 1995–1998 surveys, the same two dimensions of cross-cultural variation emerged – even though the new analysis was based on 23 additional countries not included in the earlier study (Inglehart & Baker, 2000). Each dimension taps a major axis of cross-cultural variation involving scores of basic values.

The '*Traditional/Secular-Rational*' dimension reflects the contrasting values found in religious and secular societies. Traditional societies emphasize the importance of parent–child ties in traditional families, and deference to authority, along with absolute moral standards, and they reject divorce, abortion, euthanasia, and suicide. Traditional societies are highly patriotic and nationalistic. In contrast, societies with secular-rational values display the opposite preferences on all of these topics.

The '*Survival/Self-expression*' dimension includes a wide range of beliefs and values. A central component involves the polarization between Materialist and Post-materialist values. These values reflect an intergenerational shift from an emphasis on economic and physical security, towards an increasing emphasis on self-expression, subjective well-being, and quality of life concerns. Societies characterized by Survival values emphasize materialist orientations, show relatively low levels of subjective well-being, report relatively poor health, tend to be intolerant of out-groups, such as foreigners, women and homosexuals, rank relatively low on interpersonal trust, and emphasize hard work, rather than imagination or tolerance, as important things to teach a child. By contrast, societies that emphasize Self-Expression values, display the opposite preferences on all of these topics.

Using a simple predictive model based on our revised version of modernization theory, we will first 'predict' and test the positions that 80 societies should have on these two major dimensions of cross-cultural variation in the most *recent* wave of surveys (carried out in 1999–2001). These are not genuine blind predictions, since the data to test them are already in hand, but we will use data from previous surveys to predict what will be found in later samples. We then will use this same model to predict the basic values that we expect to find for 122 countries that are most likely to be surveyed in the *next* wave of surveys, in 2005–2006 – and in this case, these are not only out-of-sample predictions, but genuine predictions of what will be found in surveys that have not yet taken place (in some cases, in countries that have never been surveyed).

Prediction is an important challenge for social scientists. Social science rarely makes genuine blind predictions and then tests its theories against them. It generally advances hypotheses and tests them against data already on hand. Hypotheses that are not supported can be dropped or reformulated in light of the actual data; and independent variables can be added or transformed, in order to better fit the hypotheses. Although social scientists rarely publish predictions of findings expected from data not yet available, the exceptions have been important. Economic forecasts have played a valuable role in formulating counter-cyclical policy. And predictive political economy models of US Presidential elections have an impressive track record. Although their forecasts have been imperfect, the fact that their predictions were published in advance has stimulated close scrutiny of how these models work, and how they can be improved. This is an important step in the development of social science.

Our predictions will not be exactly correct. In some cases, they will not even be in the right ballpark. But we are confident that in the great majority of cases they will come much closer to the observed results than would random guesses. We are confident that these a *priori* predictions will be reasonably close to the results obtained from actual fieldwork, because analysis of data from the 64 societies surveyed in previous waves of the Values Surveys indicates that cross-cultural differences in basic values have a surprisingly consistent relationship with economic development. The values and beliefs of mass publics vary a great deal cross-nationally, but they vary in a roughly predictable way that can be derived from a revised version of modernization theory.

Any simple, economically-determinist version of modernization theory is outdated– but a large body of recent evidence supports the claim that economic development and related changes tend to reshape mass belief systems in coherent ways (Abramson, 1989; Inglehart, 1990, 1997; Diamond [ed.], 1993; Putnam, 1993; Dalton, 1994; Reisinger *et al.*, 1994; Rohrschneider, 1994; Gasiorowski & Power 1998; Inglehart & Baker, 2000).

But culture has an autonomous life of its own: cross-cultural value differences help shape the prospects for democracy, environmental protection policies, gender-related policies, and other significant societal phenomena (Gibson *et al.*, 1992; Putnam 1993;

Dalton, 1994, 2000, 2004; Gibson & Duch, 1994; Miller *et al.*, 1994; Gibson, 1997; Fleron & Ahl, 1998; Crosette, 2000; Crothers & Lockhart, 2000; Fukuyama, 2000; Inglehart, 2000; Lipset & Lenz, 2000; Patterson, 2000; Pye, 2000).

This article tests a model of cultural change based on a revised version of modernization theory presented in Inglehart and Welzel (2005, forthcoming). This model postulates that: (1) economic development tends to bring predictable changes in mass values. But it is not a simple linear process: industrialization brings one set of changes, while the rise of post-industrial society is linked with another set of changes. Moreover, (2) cultural change is path dependent: a society's historical heritage has an enduring influence on its value system, so that societies shaped by Protestantism, Islam or other historical forces, show distinctive values today that differentiate them from societies with other cultural heritages.

We will test this model against data from the 64 societies surveyed in the 1999–2001 wave of the Values Surveys, predicting each society's position on two major dimensions of cross-cultural variation, the Traditional/Secular-rational values dimension, and the Survival/Self-expression values dimension. Our predictive model uses (1) each country's per capita GNP, (2) the percentage of the workforce employed in the industrial sector or service sector, (3) the number of years of communist rule that it experienced, if any, and (4) a cultural zone factor. This cultural zone constant is derived from the results of the first three waves of these surveys (carried out in 1981–1995), and it reflects the extent that a country with a given cultural heritage deviates from the scores predicted by the other components of the model.

We use each country's GNP/cap 5 years before the survey in 2000 to predict that country's scores on the two cultural dimensions. We do this to put the variables in the appropriate causal sequence: causes precede their effects, and our theory hypothesizes that economic development is shaping values. All of the other variables used to predict values – including the data from which the cultural zone constants are derived – are also based on data gathered at a time *before* the values they predict.

This parsimonious model predicts, with remarkable accuracy, the values actually observed in surveys of the 64 countries that were carried out in 1999–2001. These are not only new surveys of previously studied countries – they also include 12 countries that had *never* before been surveyed: they are genuine out-of-sample predictions.

We will then go on to predict the positions on these two dimensions that we would expect to find in 2005 for 122 societies, almost half of which we have never surveyed before. We expect that most of these countries will be included in the 2005–2006 wave of the values surveys, but even if they are not, these predictions can be tested by anyone who wishes to survey a given country. We will test these predictions when the relevant data become available; we publish them now, in order to stimulate prediction in social science and invite anyone who is interested to use the formulas published here to test our model.

Although we find immense cross-cultural differences in basic values, they are coherent and predictable to a remarkable degree. Our model explains 82 percent of the variance in these societies' locations on a two-dimensional cultural map in the

first three waves of surveys. In so far as economic development continues to take place, we expect that the prevailing mass values in these societies will change in a predictable direction. Even within the relatively short period from 1981 to the present, we have found substantial changes.

Our revised version of modernization theory has three components of predictability:

A society's level of *economic development* predicts where it will fall on the cross-cultural map, and the direction in which it is predicted to move. Rich societies should tend to rank high on both the Traditional/Secular-rational dimension and the Survival/Self-expression dimension, falling toward the upper-right hand corner of the map; poor societies should rank low on both dimensions, falling toward the lower left-hand corner. Moreover, rich societies – in so far as their people are experiencing high levels of economic security – should gradually shift toward the positive pole of both dimensions, moving toward the upper right. Low-income societies will start near the opposite end of the diagonal and will not necessarily show any movement.

Our revised version of modernization theory emphasizes another component of predictability: *the persistence of a society's historical cultural heritage*. This factor does not predict the amount or direction of change that will occur, but it does help predict a given society's position relative to other countries on the cross-cultural map. For cultural change is path dependent: whether a given society was historically shaped by Protestant, Catholic, Orthodox, Islamic or Confucian cultural tradition, continues to shape that society's values – even if few people in that society attend religious services today.

Religion is not the only important factor that helps shape a society's culture. Many countries have been shaped by their colonial heritage. Thus, the English-speaking societies in general, and the US in particular, tend to have more traditional value systems than one would expect of societies at their level of economic development. Moreover, during the past century of about one-third of the world's population was shaped by the experience of living under communist rule, making them emphasize both secular values and survival values more heavily than their economic level alone would predict. Economic development is a powerful predictor of a society's value system but it needs to be supplemented by taking the society's historical heritage into account.

If generational differences are present, they provide another indication of whether a society is experiencing cultural change, and the direction in which it is moving. The effects of intergenerational population replacement operate slowly but steadily, and over periods of several decades can have large cumulative effects. But during relatively brief periods, such as the 5-year span dealt with here, its effects are relatively modest, and building them into our model would make it more complicated. For the sake of parsimony, we use a simple predictive model based on economic factors and cultural heritage.

Economic development and cultural zones share a good deal of overlapping variance. The countries of Protestant Europe and the English-speaking zone are much wealthier than those of South Asia or sub-Saharan Africa, and it is difficult to partition the overlapping variance between culture and economic development. For example, in regression analyses presented in Inglehart and Welzel (2005), economic factors (GNP/capita and the percentage of the work force employed in the industrial sector) by themselves explain 33 percent of the variance in where given societies fall on the Traditional/Secular-rational values dimension. This is substantial. But our culture-zone dummy variables, by themselves, explain 56 percent of the variance on this dimension. The combined effects of economic factors and cultural heritage explain 76 percent of the variance in a society's position on this dimension, so cultural factors by themselves explain only an additional 43 percent of the variance, beyond what could be attributed to economic factors. But the reverse is also true: the economic variables explain only an additional 20 percent beyond what could be attributed to these societies' cultural heritages. Thus, cultural heritage could be interpreted as explaining anything from 43 to 56 percent of the variation in locations on the Traditional/Secular-rational values dimension; if one simply split the difference, one would attribute 50 percent of the variance to cultural heritage. Similarly, the economic variables could be interpreted as explaining anything from 20 to 33 percent of the variation, and splitting the difference, one would attribute 27 percent of the variance to economic factors.

Similarly, the cultural heritage variables alone explain 53 percent of the variance on the Survival/Self-expression dimension, but economic factors alone explain 76 percent of the variance on this dimension, and the combined effects of economics and culture explain 79 percent of the total variance. In this case, an extreme economic determinist might argue that a society's cultural heritage adds as little as 3 percent to the variance in Survival/Self-expression values that is explained by economic development alone, while an extreme cultural determinist might argue that economic development adds only 26 per cent of the variance that is explained by cultural heritage alone. Depending on one's ideological preferences, the explanatory power attributed to economic development could vary from 26 to 76 per cent, and that attributed to cultural heritage could range from 3 to 53 per cent. Splitting the differences, one would attribute 51 percent of the variance to economic development and 28 per cent to cultural heritage. Splitting the difference is, obviously, a very crude way to decide the question, but it almost certainly comes closer to the truth than either extreme economic determinism or extreme cultural determinism. Until we have a considerably longer time series of survey data, we won't be able to reach a precise answer. For now, it is clear that both cultural and economic factors explain substantial parts of the variance in where a society falls on the global map of cross-cultural variation. Our model takes *both* sets of factors into account, without attempting to reach a final conclusion about their relative weight.

### Generating the Cultural Zone Factors

Using the data from all available surveys from a given cultural zone obtained in the first three waves of the values surveys (carried out from 1981 to1995), we calculated the extent to which the societies of a given zone deviated from the mean score that would be predicted for that group by a combination of GNP/capita (using the World Bank's Purchasing Power Parity estimates [or PPP]), the percentage of the workforce in the industrial sector (for the Traditional/Secular-rational values factor) or the service sector (for the Survival/Self-expression values factor), and the number of years experienced under communist rule. We used Multiple Classification Analysis to calculate these adjusted scores.

The 1999–2001 wave of the values surveys gave high priority to obtaining better coverage of Islamic societies than had been attained in the first three waves. The only predominantly Islamic societies that had been surveyed previously were Turkey, Albania, and Azerbaijan – all of which were shaped by regimes that devoted intense efforts to minimize the influence of Islam – plus Bangladesh and Pakistan, which were included in the 1995 survey, but not in any previous waves. Consequently, our Islamic database was slim, and overrepresented the most secular Islamic societies. To compensate for this, in calculating the Islamic cultural zone factor, we took advantage of the fact that both Nigeria and India contain large Islamic populations (about half of the population, in the Nigerian case). We broke down Nigeria and India into separate Islamic and non-Islamic samples and treated the former as if they were separate countries, including their mean scores as part of the sample used to calculate the Islamic zone factor on both dimensions. This gave us seven Islamic countries from which to generate the Islamic cultural zone constants that were used as a component of the model that predicted the 1999/2001 positions of *all* Islamic countries – most of which had never before been surveyed. Table 1 shows the cultural zone factors calculated for each cultural region. As this table indicates, historically Protestant European societies tend to fall about half a standard deviation higher on both dimensions than other societies, even controlling for the fact that they are relatively rich and did not experience communist rule. English-speaking societies tend to rank higher on Self-expression values than their economic levels would predict – but they have more Traditional values than their other characteristics would predict.

Previous values surveys over-represented societies with relatively high levels of economic development: it was much more difficult to recruit colleagues and raise funding in poor countries than in rich ones. Consequently, most of the 12 previously unsurveyed societies for which we will advance predictions here are economically less developed – and some rank among the poorest countries in the world. Moreover, previous waves of these surveys included few historically Islamic societies, and we gave high priority to covering them more adequately in the 1999–2001 wave. Consequently, six of our 12 previously unsurveyed cases are predominantly Islamic and three more are in Sub-Saharan Africa (three of the new Islamic cases are located

**Table 1** Cultural Zone Deviation Factors

| Cultural zone | Number of surveys (in all four waves) | Factor for Traditional/Secular values (based on waves 1−3 surveys, adjusted for GDP/capita,% in industrial sector, years of communist rule) sector) | Factor for Survival/self-expression values (based on waves 1−3, adjusted for GDP/capita,% in service sector, years of communist rule) |
|---|---|---|---|
| Protestant Europe | 35 | 0.59 | 0.54 |
| English-speaking | 20 | −0.72 | 0.58 |
| Catholic Europe | 44 | −0.19 | 0.05 |
| Confucian | 13 | 1.25 | −0.49 |
| Orthodox | 30 | 0.40 | −0.50 |
| Latin America | 22 | −0.49 | −0.03 |
| South Asia | 10 | −0.44 | −0.29 |
| Islamic | 22 | −0.53 | −0.71 |
| Sub-Saharan Africa | 11 | −0.95 | −0.45 |

in North Africa, making a total of six new African cases). Although both regions are distinctive cultural zones, we had a relatively narrow empirical basis for projecting their values. The twelve new cases for which we will make predictions are not only new, out-of-sample cases; they differ systematically from the data base on which our predictive model is based.

Nevertheless, we will proceed to predict positions on the two basic cultural dimensions for the 64 countries surveyed in 1999−2001, giving special attention to the 12 countries not previously surveyed.

## Developing Predictive Formulas

Using a combination of economic and cultural-historic variables, one can develop models that explain very high proportions of the variance in each society's factor scores on the two key value dimensions. We will do so here, first analyzing the predictors of scores on the traditional/secular-rational values dimension, and then turning to the survival/self-expression values dimension.

Table 2 shows five models explaining the cross-national variation in traditional/secular-rational values, using various combinations of economic and cultural variables. Although GDP per capita is often a good predictor of social phenomena, in this case it does not do very well by itself, explaining only 14 percent of the cross-national variance. But two economic variables combined, GDP per capita (using the World Bank's Purchasing Power Parity estimates in 1995) and the proportion of the labor force in the industrial sector in 1990, explain a good deal of the cross-national variation in scores on the traditional-/secular-rational values dimension, producing an adjusted $R^2$ of 0.45, explaining 45 percent of the cross-national variation.

Nevertheless, we must introduce a cultural-historical factor to fully explain the variation in factor scores on this dimension. Being an ex-communist society reflects

**Table 2** Modeling Traditional/Secular-Rational Values as a Function of Economic and Cultural Heritage

| Independent variable | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 |
|---|---|---|---|---|---|
| Real GDP per capita, 1995 (in $1000 U.S.) | 0.38** (0.05) | 0.33** (0.04) | 0.65** (0.08) | 0.50** (0.06) | – |
| Percentage employed in industrial sector, 1990 | – | 0.54** (0.06) | 0.17* (0.02) | 0.04 (0.004) | – |
| # years under communist rule | – | | 0.62** (0.02) | 0.45** (0.017) | – |
| Cultural Zone factor (based on first 3 waves) | – | – | – | 0.50** (0.91) | 0.77** (1.42) |
| Adjusted $R^2$ | 0.14 | 0.45 | 0.63 | 0.80 | 0.59 |
| Number of Countries | 64 | 64 | 64 | 64 | 64 |

* Significant at 0.05 level; ** significant at 0.01 level.

Note: the table above shows standardized regression coefficients, with the unstandardized coefficients in parentheses.

Formula for predicting a society's score on the Traditional/Secular-rational values dimension:

Traditional/Secular-rational loading $= -1.046 + 0.063 \times$ GDP/capita $+ 0.0037 \times$ LaborIndus $+ 0.017 \times$ ExComm $+ 0.91 \times$ CultZone.

two things: (1) the cultural impact of having experienced several decades of communist rule, and (2) these countries' economic condition in recent years, following the collapse of communism. Adding to the equation a variable that measures the number of years a society experienced under communist rule, raises the explained variance to 63 percent.

Our cultural zone deviation factor reflects the impact of a given cultural-historic heritage on the traditional/secular-rational factor, controlling for the effects of the economic variables and the ex-communist variable. Adding that factor to model 4, makes it possible to explain fully 80 percent of the cross-national variance. The formula at the foot of Table 2 is derived from this analysis; one can use this formula to predict a society's position on the traditional/secular-rational values dimension. As Figure 2-3 demonstrated, dozens of attitudes measured in the values surveys are closely correlated with a society's score on this dimension. Knowing a society's GNP/capita, the percentage of industrial workers in the labor force and its historical heritage, enables one to predict, with considerable accuracy, how a given public will respond to a wide range of survey questions involving religion, authority, national pride and other topics.

Since causes precede effects, all of the independent variables used were measured at time points before 1999–2001, when the values of the respective publics were measured. In keeping with our assumption that economic levels help shape a society's values, we find that a country's real per capita GNP in 1995 predicts its values in the 2000 wave of surveys more accurately than does a measure of per capita GNP in 2000, at the time of the surveys. This also means that we can use the 2000 measure of GNP/cap to predict scores on the two values dimension in 2005 (this is convenient, since we do not yet have measures of GNP/capita in 2005).

There is an obvious ambiguity in interpreting the findings in Table 2. The various cultural zones have very different levels of economic development, but this procedure attributes the explanatory power shared by economic development and cultural zones to the economic variables, which may underestimate the importance of cultural zone membership. We therefore specified a fifth model, one using *only* the cultural zone memberships, to compute an average value on the factor relative to the overall mean (a shift factor from the raw mean, rather than from the value predicted with the economic variables). Interestingly, this cultural zone factor alone explains 59 percent of the variance – more than the two economic factors in Model 2 combined. This could be interpreted to mean that cultural factors are even more important than economic ones in explaining factor scores on the traditional/secular-rational factor, but this conclusion would be risky. The economic differences between the various cultural zones probably account for a substantial portion of the variance they seem to explain, as is obvious when one controls for economic factors. It is difficult to partition the variances between economic and cultural factors conclusively, but it seems clear that both sets of factors are important, and our predictions take both sets of factors into account.

Table 3 analyzes the economic and cultural factors that explain factor scores on the survival/self-expression dimension. In this case, a society's GDP per capita explains so much of the variance by itself (fully 60 percent) that the addition of a second economic variable (the percent of labor in the service sector) raises the total variance explained only slightly, in Model 2. But there is a significant increase in variance explained in Model 3 when the ex-communist dummy variable is added. These three factors explain 74 percent of the variance.

The addition of cultural zone factors further enhances the explanatory power of Model 4, bringing the total explained variance to a remarkable 84 percent. Again we

**Table 3** Modeling Survival/Self-Expression Values as a Function of Economic and Cultural Heritage

| Independent Variable | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 |
|---|---|---|---|---|---|
| GDP per Capita at PPP (1995) (in $1000 U.S.) | 0.78** (0.10) | 0.70** (0.09) | 0.52** (0.07) | 0.24** (0.03) | – |
| Percentage employed in service sector, 1990 | – | 0.13* (0.01) | 0.16* (0.01) | 0.118* (0.009) | – |
| # years of Communist rule | – | – | −0.39** (−0.015) | −0.45** (−0.018) | – |
| Cultural Zone factor (based on first 3 waves) | – | – | – | 0.43** (1.06) | 0.73** (1.84) |
| Adjusted $R^2$ | 0.60 | 0.61 | 0.74 | 0.84 | 0.52 |
| Number of Countries | 64 | 64 | 64 | 64 | 64 |

* Significant at 0.05 level; ** significant at 0.01 level.
Note: the table above shows standardized regression coefficients, with unstandardized coefficients in parentheses.
Formula for predicting a society's score on the Survival/Self-expression values dimension:
Survival/Self-expression loading = $-0.215 + 0.031 \times$ GDP/capita $+ 0.0093 \times$ LaborServ $- 0.0175 \times$ ExComm $+ 1.06 \times$ CultZone.

also computed the variance explained by cultural zone membership alone and found it accounts for 52 percent. This is substantial, but the economic factors are even stronger predictors of scores on the survival/self-expression dimension. A society's cultural zone membership seems especially important in shaping traditional/secular-rational values, which are deeply rooted in long-established historical factors – above all a society's religious heritage. But economic variables seem to play the dominant role in shaping survival/self-expression values, which have emerged more recently and are less strongly rooted in a society's traditional cultural heritage. Rising self-expression values (far more than secular-rational values) are a central element in a human development sequence leading from economic development to democracy. The formula at the bottom of Table 3, derived from this analysis, makes it possible to predict a society's position on the Survival/Self-expression values dimension from a handful of economic and cultural indicators.

Table 4 shows how successfully the two equations we have just derived, predict a society's position on these two dimensions for all countries surveyed in 1999–2001. This table shows the factor score we predicted for each country, the score actually observed in the 1999–2001 survey, and the difference between the predicted and observed scores. The differences between the predicted scores and the observed scores range from 0.00 to 1.15 but overall, the predicted values come close to the observed values. Across these 64 societies, the mean difference between the predicted score and the observed score on Traditional/Secular-rational values is 0.36. The mean difference between the predicted score and the observed score on the Survival/Secular-rational values dimension is almost identical: 0.37.

Table 5 shows the mean error on the two dimensions for each society, ranking them from our most accurate predictions (South Africa and West Germany) to our least accurate predictions (Puerto Rico and Sweden). Although our predictions show a wide range of accuracy, they have impressive accuracy by most standards of comparison. The mean error in prediction is 0.36, on a cultural map that extends from below −2.00 to above +2.00 on each dimension. Our average prediction falls within a radius of 0.36 of the value actually found for that society, forming a circle that occupies about two percent of the map's area. These predictions are vastly better than random. And, surprisingly, our predictions are just as accurate for the twelve societies that we had never before surveyed (shown in bold face type on this table), as for the other societies that had been surveyed at least once before. Our model does just as good a job in predicting the values of publics that have never before been surveyed, as it does in predicting the values in 1999–2001 of publics from which we have a prior reading.

How do these predictions, based on a revised version of modernization theory, compare with random predictions? Table 6 presents two sets of predictions for each of the 12 countries that had never before been surveyed. The first two columns on this table show the results of a genuinely random prediction: not knowing anything about the actual distributions, one predicts that the respondents will fall at the midpoint of the scale on each of the variables used to construct this map (for

**Table 4** Predicted and Observed Value Systems (64 societies' locations on 1999–2001cultural map, predicted from model based on data from the first three waves of surveys)

| Nation: | Traditional/ Secular-rational values: predicted | Traditional/ Secular-rational values: observed | Traditional/ Secular Values: difference between predicted vs. observed | Survival/ Self-expression values: predicted | Survival/ Self-expression values: observed | Survival/ Self-Expres. Values: difference between predicted vs. observed |
|---|---|---|---|---|---|---|
| Albania | −0.28 | 0.07 | **0.35** | −1.55 | −1.12 | **0.43** |
| Algeria | −1.48 | −1.65 | **0.17** | −0.50 | −0.72 | **0.22** |
| Argentina | −0.61 | −0.94 | **0.34** | 0.47 | 0.40 | **0.07** |
| Austria | 0.31 | 0.22 | **0.09** | 0.74 | 1.48 | **0.75** |
| Bangladesh | −0.95 | −1.19 | **0.24** | −0.81 | −0.90 | **0.09** |
| Belarus | 0.62 | 0.89 | **0.28** | −1.40 | −1.20 | **0.20** |
| Belgium | 0.08 | 0.48 | **0.40** | 0.74 | 1.20 | **0.46** |
| Bosnia | 0.15 | 0.33 | **0.17** | −1.15 | −0.62 | **0.53** |
| Britain | −0.67 | 0.26 | **0.93** | 1.20 | 1.37 | **0.17** |
| Bulgaria | 0.51 | 1.15 | **0.63** | −1.16 | −1.52 | **0.36** |
| Canada | −0.43 | −0.18 | **0.26** | 1.35 | 1.78 | **0.43** |
| Chile | −1.18 | −0.88 | **0.30** | 0.31 | 0.18 | **0.14** |
| China | 1.27 | 1.16 | **0.11** | −1.47 | −0.61 | **0.87** |
| Croatia | −0.03 | 0.08 | **0.11** | −0.39 | 0.35 | **0.74** |
| Czech | 0.68 | 1.19 | **0.51** | −0.40 | 0.42 | **0.82** |
| Denmark | 0.74 | 1.11 | **0.36** | 1.23 | 1.96 | **0.73** |
| E. Germany | 1.67 | 1.40 | **0.27** | 0.40 | 0.48 | **0.08** |
| Egypt | −1.15 | −1.57 | **0.42** | −0.54 | −0.40 | **0.14** |
| El Salvador | −1.15 | −2.04 | **0.89** | 0.22 | 0.56 | **0.34** |
| Estonia | 1.15 | 1.24 | **0.09** | −0.48 | −1.14 | **0.65** |
| Finland | 0.62 | 0.80 | **0.18** | 1.08 | 1.04 | **0.04** |
| France | 0.15 | 0.49 | **0.34** | 0.62 | 0.97 | **0.35** |
| Greece | 0.45 | 0.73 | **0.28** | 0.09 | 0.62 | **0.54** |
| Hungary | 0.19 | 0.38 | **0.19** | −0.53 | −1.22 | **0.69** |
| Iceland | 0.94 | 0.37 | **0.57** | 1.18 | 1.72 | **0.54** |
| India | −0.94 | −0.53 | **0.42** | −0.37 | −0.50 | **0.13** |
| Indonesia | −0.86 | −1.05 | **0.19** | −0.65 | −0.41 | **0.24** |
| Iran | −1.04 | −1.19 | **0.15** | −0.46 | −0.33 | **0.14** |
| Ireland | −0.98 | −0.92 | **0.06** | 0.96 | 1.27 | **0.31** |
| Italy | −0.07 | 0.18 | **0.25** | 0.53 | 0.93 | **0.40** |
| Japan | 1.32 | 1.84 | **0.51** | 0.06 | 0.68 | **0.62** |
| Jordan | −1.32 | −1.57 | **0.25** | −0.36 | −1.01 | **0.65** |
| Latvia | 1.24 | 0.70 | **0.54** | −0.47 | −1.25 | **0.78** |
| Lithuania | 0.80 | 0.97 | **0.17** | −0.96 | −0.96 | **0.00** |
| Luxembourg | 0.77 | 0.37 | **0.40** | 1.18 | 1.18 | **0.00** |
| Macedonia | 0.62 | 0.11 | **0.51** | −1.08 | −0.72 | **0.36** |
| Mexico | −0.74 | −1.47 | **0.73** | 0.19 | 0.58 | **0.39** |
| Moldova | 0.80 | 0.47 | **0.33** | −1.67 | −1.67 | **0.00** |
| Morocco | −0.98 | −1.62 | **0.64** | −0.65 | −1.13 | **0.48** |
| Netherlands | 0.81 | 0.81 | **0.00** | 1.26 | 2.05 | **0.79** |
| Nigeria | −1.72 | −1.53 | **0.19** | −0.36 | 0.32 | **0.68** |

Table 4 (*Continued*)

| Nation: | Traditional/ Secular-rational values: predicted | Traditional/ Secular-rational values: observed | Traditional/ Secular Values: difference between predicted vs. observed | Survival/ Self-expression values: predicted | Survival/ Self-expression values: observed | Survival/ Self-Expres. Values: difference between predicted vs. observed |
|---|---|---|---|---|---|---|
| Pakistan | −1.04 | −1.40 | **0.36** | −0.68 | −1.18 | **0.50** |
| Philippines | −1.01 | −1.22 | **0.22** | −0.11 | −0.11 | **0.00** |
| Poland | 0.05 | −0.44 | **0.48** | −0.59 | −0.56 | **0.03** |
| Portugal | −0.14 | −0.89 | **0.75** | 0.43 | 0.47 | **0.03** |
| Puerto Rico | −1.16 | −2.06 | **0.90** | 0.52 | 1.16 | **0.64** |
| Romania | 0.80 | −0.25 | **1.05** | −1.19 | −1.62 | **0.43** |
| Russia | 1.22 | 1.08 | **0.14** | −1.49 | −1.86 | **0.37** |
| S. Africa | −1.10 | −1.12 | **0.01** | −0.09 | −0.08 | **0.01** |
| S. Korea | 0.71 | 1.08 | **0.36** | −0.37 | −0.43 | **0.06** |
| Serbia | 0.33 | 0.64 | **0.30** | −1.19 | −1.03 | **0.16** |
| Slovakia | 0.05 | 0.65 | **0.61** | −0.37 | −0.39 | **0.02** |
| Slovenia | 0.62 | 0.91 | **0.29** | −0.29 | 0.38 | **0.67** |
| Spain | −0.17 | 0.09 | **0.25** | 0.45 | 0.56 | **0.11** |
| Sweden | 0.77 | 1.60 | **0.83** | 1.21 | 2.22 | **1.01** |
| Tanzania | −1.36 | −1.86 | **0.50** | −0.59 | −0.14 | **0.45** |
| Turkey | −0.73 | −0.83 | **0.10** | −0.21 | −0.35 | **0.15** |
| Uganda | −1.37 | −1.40 | **0.03** | −0.58 | −0.48 | **0.10** |
| Ukraine | 0.99 | 0.90 | **0.08** | −1.57 | −1.68 | **0.12** |
| USA | −0.32 | −0.53 | **0.21** | 1.42 | 1.64 | **0.22** |
| Venezuela | −1.20 | −1.59 | **0.40** | 0.40 | 0.46 | **0.06** |
| Vietnam | −0.68 | −0.70 | **0.02** | −0.88 | 0.27 | **1.15** |
| W. Germany | 1.13 | 1.13 | **0.00** | 1.20 | 1.08 | **0.12** |
| Zimbabwe | −1.42 | −1.46 | **0.04** | −0.40 | −1.33 | **0.93** |
| **Mean:** | | | **0.36** | | | **0.37** |

example, the scale used to measure acceptability of abortion ranges from 1 to 10, so we would predict a mean score of 5.5 for the society). Using this procedure for all ten variables in the factor analysis generates a score of 1.48 on the vertical axis (far above the actual empirical mean) and a score of −0.09 on the horizontal axis (quite close to the empirical mean). Our predictions would be pretty far from the results actually observed: only seven of the 65 societies fall within one standard deviation of this predicted location; and the 12 societies in Table 6 deviate from their predicted scores as indicated. The mean of the two errors is 1.43. As Table 7 indicates, our model produces a mean prediction error of only 0.34 – less than one-fourth as large as the average error in random predictions.

The second prediction is one that a well-informed social scientist might make: it predicts that each society will have the mean factor score on each dimension. We know that in a normal distribution, about two-thirds of the sample should fall within one standard deviation of this point so this is an excellent bet. This approach

**Table 5** Mean Prediction Error, by Country

| Nation | Mean error |
| --- | --- |
| S. Africa | 0.01 |
| W. Germany | 0.06 |
| **Uganda** | **0.07** |
| Lithuania | 0.09 |
| Ukraine | 0.10 |
| Finland | 0.11 |
| Philippines | 0.11 |
| Turkey | 0.13 |
| **Iran** | **0.14** |
| Moldova | 0.16 |
| E. Germany | 0.17 |
| Bangladesh | 0.17 |
| Spain | 0.18 |
| Ireland | 0.19 |
| **Luxemburg** | **0.20** |
| **Algeria** | **0.20** |
| USA | 0.21 |
| Argentina | 0.21 |
| S. Korea | 0.21 |
| Chile | 0.22 |
| **Indonesia** | **0.22** |
| Venezuela | 0.23 |
| Serbia | 0.23 |
| Belarus | 0.24 |
| Poland | 0.25 |
| Russia | 0.26 |
| India | 0.27 |
| **Egypt** | **0.28** |
| Slovakia | 0.31 |
| Italy | 0.32 |
| Canada | 0.34 |
| France | 0.35 |
| Bosnia | 0.35 |
| Estonia | 0.37 |
| Netherlands | 0.39 |
| Portugal | 0.39 |
| Albania | 0.39 |
| **Greece** | **0.41** |
| Austria | 0.42 |
| Croatia | 0.42 |
| Belgium | 0.43 |
| Nigeria | 0.43 |
| Pakistan | 0.43 |
| Hungary | 0.44 |
| Macedonia | 0.44 |
| **Jordan** | **0.45** |
| Slovenia | 0.48 |
| **Tanzania** | **0.48** |
| China | 0.49 |
| **Zimbabwe** | **0.49** |
| Bulgaria | 0.50 |
| Britain | 0.55 |

Table 5 (*Continued*)

| Nation | Mean error |
|---|---|
| Denmark | 0.55 |
| Japan | 0.56 |
| Mexico | 0.56 |
| Iceland | 0.56 |
| **Morocco** | **0.56** |
| **Vietnam** | **0.58** |
| El Salvador | 0.62 |
| Czech | 0.66 |
| Latvia | 0.66 |
| Romania | 0.74 |
| Puerto Rico | 0.77 |
| Sweden | 0.92 |
| Overall Mean | 0.36 |

Countries not surveyed in previous waves are shown in **bold** face type. Overall, the predictions for these 12 societies are fully as accurate as those for the other countries.

produces a mean prediction error of 0.99 across these 12 societies. This is much less accurate than the 0.36 mean prediction error that our model produces for the same 12 societies, but it is a considerable improvement over the random prediction in the first columns of Table 4. But this is *not* a random or a *priori* prediction: one does not know the mean factor score until one has surveyed all the societies and analyzed their

**Table 6** Alternative Predictions for 12 Societies not Previously Surveyed (difference between predicted scores and observed scores): Prediction based on prediction is midpont of each scale mean factor score

| Country | Traditional/ Secular-rational values: predicted score minus observed score | Survival/ Self-expression values: predicted score minus observed score | Traditional/ Secular-rational values: predicted score minus observed score | Survival/ Self-expression values: predicted scores minus observed score |
|---|---|---|---|---|
| Luxemburg | 0.46 | 0.30 | 0.37 | 1.18 |
| Greece | 0.82 | −0.86 | 0.73 | 0.62 |
| Zimbabwe | 1.37 | 2.81 | 1.46 | 1.33 |
| Tanzania | 1.77 | 1.62 | 1.86 | 0.14 |
| Vietnam | 0.61 | 1.21 | 0.70 | 0.27 |
| Indonesia | 0.96 | 1.89 | 1.05 | 0.41 |
| Uganda | 1.31 | 1.96 | 1.40 | 0.48 |
| Egypt | 1.48 | 1.88 | 1.57 | 0.40 |
| Morocco | 1.53 | 2.61 | 1.62 | 1.13 |
| Iran | 1.10 | 1.81 | 1.19 | 0.33 |
| Jordan | 1.48 | 2.49 | 1.57 | 1.01 |
| Algeria | 1.56 | 2.20 | 1.65 | 0.72 |
| **Mean:** | **1.20** | **1.66** | **1.26** | **0.67** |
| **Mean error on both dimensions:** | 1.43 | | 0.99 | |

**Table 7** Predicting the Value Systems of 12 Societies not Previously Surveyed (differences between predicted scores derived from revised modernization model, and actually observed scores)*

| Country | Difference between predicted and observed scores on Traditional/Secular-rational values | Difference between predicted and observed scores on Survival/Self-expression values |
|---|---|---|
| Luxemburg | 0.40 | 0.00 |
| Greece | 0.28 | 0.54 |
| Zimbabwe | 0.04 | 0.93 |
| Tanzania | 0.50 | 0.45 |
| Vietnam | 0.03 | 0.10 |
| Indonesia | 0.02 | 1.14 |
| Uganda | 0.19 | 0.25 |
| Egypt | 0.42 | 0.14 |
| Morocco | 0.64 | 0.48 |
| Iran | 0.15 | 0.14 |
| Jordan | 0.25 | 0.65 |
| Algeria | 0.17 | 0.22 |
| **Mean:** | **0.26** | **0.42** |
| **Mean error on both dimensions:** | **0.34** | |

* Prediction based on GNP/cap(PPP),% of workforce in service sector, number of years under communist rule ( 2,1,0) and Cultural zone shift factor. Cultural zones for given countries: Luxemburg: Catholic Europe; Greece: Orthodox; Zimbabwe, Tanzania, Uganda: Sub-Saharan Africa; Vietnam: South Asia; Indonesia, Egypt, Morocco, Iran, Jordan, Algeria: Islamic.

distributions. This approach selects a point that can only be known when all of the data have been analyzed. Nevertheless, our model generates genuine out-of-sample a *priori* predictions (even for societies that were never before surveyed) that are far more accurate than this *ex post facto* prediction.

## Random Versus Actual Predictions

We have just examined some genuine out-of-sample predictions. Using a model based on analysis of the data from the first three waves of surveys, we have predicted the positions of all 64 societies that were surveyed in the fourth wave, in 1999–2001. Our model includes a cultural zone deviation factor that is a constant for each cultural zone: it does not use a specific nation's position in the earlier waves to predict its position in the fourth wave. Consequently, it is a general model that not only predicts the position of countries that have already been surveyed, but also predicts the positions of 12 countries that *were* not previously covered in the values surveys (for some of these countries, such as Iran, Zimbabwe, Tanzania and Vietnam, virtually no previous representative national survey data was available from any source: we helped design the first national sampling frame used in some of these countries).
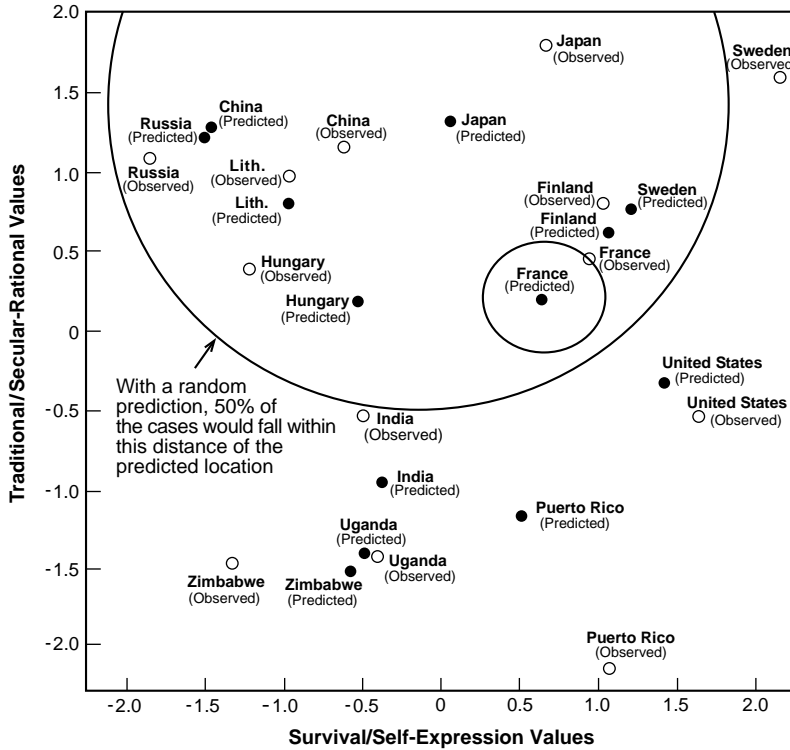
**Figure 1** Predicted and Observed positions on global cultural map. France's prediction is of average accuracy; the small circle around this prediction illustrates our average prediction error. Sweden and Puerto Rico are the two *least* accurate among 65 predictions. Finland, Lithuania and Uganda are among the six most accurate predictions.

Despite the substantial shifts that are observed from one wave to another, our model predicts the position of most countries in 1999–2001 rather accurately, as Figure 1 demonstrates. We do not attempt to show the predicted and observed locations of all 64 societies on this map (that information is provided by Table 4). Figure 1 simply illustrates some representative examples. For example, the location predicted for Finland in the fourth wave of surveys, and the location actually *observed*, appear in the upper right-hand quadrant, just inside the circle (the predicted location is shown as a black dot and the observed location is shown as a white dot). These two dots are very close, for this is one of our most accurate predictions. Our two *most* accurate predictions (for West Germany and South Africa) are not shown, because in both cases the observed location is almost identical with the predicted location: the two dots would be on top of each other. This figure also shows our two *least* accurate predictions, those for Sweden and Puerto Rico. Even these two cases fall roughly in the right ballpark, near the upper-right and lower-right hand corners of the map respectively, but they are our worst predictions. Figure 1 also illustrates two more of our best predictions, showing the predicted and observed

locations for Lithuania (abbreviated as 'Lith.') and Uganda. In each case, the predicted value is very close to the observed location.

The predicted and observed locations for France illustrate the average accuracy of our predictions: the small circle around France's predicted location on Figure 1, shows our model's mean range of error. The large circle in the upper half of Figure 1 shows the result of a random prediction, based on the procedure shown in the first half of Table 6 (predicting that the respondents will fall at the midpoint of each scale). Only seven of the 65 societies fall within one standard deviation of this predicted location. To include half of the societies requires a circle with a radius of 2.1 standard deviations. This figure provides a graphic comparison between the mean error in our model's predictions, and the much greater range of error found with random predictions: the larger circle covers an area that is *16* times as large as that of the smaller circle. The predictions generated by our model based on the data from the first three waves are not perfect, but they generally fall pretty close to the location actually observed in the fourth wave. If we had included the fourth wave data in computing our model, we would be able to generate even more accurate 'predictions' of these positions, but they then would not be genuine out-of-sample predictions.

### Predicting the Responses of 122 publics in 2005–2006

In the natural sciences, it is generally accepted that one can fit a model to any collection of observations, but the conclusive test of a theory is its ability to predict previously unobserved phenomena. This test is much more difficult to meet in the social sciences than in the natural sciences, because social science deals with much more complex phenomena, which are shaped by interactions between multiple levels of analysis. An interaction between two particles can be analyzed solely at the physical level; human choices involve physical, chemical, biological, psychological, economic, social, geographic, historical and cultural factors. Nevertheless, certain regularities that have predictive value can be observed in human behavior. Predictions of future behavior will necessarily be probabilistic and only roughly accurate, but they can provide useful guidance to choices and policies.

Consequently, let us predict what the people of various societies will tell us they believe and value when the next wave of the Values Surveys is carried out in 2005–2006. Our model could generate predictions for all 192 countries that are members of the United Nations, but we will limit ourselves to predicting the values of the publics of 122 countries that, by our most optimistic assessment, may be included in the 2005–2006 surveys. These countries contain over 95 percent of the world's population.

We will use the data from all four waves of the values surveys, carried out from 1981 to 2002, in making these predictions. Consequently, we will update the cultural zone deviation factors and predictive formulas that we have used so far in this article, and that are based on data from the first three waves of surveys. Table 8 shows the revised version of the cultural zone deviation factors and the predictive formulas.

**Table 8** Cultural Zone Deviation Factors for Predicting Locations of Societies that may be Surveyed in the 2005 Wave

| Cultural Zone: | Traditional/Secular-rational values | Survival/Self-expression values |
| --- | --- | --- |
| Sub-Saharan Africa | −0.91 | −0.41 |
| Catholic Europe | −0.09 | 0.12 |
| Confucian | 1.31 | −0.46 |
| English-speaking | −0.68 | 0.58 |
| Islamic | −0.79 | −0.58 |
| Latin America | −0.60 | 0.11 |
| Orthodox | 0.37 | −0.41 |
| Protestant Europe | 0.64 | 0.55 |
| South Asia | −0.46 | −0.12 |

Formula to predict a society's 2005 location on the Traditional/Secular-rational values dimension:
Trad/Rat loading $= -0.67 + 1.0 \times$ T/R Cultural Zone factor $+ 0.011 \times$ years under communist rule $+ 0.052 \times$ GNI/capita 5 years before survey (in thousands).
Formula to predict a society's 2005 location on the Survival/Self-expression values dimension:
Surv/Self loading $= -0.349 + 1.03 \times$ S/S Cultural Zone factor $- 0.019 \times$ years under communist rule $+ 0.032 \times$ GNI/capita 5 years before survey (in thousands) $+ 0.008 \times$ percent in service sector (5 years before survey).

Neither the factors nor the formulas differ much from the earlier versions, but we believe they should generate somewhat more accurate predictions of the results from the surveys that will be carried out in 2005−2006 and analyzed soon afterward.

Using the data from all available surveys, we estimated the scores on each dimension in 2005 for all societies for which previous data were available. We then used these scores as the dependent variables in regression analyses that enabled us to derive the coefficients for the above equations, to predict the scores for countries not previously surveyed. Table 9 shows the where our model predicts that each of 122 societies will fall on the Traditional/Secular-rational values dimension, and on the Survival/Self-expression dimension in 2005−2006. Basic values tend to be stable, so we expect that the positions of previously surveyed countries will be reasonably close to the positions they had in 2000, apart from a tendency for rich societies to move higher on both dimensions during the 5-year period from 2000 to 2005. Measurement error will also produce a certain amount of apparent movement. To maximize accuracy, the positions in 2005 of previously surveyed countries are predicted from previous data for that country, rather than from the cultural zone factor for all societies in their zone. The predicted positions of the societies that have not previously been surveyed, are based on the assumption that their values will be shaped by the same factors, linked with modernization and cultural persistence, that influence the values of the other societies and are reflected in our model. We will encounter some surprises: almost certainly, the publics of some societies will deviate markedly from these predictions, just as the US public has more religious and traditional values than our model predicts, for reasons that are not captured in the model. This model only contains a few factors, and a society's values reflect its entire historical experience. But on the whole, we are reasonably confident that the surveys

**Table 9** Predicted Locations of 122 Societies that may be Surveyed in 2005

| Country | Traditional/Secular-rational values | Survival/Self-expression values |
|---|---|---|
| Albania | 0.07 | −1.31 |
| Algeria | −1.52 | −0.89 |
| Angola | −1.69 | −0.38 |
| Argentina | −1.03 | 0.57 |
| Armenia | 0.58 | −1.32 |
| Australia | −0.12 | 2.17 |
| Austria | 0.23 | 1.66 |
| Azerbaijan | −0.14 | −1.60 |
| Bangladesh | −1.19 | −1.09 |
| Belarus | 0.91 | −1.21 |
| Belgium | 0.49 | 1.38 |
| Bolivia | −1.37 | 0.37 |
| Bosnia | 0.35 | −0.63 |
| Botswana | −1.39 | −0.20 |
| Brazil | −1.36 | 0.23 |
| Britain | 0.34 | 1.54 |
| Bulgaria | 1.17 | −1.53 |
| Cambodia | −.82 | −.48 |
| Cameroon | −1.67 | −0.37 |
| Canada | −0.10 | 1.95 |
| Chile | −0.97 | 0.35 |
| China | 1.20 | −0.46 |
| Colombia | −1.78 | 0.53 |
| Congo (Braz) | −1.73 | −0.40 |
| Costa Rica | −1.08 | 0.54 |
| Cote d'Ivoire | −1.68 | −0.37 |
| Croatia | 0.09 | 0.53 |
| Cuba | −0.60 | −0.30 |
| Cyprus | −0.03 | −0.05 |
| Czech | 1.20 | 0.60 |
| Denmark | 1.20 | 2.12 |
| Domin. Rep. | −1.12 | 0.55 |
| E. Germany | 1.49 | 0.64 |
| Ecuador | −1.34 | 0.38 |
| Egypt | −1.57 | −0.59 |
| El Salvador | −2.13 | 0.73 |
| Estonia | 1.33 | −0.98 |
| Ethiopia | −1.72 | −0.40 |
| Finland | 0.89 | 1.20 |
| France | 0.50 | 1.15 |
| Georgia | −0.02 | −1.33 |
| Ghana | −1.71 | 0.15 |
| Greece | 0.75 | 0.61 |
| Guatemala | −1.29 | 0.41 |
| Honduras | −1.36 | 0.37 |
| Hong Kong | 1.68 | 0.09 |
| Hungary | 0.39 | −1.04 |
| Iceland | 0.46 | 1.88 |
| India | −0.50 | −0.42 |
| Indonesia | −1.05 | −0.60 |
| Iran | −1.19 | −0.52 |
| Ireland | −0.84 | 1.44 |

Table 9 (*Continued*)

| Country | Traditional/Secular-rational values | Survival/Self-expression values |
|---|---|---|
| Italy | 0.19 | 1.11 |
| Japan | 1.88 | 0.83 |
| Jordan | −1.57 | −1.20 |
| Kazakhstan | −0.13 | −2.01 |
| Kenya | −1.70 | −0.39 |
| Kuwait | −0.70 | −0.08 |
| Kyrgyztan | −0.28 | −1.89 |
| Latvia | 0.79 | −1.09 |
| Lithuania | 0.98 | −0.78 |
| Luxembourg | 0.38 | 1.36 |
| Macedonia | 0.13 | −0.73 |
| Malaysia | −1.23 | −0.40 |
| Mali | −1.72 | −0.40 |
| Malta | −1.51 | 0.21 |
| Mexico | −1.56 | 0.75 |
| Moldova | 0.49 | −1.68 |
| Mongolia | .12 | −1..47 |
| Montenegro | 0.88 | −1.18 |
| Morocco | −1.62 | −1.32 |
| Mozambique | −1.71 | −0.40 |
| Myanmar | −1.31 | .01 |
| N. Ireland | −0.26 | 1.11 |
| Nepal | −1.30 | 0.02 |
| Netherlands | 0.90 | 2.21 |
| New Zealand | 0.17 | 2.04 |
| Nicaragua | −1.38 | 0.36 |
| Niger | −1.72 | −0.40 |
| Nigeria | −1.61 | 0.50 |
| Norway | 1.35 | 1.62 |
| Pakistan | −1.40 | −1.37 |
| Panama | −1.20 | 0.47 |
| Paraguay | −1.26 | 0.43 |
| Peru | −1.42 | 0.24 |
| Philippines | −1.19 | −0.03 |
| Poland | −0.43 | −0.38 |
| Portugal | −0.88 | 0.65 |
| Puerto Rico | −2.15 | 1.33 |
| Romania | −0.23 | −1.63 |
| Russia | 1.10 | −1.87 |
| S. Africa | −1.20 | 0.10 |
| S. Korea | 1.12 | −0.28 |
| Saudi Arabia | −1.07 | −0.30 |
| Senegal | −1.68 | −0.37 |
| Serbia | 0.66 | −1.04 |
| Singapore | −0.60 | −0.16 |
| Slovakia | 0.66 | −0.21 |
| Slovenia | 0.92 | 0.56 |
| Spain | 0.10 | 0.74 |
| Sri Lanka | −1.19 | 0.09 |
| Sweden | 1.69 | 2.38 |
| Switzerland | 0.86 | 1.61 |
| Syria | −1.48 | −0.55 |

Table 9 (*Continued*)

| Country | Traditional/Secular-rational values | Survival/Self-expression values |
|---|---|---|
| Taiwan | 0.67 | −0.58 |
| Tajikistan | −0.35 | −1.93 |
| Tanzania | −1.94 | 0.04 |
| Thailand | −1.04 | 0.17 |
| Tunisia | −1.34 | −0.47 |
| Turkey | −0.83 | −0.54 |
| Turkmenistan | −0.22 | −1.85 |
| Uganda | −1.48 | −0.30 |
| Ukraine | 0.92 | −1.69 |
| Un. Arab Emirates | −1.04 | −0.28 |
| Uruguay | −0.31 | 0.67 |
| USA | −0.45 | 1.81 |
| Uzbekistan | −0.29 | −1.90 |
| Venezuela | −1.68 | 0.63 |
| Vietnam | −0.67 | 0.35 |
| W. Germany | 1.22 | 1.24 |
| Yemen | −1.61 | −0.63 |
| Zambia | −1.72 | −0.40 |
| Zimbabwe | −1.54 | −1.15 |

Formulas used to predict scores of nations not previously surveyed:

Traditional/Secular-rational values in $2005 = -0.967 + 0.051 \times$ GNI/capita, 2000 (thousands) $+ 0.866 \times$ Traditional/Secular-rational cultural zone Shift Factor $+ 0.017 \times$ Number of years under communist rule.

*Survival/Self-expression values in $2005 = 0.143 + 0.031 \times$ GNI/capita, 2000 (thousands) $+ 1.375 \times$ Survival/Self-expression cultural zone Shift Factor $-0.018 \times$ Number of years under communist rule.*

*Scores for nations previously surveyed are calculated from previous scores plus trend factor.*

carried out in 2005–2006 will yield results that are reasonably close to the predictions in Table 9.

Figure 2 shows the predicted locations of some of these societies on the cultural map. Placing all 122 societies on this map would produce an almost unreadable map (though the reader can plot any additional societies that may be of interest, using the data in Table 9). Figure 2 gives special attention to showing the predicted location of 15 societies that have never been surveyed before, in context with a number of previously surveyed societies. Because most rich countries have already been covered in previous surveys, most of the newly surveyed countries tend to fall on the lower half of the map, with Guatemala, Ecuador and Paraguay falling into a cluster near other Latin American countries; and Kenya, Ethiopia and Angola falling near the Traditional pole and to the left of the midpoint of the Survival/Self-expression dimension. Yemen is also expected to fall in this region, but because of its high economic level, our model predicts that Kuwait will show more secular values than most Islamic societies. In contrast with most of the newly surveyed societies, Hong Kong is predicted to fall in the upper region – near other high-income societies such as Japan, Germany and Slovenia. Cyprus is also a relatively high-income society, and we expect it to fall near the center, not far from Spain and Croatia. Although Cuba is a Latin American society, it is the only one that has experienced communist rule, so
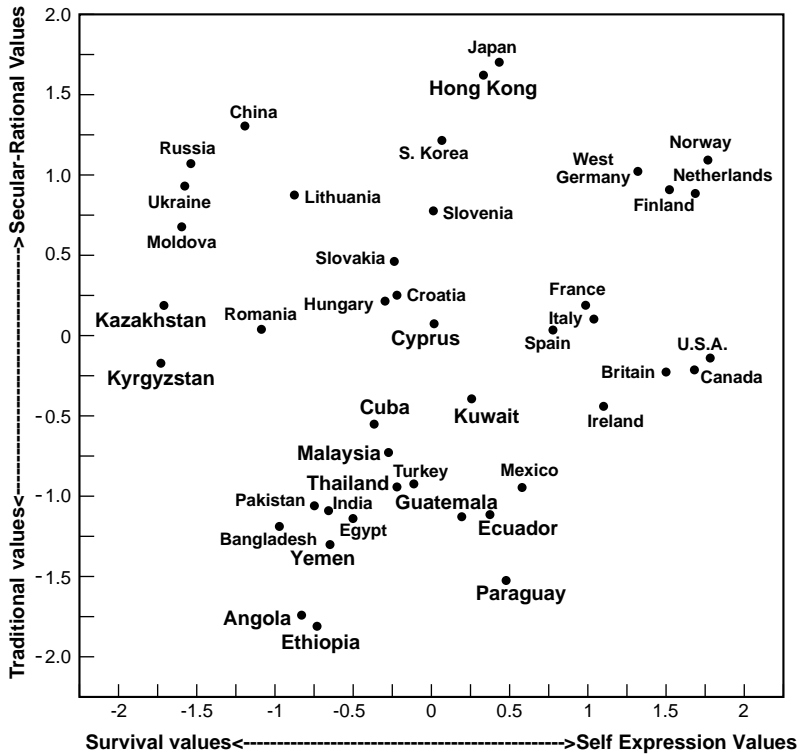
**Figure 2** Predicted locations on cultural map of societies that may be surveyed in 2005–2006. The predicted locations of 14 societies that have not been surveyed previously, are shown in italics.

our model predicts that it will be an outlier, having considerably more secular values than most Latin American countries. Similarly, Kazakhstan and Kyrgyzstan are Islamic societies that have experienced many decades of communist rule – and our model predicts that they will be outliers from the main body of Islamic societies, showing substantially more secular-rational values than mainstream Islamic societies. Their low income levels also imply that they will tend to emphasize Survival values even more than most ex-communist countries.

## Predicting Responses to Specific Questions in 2005–2006

Each of the two dimensions on which our cultural map is based, taps scores of important beliefs and values. Thus, if one knows a society's location on this map, one can predict its public's response to many additional questions. To illustrate this point, Table 10 predicts responses of 122 publics to two specific questions: (1) the percentage in each society who will say that 'Religion is very important in their lives, and (2) the percentage who will agree with the statement that 'When jobs are scarce, men have more right to a job than women'.

**Table 10** Predicted Responses to Survey Questions in 2005–2006

| Country | Religion is very Important | Men have more right to a Job |
|---|---|---|
| Albania | 33 | 52 |
| Algeria | 94 | 72 |
| Angola | 88 | 54 |
| Argentina | 51 | 25 |
| Armenia | 29 | 57 |
| Australia | 21 | 23 |
| Austria | 20 | 24 |
| Azerbaijan | 35 | 69 |
| Bangladesh | 93 | 73 |
| Belarus | 14 | 20 |
| Belgium | 20 | 20 |
| Bolivia | 80 | 36 |
| Bosnia | 36 | 22 |
| Botswana | 76 | 50 |
| Brazil | 70 | 35 |
| Britain | 11 | 18 |
| Bulgaria | 18 | 32 |
| Cambodia | 64 | 40 |
| Cameroon | 87 | 54 |
| Canada | 31 | 13 |
| Chile | 52 | 24 |
| China | 2 | 46 |
| Colombia | 54 | 28 |
| Congo (Braz) | 89 | 54 |
| Costa Rica | 69 | 33 |
| Cote d'Ivoire | 87 | 54 |
| Croatia | 23 | 16 |
| Cuba | 54 | 29 |
| Cyprus | 45 | 48 |
| Czech | 7 | 14 |
| Denmark | 6 | 3 |
| Domin. Rep. | 74 | 34 |
| E. Germany | 3 | 21 |
| Ecuador | 79 | 36 |
| Egypt | 98 | 95 |
| El Salvador | 90 | 26 |
| Estonia | 3 | 10 |
| Ethiopia | 89 | 54 |
| Finland | 10 | 5 |
| France | 10 | 17 |
| Georgia | 47 | 60 |
| Ghana | 86 | 53 |
| Greece | 35 | 15 |
| Guatemala | 78 | 36 |
| Honduras | 80 | 36 |
| Hong Kong | 2 | 39 |
| Hungary | 18 | 18 |
| Iceland | 17 | 3 |
| India | 60 | 57 |
| Indonesia | 98 | 57 |
| Iran | 85 | 78 |
| Ireland | 36 | 13 |

Table 10 (*Continued*)

| Country | Religion is very Important | Men have more right to a Job |
|---|---|---|
| Israel | 36 | 30 |
| Italy | 32 | 22 |
| Japan | 5 | 33 |
| Jordan | 98 | 87 |
| Kazakhstan | 34 | 51 |
| Kenya | 88 | 54 |
| Kuwait | 50 | 49 |
| Kyrgyzstan | 40 | 58 |
| Latvia | 9 | 16 |
| Lithuania | 11 | 18 |
| Luxembourg | 14 | 19 |
| Macedonia | 50 | 38 |
| Malaysia | 71 | 55 |
| Mali | 89 | 54 |
| Malta | 66 | 44 |
| Mexico | 71 | 30 |
| Moldova | 37 | 40 |
| Mongolia | 32 | 31 |
| Montenegro | 21 | 25 |
| Morocco | 97 | 87 |
| Mozambique | 89 | 54 |
| Myanmar | 81 | 45 |
| N. Ireland | 25 | 14 |
| Nepal | 80 | 44 |
| Netherlands | 14 | 8 |
| New Zealand | 18 | 10 |
| Nicaragua | 81 | 37 |
| Niger | 89 | 54 |
| Nigeria | 98 | 56 |
| Norway | 10 | 10 |
| Pakistan | 87 | 72 |
| Panama | 74 | 35 |
| Paraguay | 76 | 35 |
| Peru | 58 | 14 |
| Philippines | 90 | 67 |
| Poland | 44 | 33 |
| Portugal | 27 | 22 |
| Puerto Rico | 81 | 20 |
| Romania | 53 | 33 |
| Russia | 15 | 31 |
| S. Africa | 78 | 32 |
| S. Korea | 21 | 40 |
| Saudi Arabia | 85 | 74 |
| Senegal | 87 | 54 |
| Serbia | 31 | 26 |
| Singapore | 62 | 39 |
| Slovakia | 26 | 19 |
| Slovenia | 11 | 13 |
| Spain | 22 | 12 |
| Sri Lanka | 76 | 43 |
| Sweden | 9 | 2 |
| Switzerland | 14 | 25 |

Table 10 (*Continued*)

| Country | Religion is very Important | Men have more right to a Job |
|---|---|---|
| Syria | 81 | 58 |
| Taiwan | 11 | 52 |
| Tajikistan | 43 | 58 |
| Tanzania | 88 | 23 |
| Thailand | 70 | 42 |
| Tunisia | 76 | 57 |
| Turkey | 82 | 62 |
| Turkmenistan | 38 | 56 |
| Uganda | 77 | 36 |
| Ukraine | 25 | 25 |
| Un. Arab Emirates | 64 | 63 |
| Uruguay | 60 | 30 |
| USA | 57 | 7 |
| Uzbekistan | 41 | 57 |
| Venezuela | 69 | 30 |
| Vietnam | 13 | 48 |
| W. Germany | 7 | 25 |
| Yemen | 87 | 69 |
| Zambia | 89 | 54 |
| Zimbabwe | 83 | 37 |

Formulas used to predict percentages in nations not previously surveyed:
*Calculate predicted percentage saying 'Religion is very important in my life' in 2005:*
Religion Important% $= 75.5 - 2.03 \times$ GNI/capita, 2000 (thousands) $- 16.09 \times$ Traditional/Rat cultural zone Shift Factor $- 0.585 -$ Years under communist rule.
*Calculate predicted percentage saying 'Men have more right to a job than women' in 2005:*
Men Jobs% $= 41.23 - 0.557 \times$ GNI/capita, 2000 (thousands) $- 32.2 \times$ Survival/Self-expression cultural zone Shift Factor $- 0.157 \times$ Years under communist rule.
Percentages for countries previously surveyed are calculated from previous observations plus trend factor.

Neither of these two variables was used to construct either the Traditional/Secular-rational dimension or the Survival/Self-expression values dimensions. We present these predictions to illustrate the fact that our model makes it possible to predict the responses to many additional variables besides the ten that are used to construct these dimensions. This is possible because each dimension is strongly correlated with a wide range of additional variables, as Tables 2-2 and 2-3 demonstrated. Attitudes toward gender equality have been changing rapidly during the two decades covered by the previous Values Surveys, so in predicting attitudes toward gender equality we are not only predicting the responses of societies that have not been surveyed previously – we are also attempting to hit a moving target.

These are genuine predictions. None of these surveys had been carried out at when this was written, and many of these societies have not been included in any previous wave of the values surveys (a number of them have never been included in *any* survey that we are aware of). As this article was being written, it was impossible to say how accurate these predictions would be. We can safely assume that they will only be approximately accurate, and in some cases they will be far from the mark, since our model uses only four variables among the scores of conceivably relevant factors. The

fact that the US deviates from its expected location on the Traditional/Secular-rational dimension (though not on the Survival/Self-expression dimension) points to a significant feature of American culture that is not included in our model.

Even if our model made perfect predictions, we would still have to cope with the fact that the normal range of sampling error in measuring these items is about 5–6 points, so even with a perfect model, our predictions would only come within this range of the observed values. In short, a mean prediction error of 5 or 6 points is about as close as to perfection as one can attain. At the other end of the scale, random predictions would produce mean errors of 30–33 points.

In experiments similar to those used in predicting each country's position on the two-dimensional cultural map in 2000, we predicted the responses to these two variables, using our model based on a revised version of modernization theory. The mean error in predicting the percentage saying that 'Religion is very important in my life' was 10.5 points; the mean error in predicting the percentage who agreed that men have more right to a job than women' was 10.3 points. This is not perfect, but it is much closer to perfection than the results from random prediction. We also made a set of random predictions (using a random number generator), and they produced a mean error of 32 points in predicting the percentage agreeing that 'Men have more right to a job than women,' and a mean error of 31 points in predicting the percentage saying that 'Religion is very important in my life.' Empirically, our modernization model produces predictions that have an error margin much smaller than that resulting from random predictions.

## Conclusion

This article has tested a model that enables us to predict the beliefs and values of the publics of given societies, based on a revised version of modernization theory. This model is parsimonious, utilizing (1) real GNP/capita 5 years before the survey, (2) the percentage of the labor force employed in given sectors, (3) how many years of communist rule the society experienced and (4) a constant for each of the eight cultural zones that reflects the extent to which that zone's cultural heritage causes it to deviate from simple economic–historical determinism. The model explains more than 80 percent of the variance on two major dimensions of cross-cultural variation. We used this model to predict the values of 64 societies that were surveyed in 1999–2001 – including 12 societies that had not been surveyed previously. When we plot our predictions on a two-dimensional map, we found that the predicted position of the average society falls within a small radius of its actual position – within a circle that occupies about 2 percent of the map's area. These positions reflect each public's responses to scores of important political and social questions. We then used this model to predict the positions of 122 societies that are likely to be surveyed in 2005–2006; and the responses of each public to two specific questions that will be asked in these surveys. These predictions are imperfect – as they necessarily must be, since even if our model were perfect, we still would have to allow a margin for sampling

error. Nevertheless, we expect that these predictions will prove to far better than those generated by random guesses.

Our model seems to capture some of the most important factors shaping cross-national variation in mass belief systems. We have laid the groundwork for further testing and improving this kind of model. We believe that the effort to produce a predictive model of cultural change can contribute to a better understanding of how cultural change takes place, and greater insight into important long-term trends.

Our predictions are probabilistic, not deterministic, and we expect them to be only roughly accurate. But the results of the analyses presented here make us reasonably confident that the predictions presented here will be much closer to the results actually observed in 2005–2006 than random predictions would be – and that most of the country locations on the cross-cultural map will be in the right ball park. The extent to which these predictions turn out to be accurate, will provide a strong test of the validity of our revised version of modernization theory.

## Note

[1]   For more information about the World Values Survey, see the WVS web site http://www.worldvaluessurvey.com and R. Inglehart *et al.* (eds), *Human Beliefs and Values: A cross-cultural sourcebook based on the 1999–2002 Values Surveys* (Mexico City: Siglo XXI, 2004). This sourcebook comes with a CD ROM containing data from 80 societies and documentation on these surveys. The European surveys used here were gathered by the European Values Survey group (EVS). For detailed EVS findings, see Loek Halman, *The European Values Study: A Sourcebook Based on the 1999/2000 European Values Study Surveys*. Tilburg: EVS, 2001. For more information, see the EVS website, http://evs.kub.nl.

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