

## RESEARCH IN CONTEXT: Measuring Value Change

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Abramson and Inglehart find a significant trend toward postmaterialist values in Western Europe, which they argue is largely driven by the gradual processes of generational replacement. Clarke, Dutt, and Rapkin argue that this trend is a methodological artifact of the wording of Inglehart's four-item measure of materialist/postmaterialist values. They claim that because this battery does not include a question about unemployment, in periods of high unemployment respondents tend to choose postmaterialist goals. The long-term trend toward postmaterialism in Western Europe, they argue, results from rising levels of unemployment during the past two decades. Abramson and Inglehart point out that increases in inflation have a short-term impact on decreasing postmaterialism, but maintain that the positive relationship between unemployment and postmaterialism is spurious. As this analysis shows, Clarke, Dutt, and Rapkin find a positive relationship between unemployment and postmaterialism by building a model that has little theoretical justification and that is not robust to changes in specification. As this analysis demonstrates, unemployment is actually linked with support for materialist goals, and the trend toward postmaterialism is robust in the face of alternative time frames, models, and specifications. The weight of the evidence demonstrates that the long-term trend toward postmaterialism in Western Europe is driven by generational replacement.

A quarter of a century ago Inglehart (1971) proposed a theory of value change predicting that value priorities in advanced industrial societies would tend to shift away from "materialist" concerns about economic and physical security toward great emphasis on freedom, self-expression, and the quality of life, or "postmaterialist" values. This change, he argued, was generated by generational population replacement, and would therefore be gradual. Fortunately, because the ongoing surveys conducted by the Commission of the European Communities consistently employed Inglehart's basic four-item

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measure, over the course of the following decades an extensive time series, ultimately including over 250,000 respondents, was created.<sup>1</sup>

Subsequent analyses, we argue, confirm Inglehart's basic prediction of a trend toward postmaterialism. Abramson and Inglehart (1995) (see also, Inglehart and Abramson, 1994) demonstrate a clear trend toward postmaterialism in seven of the eight West European societies that can be studied over the course of two decades: West Germany, Britain, The Netherlands, France, and Italy, which were first surveyed in 1970, and Denmark and Ireland, which were first surveyed in 1973. Belgium (first surveyed in 1970) is the only society that fails to manifest a clear trend toward postmaterialism, although even in Belgium a significant trend emerges when simultaneously controls are introduced for the short-term effects of inflation and unemployment (see Abramson and Inglehart, 1995; Inglehart and Abramson, 1993, 1994.)

Although a trend toward postmaterialism is driven by generational replacement, short-term factors also influence the distribution of values among West European publics. This was clearly recognized by Inglehart, and the reasons for expecting economic adversity to suppress postmaterialism were clearly explained over 15 years ago (see Inglehart, 1981). And Abramson and Inglehart (1986) clearly pointed out the impact of inflation on reducing postmaterialism.

Clarke and his colleagues (Clarke and Dutt, 1991; Clarke, Dutt, and Rapkin, 1997) have been among Inglehart's most persistent critics. Although they acknowledge that his research is "pathbreaking" (Clarke, Dutt, and Rapkin, 1997, p. 20), they challenge his basic thesis that there actually is a trend toward postmaterialism. In their most recent critique, they question Abramson and Inglehart's (1995) time series analyses. An analysis by Abramson and Inglehart (1995) (see also Inglehart and Abramson, 1994) employing ordinary least squares (OLS) strongly suggests that the long-term trend toward postmaterialism is driven by generational replacement, but that short-term forces, especially rising inflation rates, can impede, prevent, or even reverse the long-term trend toward postmaterialism. In their analyses, the percentage of materialists subtracted from the percentage of postmaterialists (the PDI) (or what Clarke, Dutt, and Rapkin refer to as the "values balance") is the dependent variable.<sup>2</sup> Three independent variables are employed: the number of years since the baseline survey, the annual inflation rate, and the annual unemployment rate. Presenting analyses for each of the eight countries, as well as for a combined sample of the six West European societies that can be studied from 1970 through 1992, Abramson and Inglehart's estimates support three findings: (1) a significant trend toward postmaterialism in all eight countries; (2) a significant inverse relationship between inflation and postmaterialism in every country except France, Belgium, and Denmark, and (3) a spurious relationship between unemployment and postmaterialism.

Clarke, Dutt, and Rapkin (1997) challenge the first and third of these findings. They argue that the trend toward postmaterialism is spurious, but that

the positive relationship between unemployment and postmaterialism is significant and authentic. They argue that the trend toward postmaterialism found with Inglehart's four-item values battery results from short-term macroeconomic forces that make it appear that there has been a genuine shift in values. In Abramson and Inglehart's view, macroeconomic forces *could* contribute to an increase in postmaterialism. For example, if overall levels of inflation had been high in the early 1970s and had declined throughout most of the next two decades, declining inflation rates could drive postmaterialism upward. But while inflation rates have fluctuated throughout these two decades, they were at about the same level in 1990 as they were two decades earlier. Instead, Clarke, Dutt, and Rapkin argue that rising levels of unemployment have driven postmaterialism upward. If this claim is correct, Inglehart's four-item measure must be fundamentally flawed. Worse still, since Inglehart and Abramson (1994, 1995) argue that economic adversity contributes to materialist values, Inglehart's basic theory that economic prosperity contributes to developing postmaterialist values may be wrong as well.

Clarke, Dutt, and Rapkin employ a pooled cross-sectional time series of the same eight countries studied by Inglehart and by Abramson and Inglehart, although they begin their analysis with 1976, and thus study a 17-year period, whereas Abramson and Inglehart present data for 22 years. Like Abramson and Inglehart, their main dependent variable is the difference between the percentage of postmaterialists and the percentage of materialists (the PDI). Two of their three explanatory factors are the same as those used by Abramson and Inglehart: annual measures of unemployment (the percentage of the total labor force unemployed) and inflation (the year-to-year change in the consumer price index). They employ a third explanatory variable that Abramson and Inglehart do not use: the year-to-year change in the gross domestic product per capita.

## METHODOLOGICAL DIFFERENCES BETWEEN THE TWO STUDIES

Both the studies by Abramson and Inglehart (1995) and by Clarke, Dutt, and Rapkin (1997) are attempting to explain the same state of the world, yet their findings differ in crucial respects. Since the world they seek to explain is similar, and since they are both using the same data, the difference between their findings can be explained by one or a combination of three methodological differences between them: the studies differ somewhat in the time period analyzed, the type of model used, and in model specification.

### Time Period

Abramson and Inglehart analyze data from 1970 through 1992, so that they provide 19 observations for the first six countries, and 18 observations for

Denmark and Ireland. Clarke, Dutt, and Rapkin study the period between 1976 and 1992, and thus have 17 observations for each nation.

Clarke and his colleagues argue that there are "major gaps" (p. 22) in the time series before 1976, making proper time series analyses impossible. Ideally time series analyses should employ data collected over equally spaced intervals (Ostrom, 1990), although minor violations of this requirement do not yield biased estimates as long as there is no substantial volatility in the variables being employed.

In fact, it seems extremely unlikely that the differences between the Abramson and Inglehart results and the Clarke, Dutt, and Rapkin results derive from employing a different time series. All the same, we tested for this possibility by repeating the Abramson and Inglehart analyses, truncating the full time series, and analyzing the results between 1976 and 1992. In Table 1 we summarize the original Abramson and Inglehart results for the full time series (see Abramson and Inglehart, 1995; Inglehart and Abramson, 1994) with the 1976–1992 time series.

As can be seen by comparing the two sets of results, there are only three slight differences between the 1970 through 1992 results and the results for 1976 through 1992. First, although there is still a trend toward postmaterialism in all eight countries, as well as for the combined six-nation sample, the trend in Italy is no longer statistically significant. Second, the negative relationship between inflation and postmaterialism is no longer statistically significant in Britain. Third, the positive relationship between unemployment and postmaterialism in Germany does turn out to be statistically significant. In no case does the direction of the relationships change. Considering that only three out of 27 coefficients change in significance, and that none of the signs change direction, it seems highly unlikely that the difference in the base line year between the two studies can account for the differences in findings. Despite these similarities we will restrict the remainder of our analyses to the truncated period, thereby maximizing the comparability of our analyses with those presented by Clarke, Dutt, and Rapkin.

### Type of Model

Abramson and Inglehart compute their results separately for each of the eight West European nations, and for the combined sample of six European societies, using standard OLS estimates. Tests of autocorrelation reveal that serial correlation is not a problem, and the results for each of the nations as well as the combined European sample are robust to estimation using Prais-Winsten estimators (see Inglehart and Abramson, 1993, Table A1).

In contrast to the unpooled approach, Clarke and his colleagues use a pooled cross-sectional time series regression analysis. They do not appear to

**TABLE 1. Predicting Postmaterialist Values in Eight West European Societies, OLS Estimates**

Country	1970/71-92			1976-1992		
	<i>B</i>	<i>T</i>	<i>R</i> <sup>2</sup>	<i>B</i>	<i>T</i>	<i>R</i> <sup>2</sup>
<b>West Germany</b>						
Years Since Baseline	1.31	4.64**	.89	1.59	6.25**	.93
Inflation	-4.20	-4.60**		-4.16	-5.26**	
Unemployment	1.60	2.02		2.62	3.56**	
<b>Britain</b>						
Years Since Baseline	1.21	3.91**	.78	1.17	2.65*	.76
Inflation	-0.99	-2.75*		-1.05	-1.67	
Unemployment	-0.20	-0.32		-0.26	-0.28	
<b>Netherlands</b>						
Years Since Baseline	1.29	5.18**	.88	1.40	4.22**	.87
Inflation	-2.39	-4.24**		-2.30	-3.30**	
Unemployment	-0.58	-1.62		-0.44	-1.00	
<b>France</b>						
Years Since Baseline	1.82	3.38**	.73	1.60	2.61*	.73
Inflation	-0.60	-1.51		-0.84	-1.52	
Unemployment	-2.54	-2.52*		-2.50	-2.23*	
<b>Belgium</b>						
Years Since Baseline	0.79	4.01**	.85	0.58	2.54*	.87
Inflation	0.09	0.22		-0.25	-0.56	
Unemployment	-2.41	-8.29**		-2.50	-8.02	
<b>Italy</b>						
Years Since Baseline	1.07	3.29**	.85	0.75	1.48	.85
Inflation	-1.46	-6.47**		-1.74	-4.32**	
Unemployment	-2.23	-3.01**		-2.22	-2.88*	
<b>Denmark</b>						
Years Since Baseline	2.65	4.46**	.94	2.78	4.49**	.93
Inflation	-0.96	-1.20		-0.80	-0.96	
Unemployment	-0.48	-0.64		-0.12	-0.14	
<b>Ireland</b>						
Years Since Baseline	2.07	5.47**	.87	2.48	7.90**	.93
Inflation	-0.96	-3.78**		-0.58	-2.59*	
Unemployment	-2.00	-4.25**		-1.71	-4.62**	
<b>Six European Societies</b>						
Years Since Baseline	1.03	4.09***	.89	0.85	2.47*	.89
Inflation	-1.62	-4.98**		-1.91	-3.79**	
Unemployment	-0.40	-0.76		-0.53	-0.86	

*Source:* Data about values are based upon European Community Surveys. Data about inflation and unemployment are from the Statistical Office of the European Communities.

*Notes:* Values are PDI scores using the four-item measure. The results for six European societies are based upon a combined weighted sample of West Germany, Britain, The Netherlands, France, Belgium, and Italy.

\*Significant at .05 level.

\*\*Significant at .01 level.

explain why they choose this type of model, but we assume that it is for one or both of the following reasons (Stimson, 1985). First, in situations where space and time interact, and where one can be understood only with explicit reference to the other, then pooling cross-sections is an analytic strategy that can accommodate that complexity. Second, in dynamic situations where the time series is too short for reliable estimation, adding a cross-section of units for each time period increases the number of degrees of freedom. Since the time series is long enough for reliable estimation, it seems more reasonable to suppose that they use the generalized least squares–auto regressive moving average (GLS-ARMA) model to capture the interaction of space and time in the relationship of economic security and value change.

But even if we assume that there is sound justification for using this approach, the Abramson and Inglehart specification is also robust to using pooled cross-section time series analysis for the period between 1976 and 1992. As the results presented in Table 2 demonstrate, findings of the models estimated separately for each country are confirmed by three different pooled estimators: (1) OLS, (2) least squares with dummy variables (LSDV), and (3) GLS-ARMA with dummy variables.

First, estimates from the classic normal regression model, with the assumptions that the stochastic disturbances are homoskedastic and not autocorrelated, indicate a systemic trend toward postmaterialism, a significant inverse relationship between inflation and postmaterialism, and a significant negative relationship between unemployment and postmaterialism. Considering that unemployment and postmaterialism were inversely and significantly related in four of the nine unpooled estimates, and inversely related although below conventional levels of significance in four additional unpooled estimates, the results for the pooled analyses are very much as expected.

But these estimates of the pooled data are robust to evaluation with the LSDV model. This model is motivated by the assumption that each cross-sectional unit has its own intercept, which is incorporated into the regression equation by introducing binary variables (Kmenta, 1986, pp. 630–635). It yields a higher proportion of explained variance than the classic model. The LSDV estimates also indicate a trend toward postmaterialism, an inverse relationship between inflation and postmaterialism, and an inverse relationship between unemployment and postmaterialism, and all these relations are significant. The intercept with a value of  $-10.88$  for Britain is used as the reference intercept. In other words, in the base year 1976 with no inflation and no unemployment, the PDI score for Britain is predicted to be  $-10.88$ . The estimated intercept values for the eight nations derived from the LSDV model are  $-6.18$  for The Netherlands;  $-1.51$  for Denmark;  $-10.88$  for Britain;  $-7.64$  for West Germany;  $-8.49$  for France,  $-9.09$  for Ireland;  $-10.65$  for Belgium; and  $-13.40$  for Italy.

**TABLE 2. Pooled Cross-Sectional Time Series Analysis of the Effects of Macroeconomic Variables on Percentage of Postmaterialists minus Percentage of Materialists (PDI), 1976–1992**

Predictor	Percentage of Postmaterialists minus Percentage of Materialists					
	OLS		LSDV		GLS-ARMA	
Type of Model	<i>B</i>	<i>T</i>	<i>B</i>	<i>T</i>	<i>B</i>	<i>T</i>
Years Since Base	1.29	5.99**	+1.46	+8.06**	+1.16	+5.43**
Inflation	-1.53	-7.42**	-1.10	-4.81**	-1.08	-4.19**
Unemployment	-1.26	-4.97**	-0.92	-3.22**	-0.63	-1.60
Country						
W. Germany	—		-7.64	-2.54°	-8.59	-2.01°
Netherlands	—		+6.18	+2.32°	+5.67	+1.49
France	—		-8.49	-3.41**	-10.71	-2.75**
Belgium	—		-10.65	-4.16**	-11.67	-2.97**
Italy	—		-13.40	-5.32**	-11.91	-3.05**
Denmark	—		+1.51	+0.61	+1.76	+0.45
Ireland	—		-9.09	-3.18**	-12.07	-2.78**
Intercept	-7.24	-2.12°	-10.88	-2.29°	-9.84	-1.68
<i>R</i> <sup>2</sup>	.62		.78		.82	
Durbin-Watson	.66		1.05		—	
Rho	—		—		.47	
N	136		136		136	

Source: See Table 1.

°Significant at .05 level.

\*\*Significant at .01 level.

Finally, the assumption of no timewise autocorrelation in the LSDV model is dropped, and coefficients for the pooled data set are estimated using GLS-ARMA. This method generates the highest proportion of explained variance. Further, the rho value (.47) indicates a degree of autocorrelation sufficient to justify this approach. With this method the trend toward postmaterialism and the negative relationship between inflation and postmaterialism both remain significant. However, the negative relationship between unemployment and postmaterialism drops below statistical significance, a finding that coincides with Abramson and Inglehart's finding that the relationship between unemployment and postmaterialist values is not as systematic as either the trend toward postmaterialism or the tendency of rising inflation rates to depress overall levels of postmaterialism.

## Model Specification

### *Multicollinearity*

The model specified by Abramson and Inglehart to explain scores on their four-item index includes three independent variables: (1) the number of years since baseline, (2) the inflation rate, and (3) the unemployment rate. With this specification, they find that unemployment either contributed to materialism or had no effects on the values measure in seven of the eight countries they studied.

Clarke, Dutt, and Rapkin (1997, note 12, p. 36) argue that these findings are confounded by multicollinearity. In a footnote they provide the following methodological explanation: "In country-by-country analyses, measures of inflation and unemployment tend to be highly intercorrelated, and both tend to be highly intercorrelated with a linear trend term such as they use in their analyses." However, Clarke, Dutt, and Rapkin do not explain how multicollinearity can affect the coefficient estimates for unemployment. In fact, the effect of multicollinearity is to increase the magnitude of the standard errors, thus making relationships appear to be less significant than they actually are (see Achen, 1982, p. 82).

As Table 3 demonstrates, among the eight countries studied, the greatest multicollinearity among inflation, unemployment, and the linear trend term is found in France, Italy, and Ireland. (In fact, this conclusion is reached regardless of whether the analysis includes the full time series available or whether one truncates the analysis to begin with 1976, as we have done in this table.)

**TABLE 3. The Relationship Between Inflation, Unemployment, and the Linear Time Trend in Eight West European Nations, 1976-1992**

Nation	Correlation		
	Inflation and Unemployment	Inflation and Time	Unemployment and Time
W. Germany	-.39	-.39	.25
Britain	-.78	-.72	.52
Netherlands	-.44	-.68	.23
<b>France</b>	<b>-.68</b>	<b>-.82</b>	<b>.85</b>
Belgium	.16	-.72	.06
<b>Italy</b>	<b>-.65</b>	<b>-.85</b>	<b>.75</b>
Denmark	-.19	-.90	.37
<b>Ireland</b>	<b>-.78</b>	<b>-.80</b>	<b>.82</b>
Pooled	-.19	-.60	+.37

Source: See Table 1.

Note: Countries with the highest levels of multicollinearity are shown in **boldface** type.



However, as the results in Table 4 make clear, there is no evidence that multicollinearity between inflation, unemployment, and the linear trend is obscuring a positive relationship between unemployment and postmaterialism. Sensitivity analysis of the models for France, Italy, and Ireland indicates that, as expected, the only effect of multicollinearity between the trend line and inflation is the greater difficulty in determining the independent effects of each of these two factors.

In the fully specified model for France, Italy, and Ireland, postmaterialism increases over time and decreases with inflation and unemployment. When the time trend is omitted, inflation *seems* to have a stronger independent effect, but this is so only because it is highly multicollinear with the omitted trend line. Similarly, when inflation is omitted from the specification, the time trend seems to be more systematic, but this is only because it is so multicollinear with inflation. Omitting unemployment biases the coefficients for the time trend and for inflation, driving both of them toward zero and making them appear less systematic than they are. However, the bias is caused by omitting a variable that should be included in the model. Thus, Clarke, Dutt, and Rapkin's argument that Abramson and Inglehart's findings are "confounded" by multicollinearity can not be sustained even when we employ data from the three countries where these factors are highly multicollinear.<sup>3</sup>

Both the Abramson and Inglehart and the Clarke, Dutt, and Rapkin studies include measures of unemployment and inflation as independent variables. The study by Clarke and his colleagues excludes a time series trend from their pooled cross-section models, includes year-to-year change in real gross domestic product per capita, and uses natural log transformations of inflation and unemployment as explanatory factors. We discuss each of these elements of the model specification in turn, and finally present a replication of their first table.

#### *Omitting the Trend Line*

Clarke, Dutt, and Rapkin do not adequately explain the theory behind their model specification, and they provide very little justification for the omitted time trend. Abramson and Inglehart (1994, 1995) provide strong theoretical reasons for including a time trend, since generational replacement takes place at fairly even rates across time.<sup>4</sup> Despite Clarke, Dutt, and Rapkin's (1997, note 12, p. 36) claim that Abramson and Inglehart provide no empirical evidence for including a time trend, the evidence that replacement occurs is clearly documented (Abramson and Inglehart, 1995, Appendix.)

Further, Clarke, Dutt, and Rapkin do not provide any clear theoretical justification for including GDP per capita in their analysis. In their earlier

TABLE 4. The Effect of Inflation, Unemployment, and Time on the Percentage of Postmaterialists Minus Percentage of Materialists (PDI) in France, Italy, and Ireland, 1976-1992

Model	Fully Specified			Trend Omitted			Inflation Omitted			Unemployment Omitted		
	B	T	R <sup>2</sup>	B	T	R <sup>2</sup>	B	T	R <sup>2</sup>	B	T	R <sup>2</sup>
France												
Time	1.60	2.61*		-1.77	-3.54**		2.21	4.51**		0.64	1.29	
Inflation	-0.84	-1.52		-0.45	-0.47		-2.64	-2.26*		-0.94	-1.52	
Unemployment	-2.50	-2.23		-4.12	-0.39		-18.55	-2.88*		-19.49	-2.26*	
Intercept	-8.28	-0.91				.52			.63			.57
R <sup>2</sup>			.66									
Italy												
Time	0.75	1.47		-2.17	-7.58**		2.35	4.50**		0.00	0.01	
Inflation	-1.74	-4.32**		-1.67	-2.37*		-2.10	-1.81		-1.69	-3.42**	
Unemployment	-2.22	-2.88**		9.29	1.02		-32.54	-4.04**		-11.95	-1.16	
Intercept	2.71	0.28				.81			.60			.73
R <sup>2</sup>			.82									
Ireland												
Time	2.48	7.90**		-1.38	-2.94**		2.84	8.52**		1.71	4.10**	
Inflation	-0.58	-2.59*		-0.17	-0.24		-1.37	-3.33**		-0.21	-0.63	
Unemployment	-1.71	-4.62**		-13.16	-0.95		-34.97	-9.43**		-41.63	-6.36**	
Intercept	-21.65	-3.60**				.52			.87			.78
R <sup>2</sup>			.91									

Source: See Table 1.

\*Significant at .05 level.

\*\*Significant at .01 level.

study, Clarke and Dutt (1991, p. 911) write : “Given that various aspects of macroeconomic change are interrelated, it is important to control for the possibly confounding impact of other economic variables when assessing relationships between unemployment and responses to the four-item value battery. Here, we do so by conducting a pooled cross-sectional time series regression analysis with unemployment and inflation rates and annual changes in real GDP per capita as predictor variables.” Although we cannot argue with the wisdom of including additional economic variables, the selection of the specific factors to be included should be guided by theoretical reasons which we fail to find explicit. As one of the options in the four-item values battery is “Fight rising prices,” the reason for including inflation is self-evident. However, we can see no clear intuitive reason for including annual changes in real GDP per capita.

What relationships should we expect once GDP per capita is included? If, as Inglehart has argued, economic security contributes to postmaterialist values, one would expect increasing wealth to promote postmaterialism. If GDP per capita measures economic health, Clarke, Dutt, and Rapkin have no reason to expect rising GDP to promote postmaterialism. Given their logic, dissatisfied citizens would be more likely to choose the option of “giving the people more say.” They explicitly argued that the constrained choices of the four-item battery led increases in unemployment to be positively correlated with postmaterialism. As the four-choice battery does not provide the option of increasing economic wealth, we would expect dissatisfied respondents to demand that the people have more say in government decisions and that declining economic wealth contributes to postmaterialism. If, as they find, both unemployment and GDP per capita are positively correlated with postmaterialism, the logic of their argument about problems with the four-item values battery forcing respondents to move toward postmaterialism in times of economic adversity is severely strained.<sup>5</sup>

Even though Clarke, Dutt, and Rapkin’s reason for including income per capita is not explicit, and, in fact, actually contradicts the logic of their argument, we proceed with the replication. It should be recalled that when the time trend is omitted and a measure of annual changes in real GDP per capita is included, Clarke, Dutt, and Rapkin find that unemployment has a statistically positive impact on postmaterialist values.

In Table 5 we present our analyses using the actual variable values and in Table 6 we present the results using logged independent variables.<sup>6</sup> First, we present the Abramson and Inglehart model. Second, we omit the time trend and estimate the model for the 1976–1992 time series. When the time trend is omitted from the Abramson and Inglehart pooled cross-section GLS-ARMA model, the positive correlation between the time trend and inflation makes inflation seem even more systematic than it actually is. But the time

trend is included for a strong theoretical reason. Over time there is constant generational replacement, and as Abramson and Inglehart's argument is that the trend toward postmaterialism is driven by replacement, the time trend is necessary for proper model specification. When it is omitted, the apparent effect of inflation is an aggregate of the two components—the actual effect of inflation and the effect of the omitted variable for population replacement. Further, when it is omitted, the standard error of the regression increases, indicating a better fit with the time trend included. Inflation clearly has a more systematic relationship to values in the pooled eight-nation data set, regardless of inclusion or omission of the time trend.

**TABLE 5. Pooled Cross-Sectional Time-Series Analysis of the Effects of Macroeconomic Variables on Percentage of Postmaterialists Minus Percentage of Materialists (PDI), Eight Countries, GLS-ARMA, 1976–1992,  $N = 136$**

Predictor	Postmaterialists-Materialists					
	Includes Time Trend, Inflation, and Unemployment		Time Trend Omitted		Time Trend Omitted, GDP/Capita (change) Included	
	<i>B</i>	<i>T</i>	<i>B</i>	<i>T</i>	<i>B</i>	<i>T</i>
Model						
Years Since Baseline	1.15	5.43**				
Inflation	-1.08	-4.19**	-1.70	-6.59**	-1.69	-6.62**
Unemployment	-0.63	-1.60	0.23	0.48	0.33	0.68
GDP/capita (change)					0.52	1.59
Country						
W. Germany	-8.63	-2.00*	-9.17	-1.56	-8.69	-1.48
Netherlands	5.68	1.48	3.27	0.63	3.25	0.62
France	-10.75	-2.75**	-13.99	-2.51*	-14.45	-2.58*
Belgium	-11.71	-2.96**	-15.07	-2.66*	-15.37	-2.70*
Italy	-11.82	-3.02**	-8.80	-1.54	-9.53	-1.65
Denmark	1.75	0.45	0.81	0.14	0.04	0.01
Ireland	-12.09	-2.76**	-18.55	-2.98**	-18.98	-3.04**
Intercept	-9.84	-1.68	-0.13	-0.02	-2.19	-0.31
$R^2$		.82		.76		.77
Standard Error		6.38		7.30		7.21
Durbin-Watson		—		—		—
Rho		.48		.63		.64

Source: See Table 1. The GDP data were provided directly by Harold Clarke. See Clarke, Dutt, and Rapkin (1997) for details.

\*Significant at .05 level.

\*\*Significant at .01 level.

**TABLE 6. Pooled Cross-Sectional Time-Series Analysis of the Effects of Macroeconomic Variables on Percentage of Postmaterialists Minus Percentage of Materialists (PDI), Eight Countries, GLS-ARMA, 1976-1992,  $N = 136$ , LOGGED INDEPENDENT VARIABLES**

Predictor	Postmaterialists-Materialists					
	Includes Time Trend, Inflation, and Unemployment		Time Trend Omitted		Time Trend Omitted, GDP/Capita (Change) Included	
	<i>B</i>	<i>T</i>	<i>B</i>	<i>T</i>	<i>B</i>	<i>T</i>
Model						
Years Since Baseline	1.34	6.54**				
Inflation <sup>a</sup>	-4.54	-3.52**	-7.80	-5.82**	-7.62	-5.76**
Unemployment <sup>b</sup>	-2.42	-0.73	8.76	2.38	10.06	2.72*
GDP/capita (change)					0.65	1.85
Country						
W. Germany	-6.09	-1.49	-2.95	-0.57	-2.11	-0.41
Netherlands	6.92	1.89	4.81	1.03	4.98	1.06
France	-9.15	-2.55*	-10.35	-2.17*	-10.78	-2.23*
Belgium	-10.18	-2.78**	-13.05	-2.72**	-13.31	-2.73*
Italy	-13.83	-3.81**	-12.63	-2.62*	-13.08	-2.67*
Denmark	3.30	0.92	3.80	0.79	3.00	0.61
Ireland	-14.34	-3.67**	-20.47	-4.03**	-20.93	-4.07**
Intercept	-12.76	-1.62	-16.78	-1.73	-21.30	-2.16
$R^2$		.82		.74		.75
Standard Error		6.46		7.54		7.43
Rho		.42		.51		.53

Source: See Tables 1 and 5.

<sup>a</sup>Inflation rate, natural log transformed.

<sup>b</sup>Percentage of labor force, natural log transformed.

\*Significant at .05 level.

\*\*Significant at .01 level.

#### *Adding GDP Per Capita*

When the annual percentage change in GDP per capita is added to the model with the time trend omitted, the estimates change somewhat. Even so, regardless of the specification, inflation is always negatively and significantly related to postmaterialism. The proportion of variance explained by the model is virtually the same without the addition of GDP per capita, which is not systematically related to the PDI among the population. Further, adding the percentage change in GDP per capita has little effect on the results of the pooled model. The effect of unemployment on values is not robust, with the signs changing direction from model to model. These results demonstrate

that when the effects of inflation are controlled, unemployment has no consistent relationship to values. All of these tests support Abramson and Inglehart's conclusion that inflation rates are the major short-term force affecting postmaterialist values. When inflation increases, postmaterialism decreases. This effect is robust to various model respecifications and does not depend on including the time trend or GDP per capita.

#### *Logging the Independent Variable*

In addition to omitting the time trend and adding year-to-year percentage change in GDP per capita as an explanatory variable, Clarke, Dutt, and Rapkin transform inflation and unemployment into natural log form. As they correctly argue (1997, note 8, p. 36), lin-log specifications are common in economic models, and they permit us to assess how proportional change in independent variables affect absolute change in dependent variables. However, lin-log specifications are hardly required; the analyst has a choice whether or not to include them. Decisions about functional form should be made on the basis of prior theory and substantive reasons. Otherwise, as Achen explains (1982, p. 56), the analysis will be subject to overfitting.

In the linear form, the effect on the PDI of a unit of change in unemployment and inflation is the same across all possible values. For example, in the third model of Table 5, an increase of 1% in the inflation rate leads to a decrease of 1.69 on the PDI, and this is true whether inflation rates increase from 5% to 6% or from 15% to 16%. Granted, in periods of severe inflation, transforming rates into a log form might be justified. But given the relatively modest range of inflation and unemployment during the actual period studied, the transformation contributes to obfuscation.

Of course, some variables cannot be transformed even if a logarithmic relationship is hypothesized. Logarithms are undefined for values less or equal to zero. For example, it is not possible to transform the PDI or percentage change in GDP per capita into logarithmic form. We must guess that Clarke, Dutt, and Rapkin transformed variables where possible, and did not where it was not feasible. However, to the extent that an explanation of these decisions is lacking, the model estimates are difficult to evaluate.<sup>9</sup>

It is possible that Clarke and his colleagues changed the functional form because their model produced "better" results (what Achen calls overfitting). After omitting the time trend, adding GDP per capita, and using the logarithmic form of the unemployment rate and inflation, Clarke, Dutt, and Rapkin are able to find a positive and significant tendency for unemployment to contribute to higher scores on the four-item index of materialist/postmaterialist values. Indeed, as we show in Table 7, we can come close to reproducing the results of their Table 1, which presents results not only for

the PDI, but also for the percentage of postmaterialists and the percentage of materialists. As we show, the log of the percentage of the labor force unemployed is positively and significantly related to the PDI, positively related to the proportion of postmaterialists, and significantly inversely related to the proportion of materialists.

But how significant are their findings for casting doubts on Abramson and Inglehart's evidence that there is a long-term trend toward postmaterialism? The relationship between unemployment and postmaterialism is fragile, unlike the relationship of inflation to postmaterialism, which is robust to changes in model specification and functional form. The PDI decreases as inflation increases whether or not the time trend is included in the model, whether or not income per capita is included, and whether or not the variable is transformed. The cohort evidence presented in great detail by Abramson and Inglehart (1992, 1995) is ignored, although it seems clear that there

**TABLE 7. Pooled Cross-Sectional Time-Series Analysis of the Effects of Macroeconomic Variables on Percentage of Postmaterialists Minus Percentage of Materialists (PDI), Eight Countries, GLS-ARMA, 1976-1992,  $N = 136$ , LOGGED INDEPENDENT VARIABLES**

Predictor Variables	Postmaterialists-Materialists		Postmaterialists		Materialists	
	<i>B</i>	<i>T</i>	<i>B</i>	<i>T</i>	<i>B</i>	<i>T</i>
GDP per capita <sup>a</sup>	0.65	1.85	0.30	2.15*	-0.34	-1.45
Unemployment Rate <sup>b</sup>	10.06	2.72*	3.10	2.16*	-6.73	-2.71*
Inflation <sup>c</sup>	-7.62	-5.76**	-2.64	-5.08**	5.51	5.61**
Country						
Belgium	-2.11	-0.41*	1.17	0.59	3.50	0.99
Denmark	4.98	1.06	4.79	2.66	-0.36	-0.11
France	-10.78	-2.23*	-0.84	-0.46	9.94	3.08**
Germany	-13.31	-2.73*	-3.10	-1.68	10.47	3.21**
Ireland	-13.08	-2.67*	-3.27	-1.76	9.81	2.99**
Italy	3.00	0.61	2.17	1.17	-0.87	-0.27
Netherlands	-20.93	-4.07	-7.32	-3.75**	13.54	3.93
Intercept	-21.30	-2.16	11.81	3.09**	32.62	4.92**
$R^2$		.74		.72		.72
Standard Error		7.54		2.93		5.01
Rho		.53		.50		.52

Source: See Table 1.

<sup>a</sup>Year-to-year percentage change.

<sup>b</sup>Percentage of labor force, natural log transformed.

<sup>c</sup>Inflation rate, natural log transformed.

\*Significant at .05 level.

\*\*Significant at .01 level.

would have been very little change in overall levels of postmaterialism among the West European public if 40% of the adult population had not been replaced over the course of the time series.

### INDIVIDUAL-LEVEL ANALYSIS

Clarke, Dutt, and Rapkin present two basic arguments which they claim undermine Inglehart's thesis by examining individual data. First, they claim that panel data demonstrate too much individual-level change on the four-item measure to consider it a measure of values. Inglehart and Abramson (1992) question this claim. The issues involved merit a separate paper, but we do not consider the argument central to Abramson and Inglehart's basic thesis that long-term value change results from generational replacement. Even high levels of individual-level instability are compatible with the thesis that long-term generational replacement drives postmaterialism upward (see Abramson and Inglehart, 1995, pp. 162-163, note 5.)

Second, Clarke, Dutt, and Rapkin employ data from EuroBarometer #31A, conducted in the Spring of 1989, and demonstrate that respondents who named inflation as the most important political problem were more likely to score as materialists than those who name unemployment as the most important issue. This is precisely what we would expect, based upon Abramson and Inglehart's analysis of the six U.S. National Election Studies that include the four-item values battery and that also ask respondents to name the most important problem facing the country (see Abramson and Inglehart, 1995, p. 32.) In fact, their analyses from the Spring 1991 EuroBarometer yield results similar to Abramson and Inglehart's findings about the U.S. electorate. Europeans who are concerned about inflation are clearly more likely to be materialists than the overall European public (and consequently more materialist than the subset concerned about unemployment). But, as they fail to report, in each of the eight countries they study respondents who are concerned about unemployment differ very little from the overall public. In a more direct test using data from the Fall 1973 European Community Study, Inglehart demonstrates (see Inglehart, 1977, Figure 2-4) that Europeans who are concerned with job security as a goal are more likely to emphasize materialist priorities than the overall European public.

### CONCLUSION

Statistically, it is possible to achieve a positive relationship between unemployment and the proportion of postmaterialists in eight European countries between 1976 and 1992. However, unlike the effect of inflation on values, the effect of unemployment is not robust to alternative model specification or



changes in functional form. For the most part, the methodological path along which Clarke, Dutt, and Rapkin reach their results is uncharted. There they provide no adequate theoretically based explanations for omitting the time trend from the model, adding income to the model, or changing the functional form of inflation and unemployment. Obviously, such analyses are legitimate, but we believe that one can be more confident about explanations when they are supported by findings that are robust to alternative econometric techniques and less confident about interpretations based upon estimates that are far more idiosyncratic.

Clarke, Dutt, and Rapkin correctly endorse Sniderman's (1993) observation that survey researchers must consider the questions that they do not ask. Sniderman argues that surveys should be seen as "conversations in context," even though most survey researchers recognize that a survey is only loosely analogous to a conversation. But it is also important that research be conducted in the context of the theoretical questions that are being addressed. Just as survey researchers should be aware of the questions they fail to ask, regression analysts should be aware of the assumptions that they fail to examine. Thus, while Clarke and his colleagues do well to remind us that all social scientific conclusions should be subjected to close scrutiny and to tests using alternative assumptions, the weight of the evidence demonstrates that the long-term trend toward postmaterialist values in Western Europe is driven by generational replacement.

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## NOTES

1. The basic four-item measure has been described in many publications (see Abramson and Inglehart, 1990, 1995; Inglehart and Abramson, 1994), as well as in codebooks available from the Inter-university Consortium for Political and Social Research.

Respondents are asked to select what they believe their country's two top goals should be among the following four alternatives: (1) maintaining order in the nation; (2) giving the people more say in important government decisions; (3) fighting rising prices; (4) protecting freedom of speech.

Given two choices among four goals, six combinations are possible. Respondents who select "maintaining order" and "fighting rising prices" are classified as materialists, while those who choose "giving the people more say" and "freedom of speech" are classified as postmaterialists. The remaining four combinations—all of which are made up of one materialist and one postmaterialist response—are classified as "mixed."

2. For the full distribution of values for all eight countries from 1970 through the spring of 1993, see Abramson and Inglehart, 1995, Table 2-1. For the full distribution for the combined six-nation sample, see Table 2-3. For evidence that the PDI is the functional equivalent of a

- mean score, see Inglehart, 1990, Figure A-2, and Abramson and Inglehart, 1995, p. 162, note 5.
3. The variance explained for each respecification in the sensitivity analysis also shows that inflation has the most important effect on the PDI in Italy, while the trend has the greatest systemic influence in France and Italy.
  4. The rate of replacement varies slightly from year to year, but in practice it has not varied much in Western Europe during the past two decades. It clearly will slow down somewhat during the next three decades (see Abramson and Inglehart, 1995).
  5. In fact, the PDI and GDP per capita are slightly positively correlated (.15). However, unemployment and change in GDP per capita have a slightly negative correlation (-.16). If unemployment is used as a measure of "the state of the economy," as Clarke, Dutt, and Rapkin employ, why do they include GDP per capita in their model?
  6. The GDP data were obtained directly from Harold Clarke. See Clarke, Dutt, and Rapkin (1997) for the sources for these data.
  7. The standard error of the regression describes how far the average dependent variable departs from its forecasted value. This standard error has the same unit of measure as the dependent variable, which in this case is the difference between the percentage of materialists and post-materialists in a society. Thus, comparison across regressions is meaningful when the dependent variable has the same units in both measures. This is a better measure of goodness of fit than  $R^2$ , which is dimensionless and is sensitive to the degree of variability in the independent variable (Achen, 1982, pp. 61-66).
  8. Before using a specific functional form in an analysis one should be satisfied that the following questions have been answered: What is the expected change in the dependent variable for a unit change in the independent variable? Does the effect of a change in the independent variable depend on the magnitude of the dependent variable? Does the effect of a change in one independent variable depend on the magnitude of another independent variable? Must any assumptions be made about the distribution of the error term? (See Hanushek and Jackson, 1977, p. 100.)

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