Uncertainty Shocks, Cultural Behaviors and Economic Development

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Abstract: The literature regarding cultural background change points out that changes in cultural background can only be slow moving. However, under high uncertainty levels, cultural background may change in the short or medium term as well. In this paper, the effects of uncertainty on cultural behaviors are investigated. Cultural background is captured through the Schwartz's cultural values, based on the waves provided by the European Social Survey from 2002 up to 2018, performing relative Principal Component Analyses. An Uncertainty Index is constructed based on the volatility of the stock market for all Eurozone countries, from the euro's adoption in January 2001 up to December 2018. Using an unbalanced panel dataset comprised of 18 Eurozone countries for the time period from 2002 up to 2018, a fixed-effects assessment method, different fixed terms between the examined economies, dummies per wave of the nine total data waves of the European Social Survey and country-specific clustered robust estimates of the standard errors, the main conclusions of the empirical analysis are the following: (a) Uncertainty significantly affects the cultural background of societies and leads to its change; (b) The effects of uncertainty on culture start two years after an uncertainty shock has occurred; (c) The effects of uncertainty on specific cultural values reveals significant effects on all Schwartz's cultural values. However, the effect is the highest for the dipole "conservatism and autonomy" and the smallest for the dipole "mastery vs. harmony". (d) When uncertainty is high, this leads to higher levels of hierarchy (authority, humbleness), self-direction (independent thought and action), stimulation (excitement, novelty and challenge in life), affective autonomy (pursuit of actively positive activities: pleasure, exciting life) and mastery (ambition and hard work, daring, independence, drive for success) which means their life's harmony is disrupted, at least two years later. Thus, countries exhibiting systematically high levels of uncertainty are about to develop a cultural background that is going to hinder economic development, and vice versa.

Keywords: uncertainty; culture; economic development; financial crisis; COVID-19

1. Introduction

The change of cultural values over time is an issue that concerns, among other things, economic science, as this change is responsible for the reform of the economic, political and social life of societies. Boyd and Richerson (2005) argue that cultural change should be considered an evolutionary process based on Darwin's theory, in which some cultural values become more common and others are lost.

The general observation about the change in cultural background is that it remains relatively stable over time "under normal conditions". This conclusion emerges simply if one considers that the cultural dimensions that shape the cultural background remain relatively constant over time (De Jong, 2009; Petrakis and Kostis, 2014). The cultural background often appears stable at any given time because cultural mutations occur gradually (Jones, 2006). Research (Johnston, 1996) shows that stereotypes are generally very resistant to change and redefinition. Individuals who have adopted specific cultural characteristics tend to retain them in the process of gathering information. Therefore, they do not show signs of change in existing stereotypes.

Thus, the fact that the cultural dimensions and consequently the cultural background remain stable "under normal conditions" leaves much room for reflection and control of these conditions. Eurozone has suffered much from the crisis and many of its members adopted adjustment programs, significantly changing the function of the economies and the general living conditions.

The aim of the present paper is to investigate the effects of uncertainty on cultural values change. The main hypothesis examined is whether conditions such as those related with the recent global financial crisis of 2008 have led to changes in behaviors and values and, thus, on the cultural background of the societies.

The structure of the paper is as follows: In Section 2, a literature review is presented regarding the factors that may lead to cultural background change. Section 3 presents the data used in the empirical analysis, as well as the methodology employed. Then, Section 4 presents the empirical results. Finally, the basic conclusions of the overall analysis are presented.

2. Literature Review

The factors that exogenously influence the creation and shaping of the cultural background of a society are related to specific conditions that prevail in that society. The most serious sources of external influence on the formation of the cultural background are considered to be the available resources, the climate and in general the geographical features (McClelland, 1961; Diamond, 1999; Tavassoli, 2009; Triandis, 2009; Petrakis, 2014). These are factors that do not change or change gradually over time. As these factors create the background for the formation of the cultural background of a society, any change they show affects the prevailing cultural background accordingly.

Globalization is also considered an important factor in changing the cultural values of societies. Two conflicting schools of thought regarding the impact of globalization emerge. The first school of thought is based on the theory of modernization (Inglehart and Baker, 2000), arguing that globalization contributes to the convergence of differences between cultural backgrounds, as political and social forces lead to a change in cultural values. The consequence of globalization is the creation of a network of cultural values (Hermans and Kempen, 1998). This grid is based on common features between different societies that interact with the local cultural background of the societies, ultimately leading to a cultural transformation with high coherence between cultural fields. The second school emphasizes the stability and "resilience" of traditional values to the economic and political changes that are taking place under globalization. DiMaggio (1994) argues that the resistance of traditional values to change stems from the fact that these values are independent of economic change.

The aging of the population is another cause of incremental changes in the cultural background in recent decades. While the greatest differences in personality occur in adolescence (Borghans et al., 2008), significant changes in personality characteristics appear—even to a lesser extent—later in life. As individuals grow older, they become more emotionally stable personalities (Roberts et al., 2006). At the same time, behavior associated with being open

to new experiences is something that increases at younger ages and decreases at older populations (Roberts et al., 2006). As people get older, they tend to become more "myopic" in the sense that they appear more oriented in the present while they do not seem to be particularly interested in long-term situations. In addition, older people are considered more politically active, forming the main bulk of the electorate and relying more on traditional and materialistic values.

In addition, developments such as generational replacement, increased access to higher education, urbanization, increasing gender equality and increasing national diversity have led to the shift of cultural values from materialistic to post-materialist, from the 1970s onwards (Norris and Inglehart, 2016, 2019). These developments have also brought about gradual changes in the cultural background.

The above changes in cultural background do not happen suddenly and so can be characterized as incremental. Significant but also sudden are the changes observed in the cultural background after an external shock. It is a fact that crises tend to "give birth" or accelerate cultural changes which, if accepted once because of the crisis, tend to become permanent. Changes of this type can cause high stress in individuals (Eschbach et al., 2001), affecting their psychological adaptation to new conditions and can be a strong shock to the context of cultural values that characterize the societies. In such cases, the result is a change in cultural background, which is usually much faster than the incremental change described above.

An example is the recent financial crisis of 2008, which has affected most economies worldwide. Economic developments significantly affect the cultural background of individuals. Thus, the economic crisis not only affects economies but also societies and more specifically their cultural background (Magee et al., 2013). As a result of the global financial crisis, there were significant economic consequences for economic actors, which led to significant stress and psychological pressure (Eschbach et al., 2001; Petrakis, 2011; Sargent-Cox et al., 2011). Casanova (2018) focuses on political culture and values and examines whether it changed after the financial crisis of 2008 in those countries that adopted an adjustment program in Europe, noting that people's orientation towards politics and democracy got worse in those countries in relevance to the other European countries. Proponents of the insecurity hypothesis argue that the economic stress, insecurity and austerity experienced by individuals as a result of the crisis have changed their cultural values and are responsible for the rise of the populist wave (Norris and Inglehart, 2019; Rodrik, 2019).

3. Data and Methodology

To investigate the relationship between uncertainty and culture, an unbalanced panel dataset, for the Eurozone countries[1] for the period from 2002 to 2018, is used. The choice of the time period under consideration is determined by the availability of data regarding culture, based on the European Social Survey (ESS) waves that have been released during that period.

To examine the effects of uncertainty on cultural background, the following equation is estimated:

$$Culture_{it} = a_i + \beta \, Uncertainty_{it} + \lambda_t + u_{it}, \qquad (1)$$

where i denotes the economies of the Eurozone ($N_{max} = 18$) and t is the ESS wave under analysis ($T_{max} = 9$). The dependent variable *Culture* is a vector of variables that represent the cultural background, *Uncertainty* is an index of economic uncertainty, a_i is a constant term that captures the country-specific fixed effects and which records the country-specific time-invariant heterogeneity. Finally, λ_t is a set of dummies that control for specific effects per wave that are common to all economies under analysis.

The estimation of Equation (1) is done through the two ways fixed effects analysis (FE), which allows the economy-specific heterogeneity using a different constant term per economy and can be estimated using the standard least squares method (OLS). In addition, time dummies for each wave are included in order to incorporate in

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[1]Malta not included in the analysis due to unavailable data regarding cultural background.

the analysis time effects that are common to all countries in the sample. In addition, cluster-robust estimates of the standard errors were taken into account in order to control for the correlation and heteroskedasticity for each economy.

In order to construct the Economic Uncertainty Index, following our previous research work (Petrakis and Kostis, 2014; Kafka et al., 2020), daily data of high capitalization stock indices are used for the countries under analysis. Additionally, as a proxy for global uncertainty, an Index is calculated that expresses the Global Stock Market based on the daily prices of the largest stock markets (USA, Canada, Mexico, Brazil, Eurozone, United Kingdom, Japan, China–Hong Kong, and India) as the weighted average based on the Gross Domestic Product (GDP) of each economy (GDP at current prices) as derived from the International Monetary Fund (IMF) World Economic Outlook Database.

Table 1 presents the indices used for each country under analysis, as well as the major stock indices used to construct the global stock market index. This table also presents the descriptive statistics of those indices, after maintaining only the daily prices for which data were available for all countries. All data were obtained using Reuters Datastream.

Index	Country	N	Med.	Avg.	St.Dev.	Min	Max
AS51 Index	Austria	1045	4804.1	4705.0	1071.1	2744.0	6929.0
BEL20 Index	Belgium	1045	3000.9	3047.5	705.0	1527.3	4749.5
CYSMFTSE Index	Cyprus	1045	332.6	385.2	423.9	32.6	1864.8
TALSE Index	Estonia	1045	663.4	655.6	348.5	110.7	1316.3
HEX25 Index	Finland	1045	2450.1	2568.5	861.0	1106.1	4354.0
CAC Index	France	1045	4397.3	4444.6	926.9	2534.5	6813.7
DAX Index	Germany	1045	6851.7	7451.9	2891.9	2403.2	13,483.3
FTASE Index	Greece	1045	8327.9	10,064.8	8092.8	1194.1	29,400.0
ISEQ Index	Ireland	1045	5459.2	5319.3	1716.3	1949.6	9963.4
FTSEMIB Index	Italy	1045	22,652.9	25,973.2	8768.2	12,740.0	49,355.0
RIGSE Index	Latvia	1045	423.5	487.9	258.7	106.9	1073.2
VILSE Index	Lithuania	1045	399.7	373.2	187.2	64.0	726.1
LUXXX Index	Luxembourg	1045	1421.8	1441.0	380.3	651.5	2578.2
MALTEX Index	Malta	1045	3524.9	3673.3	954.9	1755.5	6552.6
AEX Index	Netherlands	1045	422.6	430.0	107.7	199.5	695.2
PSI20 Index	Portugal	1045	6710.6	7270.3	2312.5	4362.1	14,822.6
SBITOP Index	Slovenia	1045	824.4	940.8	428.5	501.3	2674.7
SKSM Index	Slovakia	1045	247.7	266.1	109.2	70.2	501.3
IBEX Index	Spain	1045	9600.4	9785.1	2003.3	5499.2	15,823.7
SPX Index	USA	1045	1360.7	1578.0	590.3	683.4	3265.4
SPTSX60 Index	Canada	1045	708.0	695.5	176.1	330.4	1025.7
MEXBOL Index	Mexico	1045	31,834.1	28,833.8	15,320.7	5087.9	51,564.6
IBOV Index	Brazil	1045	51,940.7	47,842.5	24,199.9	8715.9	117,706.7
SX5E Index	Eurozone	1045	3156.5	3254.7	706.2	1817.2	5450.2
UKX Index	UK	1045	5951.4	5886.5	1018.1	3491.6	7778.8
NKY Index	Japan	1045	13,774.5	14,256.5	4432.0	7173.1	24,120.0
HSI Index	China–Hong Kong	1045	20,668.8	19,681.8	5736.3	8409.0	33,154.1
SENSEX Index	Bombay	1045	16,859.7	16,999.3	10,697.3	2600.1	41,681.5

Table 1 Descriptive statistics of stock market indices.

Then, an Economic Uncertainty Index (UI) is created for each economy by calculating the rolling standard deviation of the previous 30 days of the returns of the main stock index of each economy. To isolate the shocks due to each economy, the monthly average of this index (standard deviation of 30 days) is regressed on its global counterpart and the residuals of each regression are marked as the uncertainty index for each economy. The monthly evolution of the residuals of each regression is the monthly evolution of the uncertainty index of each country from 2001 to 2018. Next, these monthly UI data are converted into biennial data to be compatible with the culture values that get released in waves every two years by the ESS. The climate of uncertainty increases on dates of significant political and economic turmoil. Since the onset of the crisis, most Eurozone economies have been hit by a series of uncertainty shocks.

Regarding the cultural background, the ESS questions are used, which are presented in the second column of Table 2, which concern the way in which the cultural values of Schwartz (1992, 2006) are compiled. The percentage of those who answered "Very Much Like Me" was used in the sentences that appear in the second column. Based on Smith and Schwartz (1997) and Schwartz (2012), the following table is derived, which relates human values to cultural values based on specific questions that are realized in the waves of the ESS.

Human Values	ESS Questions	Cultural Values
Self-direction	Important to think new ideas and be creative	Conservatism/Embeddedness vs. Autonomy
Stimulation	Important to try new and different things in life Important to have a good time Important to seek adventures and have an exciting life Important to seek fun and things that give pleasure	Embeddedness
Hedonism	Important to understand different people	Intellectual Autonomy
Achievement	Important to show abilities and be admired Important to be successful and that people recognize achievements	Affective Autonomy
Power	Important to be rich, have money and expensive things Important to do what is told and follow rules	Hierarchy vs. Egalitarianism
Security	Important to live in secure and safe surroundings Important that government is strong and ensures safety	Hierarchy
Conformity	Important to behave properly	Egalitarianism
Tradition	Important to get respect from others Important to follow traditions and customs	Mastery vs. Harmony
Benevolence	Important that people are treated equally and have equal opportunities Important to help people and care for others' well-being Important to be loyal to friends and be devoted to those nearby	Mastery
Universalism	Important to care for nature and the environment	Harmony

Table 2 Linking Schwartz's values to relevant European Social Survey (ESS) questions.

Table 3 presents the descriptive statistics for the ESS questions through which the Schwartz's cultural values are captured.

		N	Med.	Avg	Stdev	Min	Max
Conservatism/ Embeddedness vs. Autonomy	Important to think new ideas and be creative	118	19.5	19.2	5.7	7.7	35.8
	Important to try new and different things in life	116	13.7	14.4	4.2	5.8	29.4
	Important to have a good time	118	12.5	13.9	6.5	3.3	31.5
	Important to seek adventures and have an exciting life	118	5.5	5.8	2.2	1.5	14.3
	Important seek fun and things that give pleasure	114	13.2	12.1	5.4	1.5	27.0
	Important to understand different people	117	19.6	19.7	6.5	4.8	32.7
	Important to show abilities and be admired	116	9.8	10.5	5.5	3.0	28.8
	Important to be successful and that people recognize achievements	114	8.7	9.7	4.8	3.8	29.4
Hierarchy vs. Egalitarianism	Important to be rich, have money and expensive things	116	2.2	3.1	2.3	0.4	12.2
	Important to do what is told and follow rules	116	9.2	9.5	3.5	3.6	21.3
	Important to live in secure and safe surroundings	116	24.0	25.5	11.5	3.6	63.7
	Important that government is strong and ensures safety	116	25.7	28.0	11.5	9.1	67.6
	Important to behave properly	116	15.2	17.1	6.7	6.7	33.4
Mastery vs. Harmony	Important to get respect from others	118	10.0	10.1	6.4	2.1	35.1
	Important follow traditions and customs	118	16.2	18.0	9.8	2.1	48.4
	Important that people are treated equally and have equal opportunities	113	32.3	33.6	9.8	14.9	57.6
	Important to help people and care for others well-being	116	25.1	25.0	8.7	8.7	48.8
	Important to be loyal to friends and devote to people close	120	35.5	33.6	10.0	10.5	52.4
	Important to care for nature and environment	116	31.4	31.4	8.0	13.2	54.6

Table 3　Descriptive statistics of ESS questions on cultural background.

Then, Principal Component Analyses (PCA) are realized in order to capture the cultural values dipoles "Conservatism/Embeddedness vs. Autonomy", "Hierarchy vs. Egalitarianism", and "Mastery vs. Harmony" based on the ESS questions that are related with each cultural value. Moreover, a PCA is performed for all ESS questions in order to capture a total measurement of cultural background.

4. Empirical Analysis and Discussion

Table 4 presents a correlation matrix between the ESS questions. The questions used in the analysis present high correlation between each other, something that allows for using PCA in order to capture the overall culture measure and the Schwartz's cultural values.

		C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18
Important to think new ideas and be creative	C1	1																	
Important to try new and different things in life	C2	0.74	1																
Important to have a good time	C3	0.44	0.52	1															
Important to seek adventures and have an exciting life	C4	0.58	0.67	0.25	1														
Important seek fun and things that give pleasure	C5	0.64	0.66	0.34	0.62	1													
Important to understand different people	C6	0.73	0.67	0.55	0.40	0.47	1												
Important to show abilities and be admired	C7	0.41	0.53	0.21	0.64	0.53	0.26	1											
Important to be successful and that people recognize achievements	C8	0.36	0.40	0.04	0.51	0.36	0.12	0.66	1										
Important to be rich, have money and expensive things	C9	0.20	0.14	−0.04	0.52	0.12	0.00	0.48	0.62	1									
Important to do what is told and follow rules	C10	0.35	0.42	−0.14	0.37	0.27	0.31	0.34	0.41	0.42	1								
Important to live in secure and safe surroundings	C11	0.46	0.42	0.14	0.47	0.36	0.41	0.50	0.54	0.44	0.49	1							
Important that government is strong and ensures safety	C12	0.46	0.46	0.07	0.59	0.41	0.44	0.68	0.65	0.53	0.47	0.67	1						
Important to behave properly	C13	0.59	0.72	0.41	0.61	0.55	0.65	0.66	0.39	0.29	0.49	0.59	0.76	1					
Important to get respect from others	C14	0.50	0.47	0.24	0.62	0.51	0.40	0.79	0.77	0.63	0.46	0.68	0.79	0.70	1				
Important follow traditions and customs	C15	0.47	0.40	−0.02	0.54	0.66	0.41	0.65	0.59	0.45	0.49	0.56	0.80	0.65	0.72	1			
Important that people are treated equally and have equal opportunities	C16	0.76	0.73	0.52	0.43	0.50	0.83	0.39	0.19	0.08	0.40	0.43	0.54	0.76	0.47	0.44	1		
Important to help people and care for others well-being	C17	0.74	0.61	0.31	0.48	0.58	0.82	0.42	0.29	0.05	0.35	0.46	0.58	0.69	0.50	0.58	0.78	1	
Important to be loyal to friends and devote to people close	C18	0.60	0.44	0.60	0.26	0.38	0.82	0.21	0.03	−0.05	0.09	0.28	0.36	0.47	0.29	0.32	0.65	0.71	1
Important to care for nature and environment	C19	0.54	0.63	0.41	0.40	0.43	0.73	0.36	0.39	0.08	0.36	0.51	0.57	0.69	0.49	0.49	0.67	0.648	0.62

Table 4   Correlation matrix of the ESS questions.

Moreover, Table 5 presents the PCA for the "Conservatism/Embeddedness vs. Autonomy" cultural value.

	PC1	PC2
Important to think new ideas and be creative	**0.40**	−0.19
Important to try new and different things in life	**0.42**	−0.11
Important to have a good time	0.26	**−0.47**
Important to seek adventures and have an exciting life	0.38	0.23
Important to seek fun and things that give pleasure	0.38	0.04
Important to understand different people	0.34	**−0.44**
Important to show abilities and be admired	0.34	**0.43**
Important to be successful and that people recognize achievements	0.27	**0.55**
Eigenvalue	4.42	1.43
Var	55.28%	17.89%

Note: In bold are presented those values above 0.4 or below −0.4, since there are the ESS questions that more significantly shape the principal components.

Table 5   Principal Component Analyses (PCA) for Conservatism/Embeddedness vs. Autonomy.

The first two principal components are used. The first one has an eigenvalue of 4.42 and is related to 55.28% of total variance. It is positively configured by the following questions: "Important to think new ideas and be creative" and "Important to try new and different things in life". In that way it is a component that is characterized by **self-direction and stimulation**.

The second one has an eigenvalue of 1.43 and is related to 17.89% of total variance. It is positively configured by the following questions: "Important to show abilities and be admired" and "Important to be successful and that people recognize achievements". Moreover, it is configured negatively by "Important to have a good time" and "Important to understand different people". In that way it is a component that is characterized by **affective autonomy**.

Table 6 presents the PCA for the "Hierarchy vs. Egalitarianism" cultural value.

	PC1	PC2
Important to be rich, have money and expensive things	0.37	**0.81**
Important to do what is told and follow rules	**0.41**	0.17
Important to live in secure and safe surroundings	**0.48**	−0.09
Important that government is strong and ensures safety	**0.51**	−0.15
Important to behave properly	**0.46**	**−0.53**
Eigenvalue	3.07	0.76
Var	61.43%	15.40%

Note: In bold are presented those values above 0.4 or below −0.4, since there are the ESS questions that more significantly shape the principal components.

Table 6   PCA for Hierarchy vs. Egalitarianism.

The first two principal components are used. The first one has an eigenvalue of 3.07 and is related to 61.43% of total variance. It is positively configured by the following questions: "Important to do what is told and follow rules", "Important to live in secure and safe surroundings", "Important that government is strong and ensures safety" and "Important to behave properly". In that way it is a component that is characterized by power and security and, thus, **hierarchy**.

The second one has an eigenvalue of 0.76 and is related to 15.40% of total variance. It is positively configured by the question "Important to be rich, have money and expensive things" and negatively by "Important to behave properly". In that way it is a component that is characterized by power and non-conformity and, thus, **hierarchy** as well.

Table 7 presents the PCA for the "Mastery vs. Harmony" cultural value.

The first two principal components are used. The first one has an eigenvalue of 4.57 and is related to 65.31% of total variance. It is positively shaped by "Important that people are treated equally and have equal opportunities",

"Important to help people and care for others well-being" and "Important to understand different people". In that way it is characterized by benevolence and, thus, **mastery**.

	PC1	PC2
Important to get respect from others	0.30	**0.62**
Important to follow traditions and customs	0.31	**0.60**
Important that people are treated equally and have equal opportunities	**0.41**	−0.15
Important to help people and care for others well-being	**0.42**	−0.08
Important to be loyal to friends and devote to people close	0.38	−0.38
Important to care for nature and environment	0.39	−0.03
Eigenvalue	4.57	1.15
Var	65.31%	16.49%

Note: In bold are presented those values above 0.4 or below −0.4, since there are the ESS questions that more significantly shape the principal components.

Table 7   PCA for Mastery vs. Harmony.

The second one has an eigenvalue of 1.15 and is related to 16.49% of total variance. It is positively shaped by "Important to get respect from others" and "Important to follow traditions and customs". In that way it is characterized by tradition and, thus, **mastery** as well.

Finally, Table 8 presents the PCA for overall culture. The first two principal components are used. The first one has an eigenvalue of 9.76 and is related to 51.39% of total variance. The second one has an eigenvalue of 3.02 and is related to 15.89% of total variance.

	PC1	PC2
Important to think new ideas and be creative	0.25	−0.16
Important to try new and different things in life	0.25	−0.13
Important to have a good time	0.14	−0.32
Important to seek adventures and have an exciting life	0.24	0.12
Important seek fun and things that give pleasure	0.23	−0.04
Important to understand different people	0.24	−0.32
Important to show abilities and be admired	0.23	0.22
Important to be successful and that people recognize achievements	0.19	0.34
Important to be rich, have money and expensive things	0.13	0.39
Important to do what is told and follow rules	0.17	0.18
Important to live in secure and safe surroundings	0.22	0.16
Important that government is strong and ensures safety	0.26	0.20
Important to behave properly	0.28	−0.02
Important to get respect from others	0.26	0.24
Important follow traditions and customs	0.24	0.19
Important that people are treated equally and have equal opportunities	0.26	−0.24
Important to help people and care for others well-being	0.26	−0.19
Important to be loyal to friends and devote to people close	0.19	−0.34
Important to care for nature and environment	0.24	−0.15
Eigenvalue	9.76	3.02
Var	51.39%	15.89%

Table 8   PCA for Overall Culture.

Table 9 presents the estimation of Equation (1). Each column represents a different estimation of Equation (1) since different depended variables are used. The first eight columns represent the results when uncertainty is used as independent variable, and columns 9 to 18 represent the results when uncertainty with a lag is used as independent variable.

Dependent Variable				Uncertainty without Lag								Uncertainty with a Lag				
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Hierarchy vs. Egalitarianism—PC1	0.000 (−0.00)								0.003 *** (2.68)							
Hierarchy vs. Egalitarianism—PC2		0.000 (0.71)								−0.001 (−0.60)						
Conservatism/Embeddedness vs. Autonomy—PC1			−0.001 (−0.95)								0.004 *** (2.82)					
Conservatism/Embeddedness vs. Autonomy—PC2				0.001 (0.67)								0.001 *** (2.61)				
Mastery vs. Harmony—PC1					0.001 (0.07)								0.003 *** (2.45)			
Mastery vs. Harmony—PC2						0.001 (0.70)								0.002 *** (3.45)		
Overall Culture—PC1							−0.001 (−0.41)								0.007 *** (3.00)	
Overall Culture—PC2								0.001 (1.00)								0.002 ** (1.93)
N	111	111	109	109	111	111	107	107	103	103	101	101	104	104	100	100
R^2	0.01%	15.99%	1.86%	2.80%	15.54%	2.40%	3.61%	19.21%	8.38%	12.14%	15.00%	8.70%	22.80%	14.19%	17.87%	18.03%
F-stat	0.08	8.66 ***	0.84	1.28	8.37 ***	1.12	1.63	10.34 ***	3.80 **	5.73 ***	7.15 ***	3.86 ***	11.90 ***	6.95 ***	8.70 ***	8.80 ***

Notes: The t-statistics values are displayed in parentheses. ** and *** represent statistical significance at 10%, 5% and 1% significance level, respectively. Each column represents a separate regression. All regressions have included the effect of the time variable (taking into account the effects common to countries in each wave), different constant terms (to take into account the effects on each economy separately) as well as corrections to standard errors (clustered robust standard errors).

Table 9 Estimation of Equation (1) using different independent variables.

Looking at regressions 1 to 8, no statistically significant effects of uncertainty on culture emerge. However, using a lag in uncertainty the results are completely different (regressions 9 to 16). All regressors are positive and statistically significant, at 1% level of statistical significance, except from the second principal component of the cultural value of hierarchy vs. egalitarianism (regression 10). This means that when uncertainty is higher this leads to higher levels of hierarchy (authority humbleness), self-direction (independent thought and action) and stimulation (excitement, novelty and challenge in life), affective autonomy (pursuit of actively positive activities: pleasure, exciting life) and mastery (ambition and hard work, daring, independence, drive for success), at least two years later.

5. Conclusions

The analysis provided by the present paper concludes that there is significant effect of uncertainty on cultural values in the Eurozone countries during the period from 2002 up to 2018. This means that under conditions characterized by a high level of uncertainty such as the global financial crisis of 2008 or the recent pandemic of COVID-19, the behaviors, the preferences and, in general, the cultural background of the societies is about to change, thus affecting the way decisions are made and economic development.

While cultural background is a slow-moving structure that usually is changed in an incremental way, when uncertainty shocks are present culture can change more suddenly. The empirical analysis provided by this paper revealed no effect of uncertainty within the first two years of presence of high uncertainty. However, after two years of an uncertainty shock all Schwartz's cultural values as well the overall culture significantly changed.

In addition, the empirical analysis concludes that when uncertainty is high this leads to higher levels of hierarchy (authority, humbleness), self-direction (independent thought and action), stimulation (excitement, novelty and challenge in life), affective autonomy (pursuit of actively positive activities such as pleasure and an exciting life) and mastery (ambition and hard work, daring, independence, drive for success) which means their life's harmony is disrupted, at least two years later.

In general, the cultural background has a long-term homocyclic effect in many Eurozone countries. In the economic prosperity phase, there are a number of "anti-growth" aspects of social values linked to a lack of openness. However, in times of recession, this social model itself is giving rise to lines of defense linked to inward-looking while, at the same time, opposing its change. Thus, during the crisis, in-group collectivism (family) helps to reduce the negative effects of the crisis. However, the fact that, in the very difficult phase of recession, cultural background works as a "life-saver" gives it the chance to survive, possibly even grow stronger in the development phase where it is now acting as an obstacle. This is known as a cultural anti-growth trap (Petrakis and Kostis, 2021).

These results may be critical for governments and policymakers that face increased uncertainty levels. The cultural background of the societies affects the effectiveness of economic policy, since a society firstly has to approve an economic policy in order to make it more effective (Kafka, 2020; Kafka et al., 2020). Thus, countries exhibiting systematically high levels of uncertainty are about to develop a cultural background that is going to hinder economic development, and vice versa.

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