ECONOMICS
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DOES CULTURE MATTER IN SETTING CONSUMER CONFIDENCE?

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ABSTRACT. In this paper, we explore whether the diversity of consumer confidence indicators across different countries can be explained by diverse cultures in those countries. For this purpose, we consider the OECD consumer confidence indicators and macroeconomic indicators of 37 countries. In particular, we analyse the consumer confidence indicator levels in January of 2007 and 2009, that is before and during the financial crisis, and also in January of 2020 and 2021, which is before and during the Covid-19 crisis. For measuring culture, we use the two-dimensional models of Kaasa and Minkov (2022), Inglehart and Welzel (2021), Minkov and Kaasa (2022) and Beugelsdijk and Welzel (2018). We employ forward and backward stepwise regressions and principal components regressions for analysis. Our results show that in bad times consumer confidence is lower in cultures that are characterised by individualism (vs collectivism), responsibility (vs faith), secularism (vs traditionalism), and flexibility (vs monumentalism) compared to cultures characterised by the opposite. We have also found that the extent of the decline in consumer confidence during the crises, especially the Covid-19 crisis, was smaller in cultures characterised by freedom (vs concern), self-expression (vs survival), and joy (vs duty) than in countries on the opposite side of the spectrum. Finally, we conclude that culture has clearly been more relevant for the change in consumer confidence during the Covid-19 crisis, as opposed to the financial crisis.

Introduction

Consumer and producer confidence indicators, as two of the key macroeconomic indicators, are used for measuring and forecasting economic activity (Santero and Westerlund, 1996; Kilci, 2020). In our work, we focus on the impact of culture on the consumer confidence indicators. Indeed, consumption, purchase and saving plans of the consumers depend on their view of the current state of the economy and their own expectations. Islam and Mumtaz (2016) found that consumer confidence indicators (CCI) predict economic growth, and Klopocka (2017) demonstrated that they predict household saving and borrowing behaviour. Indeed, CCIs

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are also one of the leading indicators for evaluating recession risk[i] (see Kellstedt, Linn, and Hannah, 2015).

The consumer confidence indicators are not directly observable variables. They are usually obtained through monthly surveys in every country. In these surveys, some questions could differ based on the institution conducting them. What is common, however, is that same populations of consumers answer them. There are many papers in the literature that argue that consumer confidence indicators provide mixed signals. For example, Santero and Westerlund (1996) argue that although surveys may indeed provide valuable input for estimating and forecasting economic activity, they are less useful for consumer confidence indicators. The authors also report that the relationship between consumer confidence indicators and economic variables varies a lot across the countries. Gholipour et al. (2022) show that there is heterogeneity across countries in the impact of CCI on tourism demand and admits that this is an expected observation since uncertainty and confidence are shaped by the cultures of different countries. Similarly, Golinelli and Parigi (2004) argued that the main driving forces behind confidence indicators cannot be simply summarized as the main macro indicators. In the same line of thought, Malovana, Hodula, and Frait (2021) questioned if the survey questions behind these indicators reflect a rational or irrational assessment of future expectations. For example, how would one distinguish the economic expectations from what would be inherent in people's lives, such as the geography of a country, political tensions a country faces or perhaps the historical experience of the people or the culture guiding the way people tend to think? In some countries, perhaps people feel threatened by the military tensions, while in others, people are pessimistic for historical reasons. In each country, culture serves as the basis for people's lives and determines how people and institutions interact (Schwartz, 1994; Schwartz, 1999). Culture lies under the differences in consumer behaviour across countries (Hofstede, 1984; Schneider and De Meyer, 1991; Galariotis and Karagiannis, 2021). Logemann (2020) states that the consumers' expectations depend largely on their social and cultural background, and the impact of an economic stimulus would differ depending on the social and cultural settings and how such stimulus is framed.

In this paper, we aim to empirically show that the consumer confidence indicators are indeed influenced by the culture of each country. Since these indicators are obtained via surveys, the cultural background of the consumers is bound to affect their answers. We believe that cultural dimensions could be one of the missing pieces of the puzzle that Golinelli and Parigi (2004) mentioned about the variation of the relation of CCI to macroeconomic variables across countries. The novelty of our paper is in its interdisciplinary approach, which combines the field of culture studies with macroeconomic modelling.

For this study, we use the OECD consumer confidence indicators and various macroeconomic variables of 37 countries, which are chosen based on CCI data availability. These macroeconomic variables are selected based on the previous literature. To study the impact of cultural dimensions, we considered calm years as well as crisis years of macroeconomic activity. Namely, we focused on the confidence indicators of January of 2007 (before the 2007-2008 financial crisis), 2009 (during the crisis), 2020 (before the Covid-19 crisis) and 2021 (during the crisis).[ii] Assuming that the CCI are formed during the previous year, we relate them with the macroeconomic variables from 2006 to 2008, and from 2019 to 2020. Another aspect of the impact of culture could be how people react to the crisis news. Hence, we also looked into the changes in the CCI from January 2007 to January 2009 and January 2020 to January 2021 and changes in macroeconomic variables from 2006 to 2008 and from 2019 to 2020. We also considered various ways of pooling these data together to obtain a larger sample.

In order to quantify the cultural aspects of different countries, many different cultural dimensions have been offered in literature. However, in recent literature, two-dimensional models have been shown to be quite sufficient to summarize the main cultural differences (Kaasa and Minkov, 2022; Fog, 2021). In our paper, we will use various two-dimensional models of culture by Inglehart and Welzel (2021), Minkov and Kaasa (2022), Beugelsdijk and Welzel (2018) and Kaasa and Minkov (2022).

The rest of the paper is structured as follows. *Section 1* gives a literature review on consumer confidence indicators and the possible impact of culture and macroeconomic variables on them. *Section 2* describes the data and its sources, giving also some descriptive statistics. *Section 3* discusses how the regressors were selected and the estimation methodology. *Section 4* presents the results on the possible impact of cultural dimensions on CCI levels and changes in the CCI levels, obtained via the stepwise regression method. *Section 5* explains the estimation results using the principal components regression method. Lastly, the paper is concluded with a short summary and suggestions for further research.

1. Literature review

Although they might be obtained using different methods, confidence indicators are often presented as leading macroeconomic indicators about the state of and future expectations on the economy. (See, for example, Demirel & Artan, 2017; Matosec & Obuljen Zoricic , 2019; Nowzohour and Stracca, 2020, among others.) Typically, these indicators are obtained via monthly surveys, and different sources could use different survey questions to enquire about the sentiments of the businesses and consumers. Our focus in this paper is on the OECD consumer confidence indicator.

On the one hand, Malovana, Hodula, and Frait (2021), Golinelli and Parigi (2004) and Demirel and Artan (2017), among others, focused on what drives the confidence indicators and found that certain macroeconomic variables related to GDP, savings, trade, inflation and unemployment are the driving factors behind CCI. On the other hand, some papers point out an intertemporal causal relation from consumer confidence indicators towards macroeconomic indicators. CCI is, in fact, one of the leading indicators of recession risk.[iii] Kilci (2020) empirically confirms that confidence indicators impact the macro-financial indicators of finance and real estate sectors. Islam and Mumtaz (2016) find that the consumer confidence indicator is a significant predictor of economic growth, and Klopocka (2017) finds a similar relation between CCI and household saving and borrowing behaviour. Mourougane and Roma (2003) found that CCI can predict short-term real GDP growth. Similarly, Ibrahim et al. (2015) present results that confirm that CCI can predict economic fluctuations and real GDP growth. However, Ludvigson (2004) found that much of the variation in consumer spending is already explained by the key macroeconomic variables, and CCI explain only a modest amount of additional variation in consumer spending.

However, there is much heterogeneity in the relation of CCI and macroeconomic variables. For example, Peric and Soric (2018) demonstrated high heterogeneity across countries in the relationship between the economic policy uncertainty index and consumer confidence indicators with GDP. They also found that consumer confidence is more important than economic uncertainty when explaining economic activity. Similar heterogeneous findings across countries are reported by Santero and Westerlund (1996), Malovana, Hodula, and Frait (2021), Golinelli and Parigi (2004) and Gholipour et al. (2022).

Since CCI is based on monthly surveys answered by consumers, the described heterogeneity is not surprising. Consumers from different cultural backgrounds might perceive and interpret the same economic situation differently. Nofsinger (2012) explains that household

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behaviour is motivated by cognitive limitations, psychological bias, group thinking and social norms. These factors are all related to the culture of a country. Household behaviour augments the extent of the boom-and-bust cycles. In boom times they tend to overspend, take too much debt and undersave, which increases economic growth. In bust times, they tend to pay debts and save, which further slows down the economy. Financial overoptimism, which could be again related to culture, is positively related to increased amount of debt, delays in mortgage payments and reduced amount of savings (Dawson and Henley, 2012; Brown et al., 2005; Brown and Taylor, 2006).

Kellstedt, Linn, and Hannah (2015) and De Boef and Kellstedt (2004) argue that consumers base their purchasing decision on their ability and willingness. The former is related to economic factors such as income, savings, debt and so on. At the same time, the latter is related to the non-economic factors that are not much explored in the literature. De Boef and Kellstedt (2004) note that these factors may include political issues and instability that the countries are facing, as well as unexpected events such as war, natural disasters and terrorism. However, we believe that cultural background has an important role as well.

Culture can be defined as the pattern of values, beliefs, attitudes, and norms that differentiates one group of people (e.g. a country) from another (Hofstede (2001); Schwartz, 2008). It can be seen as the collective construction of the mind of any group of people, which creates diversity and differences between cultures (Hofstede (1980). The first author to measure culture was Hofstede (1980), with his original study using survey data of the IBM employees in different countries providing four cultural dimensions: individualism vs collectivism, power distance (loaded into the same factor with individualism, but presented as a separate dimension by Hofstede for theoretical reasons), uncertainty avoidance vs acceptance, and masculinity vs femininity. Later, Hofstede added long vs short-term orientation into his model (Hofstede, 2001) inspired by the findings of the Connection (1987) and indulgence vs. restraint (Hofstede, Hofstede, and Minkov, 2010) inspired by the work of Minkov (2011) based on the World Values Survey (WVS). However, later studies have demonstrated serious problems with Hofstede's model. It has been criticized for too many dimensions (Beugelsdijk and Welzel, 2018), but moreover, the dimensions of uncertainty avoidance and masculinity vs femininity have been repeatedly shown not to replicate (Merritt, 2000; Minkov, 2018; Minkov and Kaasa, 2020), possibly because of problems with the IBM data. Thus, the revised version of the Hofstede model by Minkov (2018) based on an international survey of nationally representative samples includes two dimensions: individualism vs collectivism that also captures elements of power distance, and flexibility vs monumentalism that captures the elements of long vs short term orientation and is close to restraint vs indulgence. Minkov and Kaasa (2022) provide up-to-date data for those dimensions with the help of the WVS data.

Another well-known approach to measuring culture is the one created by Inglehart (1997) also using the WVS data with the up-to-date data provided by Inglehart and Welzel (2021). This model includes two dimensions: self-expression vs survival and secular vs traditional. In their attempt to synthesize Hofstede's and Inglehart's models using WVS data, Beugelsdijk and Welzel (2018) created three factors, two of which were culture in the same sense as the dimensions of Hofstede or Inglehart (Kaasa and Minkov, 2022). Those two dimensions were named individualism vs collectivism and duty vs joy. Recently, Kaasa and Minkov (2022) analysed a set of 25 items from the WVS describing various aspects of culture and ended up with two dimensions, freedom vs concern and responsibility vs faith, that are very similar to the dimensions of self-expression vs survival and secular vs traditional, respectively. They were also able to demonstrate that all the mentioned modern two-dimensional models are, in fact, rotations of each other and thus, just group the same aspects of culture in a different way. Hence, no model can be expected to be superior to the other.

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The literature is very scarce regarding the possible impact of culture on consumer confidence indicators. Macready et al. (2020) analysed consumer trust in food chain actors and food-producing technology. They found that the cross-country differences in consumer confidence cannot be explained solely by the differences in consumer trust. Hence cultural differences should be taken into account. Instead of using cultural dimensions, Medikiene, Dapkus, and Maditinos (2018) used hierarchical cluster analysis to identify clusters of consumer confidence. The authors identified a cluster in Northern European countries and another in almost all West European countries (except Netherlands and Luxembourg). The authors mention that this could be partly explainable by sharing similar cultural perspectives. The Southern and Central-Eastern European countries did not follow a common socio-economic behaviour pattern.

Ahmadi et al. (2022) showed that the consumer stockpiling behaviour during the Covid-19 pandemic was stronger in cultures with (when considering Hofstede's cultural dimensions) higher uncertainty avoidance, short-term orientation, restraint, and individualism. The relationships demonstrated by Kaasa and Minkov (2022) allow us to relate these results with the modern two-dimensional models of culture. Namely, uncertainty avoidance is covered both by the survival (vs self-expression) dimension by Inglehart and Welzel (2021) and the concern (vs freedom) dimension of Kaasa and Minkov (2022), but also by the Minkov's collectivism (vs individualism) (Minkov and Kaasa, 2022). The cultural elements tapped by Hofstede's individualism (vs collectivism) dimension are contained in the secular (vs traditional) dimension of Inglehart and Welzel (2021), and in the responsibility (vs faith) dimension of Kaasa and Minkov (2022) and in the individualism (vs collectivism) dimensions by Beugelsdijk and Welzel (2018). As uncertainty avoidance is close to collectivism, which is the opposite of individualism, it seems contradictory that both uncertainty avoidance and individualism are reported to be linked to stronger consumer stockpiling behaviour in Ahmadi et al. (2022).

The older concept of short (vs long)-term orientation is now covered by the monumentalism (vs flexibility) dimension of Minkov's revision of the Hofstede model (Minkov and Kaasa, 2022) and restraint (vs indulgence) dimension can be related to the duty (vs joy) dimension by Beugelsdijk and Welzel (2018). Again, as the duty and flexibility poles of those two dimensions are close to each other, it seems contradictory that both restraint and short-term orientation were reported to be linked to stronger consumer stockpiling behaviour by Ahmadi et al. (2022). One possible explanation lies in the aforementioned problems with Hofstede's model. Hence, there is a call for an analysis of the possible impact of culture on consumer confidence using modern cultural models that have stood the replicability tests and provide up-to-date data for measuring the main cultural differences across countries.

In our paper, we explore whether the cultural dimensions of the modern two-dimensional cultural models could explain the heterogeneity in the relationship between consumer confidence indicators and macroeconomic variables.

2. Data

The dependent variable in our regressions is the OECD consumer confidence index. This index is constructed by analysing the results of monthly surveys and reflects the households' future consumption and saving expectations given the current economic situation, unemployment, and savings. In *Figure 1*[iv], we can see the OECD average consumer confidence index in black colour, along with those of the countries in our dataset in green colour. We assume that the confidence indicators obtained in these surveys were formed during the previous year. Since our macroeconomic data are annual, we focused on the CCI indices measured in January of these years. In *Table A1*, we present the descriptive statistics for this

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variable. One can clearly notice how, in January 2007 and January 2020, CCI was high compared to January 2009 and January 2021. In our regressions, we consider the CCI indices measured in January 2007, 2009, 2020 and 2021. As can be confirmed from *Figure 1*, January 2007 and 2020 are times when the CCI had high values, but January 2009 and 2021 are times when CCI was reduced due to the financial crisis and Covid-19, respectively. Therefore, we also pool the 2007 and 2020 periods as good times, and 2009 and 2021 periods as bad times. Finally, we pool all the data to benefit from the increased sample size.
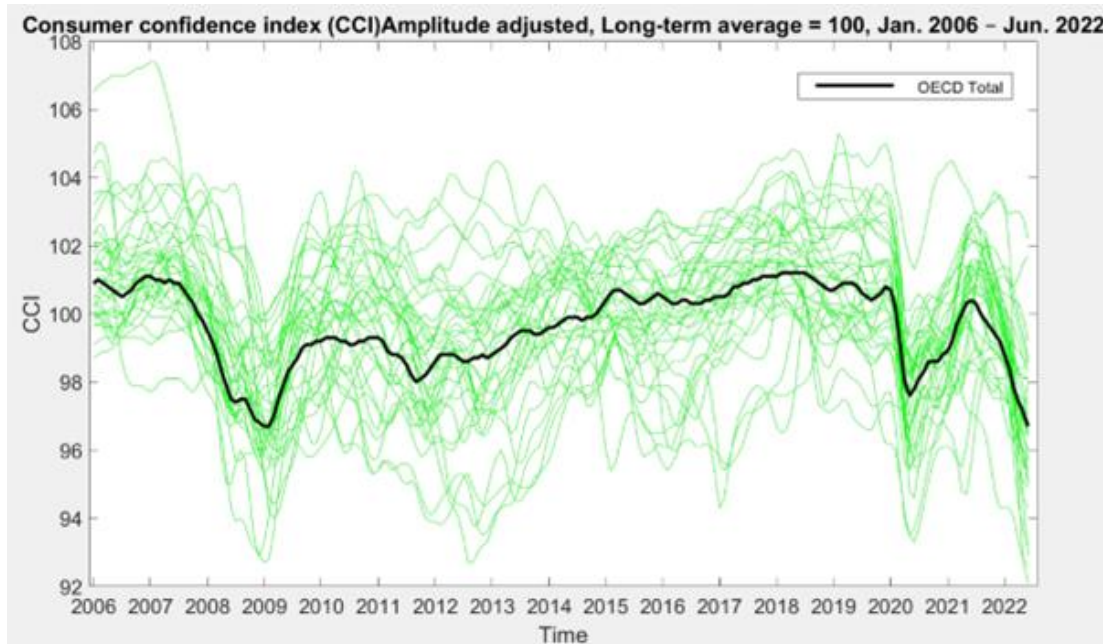

Figure 1: Time series plot of OECD consumer confidence indices of each country.
Note: OECD average consumer confidence index between January 2006 - June 2022. The OECD average is coloured in black, while the other countries are coloured in green. Source: OECD

We would like to also draw attention to the sharp decline in the consumer confidence index in 2008 and 2020. Although the crises' backgrounds differed, consumer confidence index showed a large decline for all the countries in those dates. Hence, alternatively, we also analyse if the changes in the macroeconomic variables and cultural dimensions can explain the declines in 2008 and 2020.

The treatment variables in our regressions are the cultural dimensions provided by Kaasa and Minkov (2022), Inglehart and Welzel (2021), Minkov and Kaasa (2022), and Beugelsdijk and Welzel (2018). We provide the scatter plots of the standardized[v] values of the cultural dimensions, in the same order, in *Figures A1-A4* in Appendix. According to Kaasa and Minkov (2022), these different two-dimensional models are only different rotations pointing out very similar cultural features. It is not surprising that these cultural dimensions are correlated across the models and the locations of the countries with respect of each other in *Figures A1-A4* in Appendix are quite similar. In *Tables A3* and *A4* in the Appendix, we also provide information on what kind of features these cultural dimensions are connected to based on the explanations by Kaasa and Minkov (2022), Inglehart and Welzel (2021), Minkov and Kaasa (2022), and Beugelsdijk and Welzel (2018). Once again, it can be seen that there is overlap in these features, which confirms the findings of Kaasa and Minkov (2022). However, as also brought out by Kaasa and Minkov (2022), different sets of dimensions might prove useful to a different extent in explaining different research problems. Our results will compare

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those different sets to explain consumer confidence indicators. In order to compare the explanatory power of different cultural dimensions, we standardized all cultural dimensions before entering them into the analysis.

As we mentioned in *Section 1*, many macroeconomic and financial variables could be affecting the formation of the CCI. The variables we consider are given in *Table 1*, with references where possible. The control variables we use are the macroeconomic variables that have been used also in previous articles. The variable list is given in *Table 1,* and summary statistics can be found in *Table A1*. While most variables had similar variation over the years, it is noticeable that consumption expenditure (ConsExp) and GDP per capita (GDPpc) increased their variation, which indicates that the dispersion between poor and rich countries increased over the years. Finally, we included dummy variables for membership to economic cooperation organizations, namely OPEC, BRICS and Eurozone.

Table 1: The regressors we chose for explaining the levels and changes in consumer confidence indicator of the OECD

Regressor	Abbreviation	Articles
Final consumption expenditure (% of GDP)	Consexp	Demirel and Artan (2017)
Foreign direct investment, net inflows (% of GDP)	FDlin	
GDP per capita (based on PPP)	GDPpc	
Gross fixed capital formation (% of GDP)	GDF	
Gross savings (% of GDP)	GSpe	Malovaná, Hodula, and Frait (2021), Klapkiv (2016), Demirel and Artan (2017)
Industry (including value added (% of GDP)	Indus	Malovaná, Hodula, and Frait (2021)
Official exchange rate (LCU per US$, period average)	Excloc (left out high corr)	
Inflation, consumer prices (annual %)	Infann	Demirel and Artan (2017), Golinelli and Parigi (2004)
Unemployment, total (% of total labour force) (national estimate)	Unemp	Demirel and Artan (2017), Golinelli and Parigi (2004)
GDP growth (annual %)	GDPgr	Golinelli and Parigi (2004), Klapkiv (2016)
BRICS membership	BRICS	
Eurozone membership	EUROZN	
OECD membership	OECD	

Note: LCU indicates measurement in local currency. The cited articles used these variables as predictors of CCI. Klapkiv (2016) uses household savings, instead of gross savings. Source: own compilation.

Final consumption expenditure is the sum of the final consumption expenditure of the households and the government as a percentage of the gross domestic product (GDP). Foreign direct investment net inflows is a variable that measures the inflow of net investment (new

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investment minus the disinvestment) as a percentage of the GDP. GDP per capita is based on purchasing power parity (PPP) and is measured in thousands of dollars. Gross fixed capital formation, measured as a percentage of the GDP, is the country's investment to infrastructure such as land improvement, machinery purchases, construction of roads, railways, schools, hospitals, offices, residential, commercial, and industrial buildings. Hence, we could speculate that the gross fixed capital formation reflects partially the ease of life as well as the innovativeness of a country. Gross savings, measured as a percentage of the GDP, is the disposable income minus the consumption expenditure.

We also considered gross domestic income. However, we discarded it due to its high correlation with the other variables. Data for interest rates and compensation of employees (as a percentage of expenses) were available for a smaller number of countries. That is why we had to discard these variables. Finally, foreign direct investment net outflows were consistently excluded in any of the stepwise regression methods we applied. Therefore, we discarded this as well.

For reference, we mention the variables from the cited papers, which we could not use due to lack of data. Malovana, Hodula, and Frait (2021) use gross disposable income, compensation of employees, average registered number of employees, bank interest rates on consumer loans, bank lending rate on housing loans, residential property prices, and share price index in addition to the variables we considered from their paper. Demirel and Artan (2017) use interest rates, and Golinelli and Parigi (2004) consider the output gap, public sector borrowing requirement divided by GDP, employment rate, interest rates, and stock price changes.

It is worth noting that our data contain variables, which are inevitably correlated. On the other hand, these variables are carefully selected using the literature, and they all have some impact on consumer confidence indicators. *Figure 2* presents a correlation heatmap of CCI and the macroeconomic variables. We notice a large negative correlation between gross savings and consumption expenditures, gross fixed capital formation and consumption expenditures, terms of trade and GDP per capita, and finally, unemployment and gross savings. Regarding positive relations, the largest correlations are between exchange rate and GDP per capita, gross savings and gross fixed capital formation, and industry index and gross fixed capital formation. When we look at the CCI level, we actually notice that it has a high positive correlation with GDP growth rate and some negative correlation with inflation rate.

3. Methodology

First, we run regressions with CCI as a dependent variable on cultural dimensions and control variables year by year. We enter the cultural dimensions from the previously mentioned four sets of dimensions into the analysis set by set, as we view different sets as alternatives to each other. Since our interest also lies in analysing if the changes in the CCI during the financial/Covid-19 crises can be explained by the cultural dimensions and the changes in the macroeconomic variables, we run regressions where all the variables (except cultural dimensions) are converted to a percentage change from one year to the other.

Regarding the multicollinearity, there are various methods to consider when the econometric model presents a multicollinearity problem. This problem is diagnosed when a regression's variance inflation factor (VIF) is high. In addition, one could examine the standard errors and decide if they are somehow inflated. In addition, the standard errors also depend on the sample size and the variance of the error term, and therefore, the existence of multicollinearity does not directly imply that the standard errors of the coefficients will be high.

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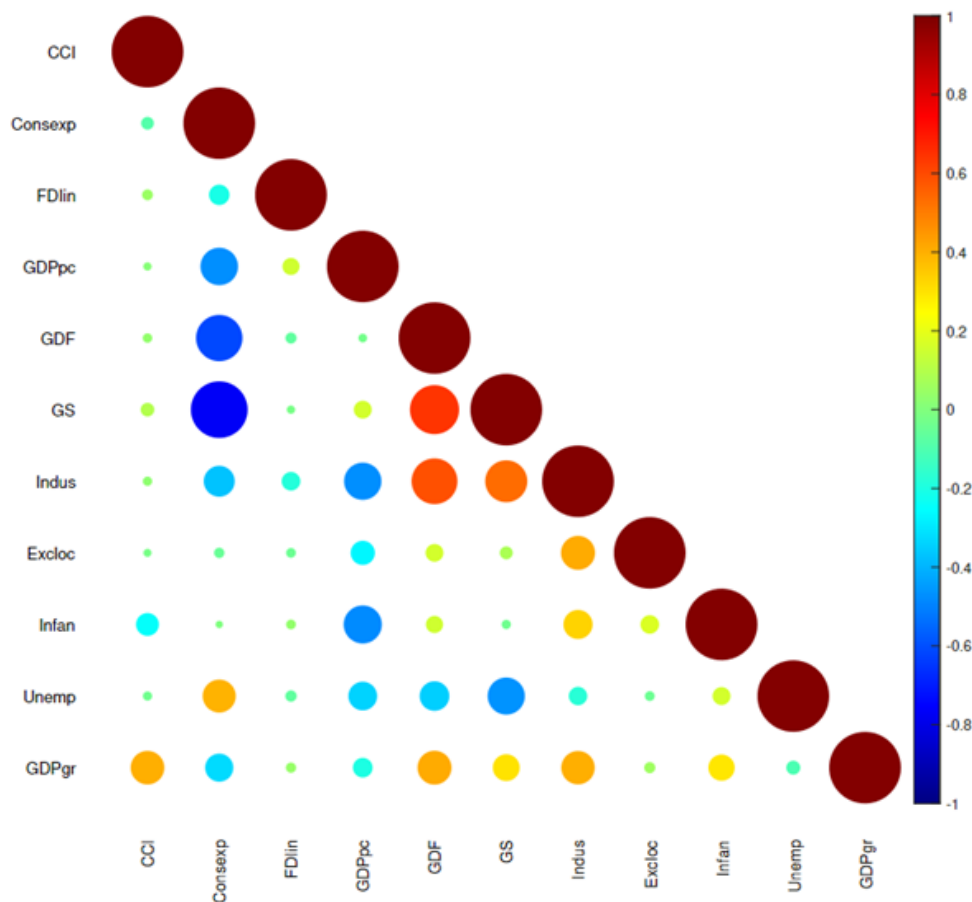Anneli Kaasa

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Figure 2: Correlation heatmap for the macroeconomic variables. The circle sizes indicate the magnitude of the correlation, while the colours indicate the magnitude and sign of correlation. Source: own calculations.

In our study, unfortunately, the number of countries in the sample is small, and there are many regressors, which are correlated with each other. Hence, we need to reduce the number of regressors while not losing much from the explanatory power of the regression. Even with fewer regressors, one could still have multicollinearity between some control variables. This is less concerning since, as mentioned in Wooldridge (2015) on page 98, when explaining the causality of one variable on the dependent variable, the multicollinearity between the other regressors should be ignored completely.

If we notice that the VIF values are high in a regression, one simple and rather obvious method is to go through the correlation matrix of the variables. We could remove the variable that has a high VIF value, correlated with other variables and least correlated with the dependent variable. Afterwards, we rerun the regression again and repeat. Unfortunately, this is a very lengthy process, and since we look at the correlations but not the partial correlations, this approach may be misleading. Instead, we used stepwise regression and principal components regression methods to handle the multicollinearity problem.

Stepwise regression methods add and remove variables looking at how much explanatory power a variable has in the model. In a backward stepwise selection method, the estimations start with a full specification and eliminate the variable with the least impact afterwards. On the other hand, a forward stepwise selection method starts with an empty model (only a constant) and adds variables that has large impact. Whether one regression is superior to another is tested via Wald test or likelihood ratio test. As indicated in Agresti (2018), Wald test is less reliable when the sample size is small. Therefore, we used the likelihood ratio test option to compare different nesting models.

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It is important to mention that if two variables are correlated, and one of them is already in the regression, adding the other one to the regression hardly brings additional explanatory power. Therefore, adding this other variable would not improve the fit of the regression, and a likelihood ratio test would most likely indicate that there is little to gain from including that variable in the regression. In this sense, stepwise regressions are already designed to alleviate the problem of multicollinearity by including the variables that have a significant impact and excluding the others. Although the multicollinearity is reduced by this approach, the regressors in the equations are inevitably correlated and their standard errors are inflated. We avoid discarding the regressors whose coefficients turn out to be insignificant because the correlation of the discarded regressor with the other regressors could lead to omitted variable bias. Finally, we would like to also point out here that in all the regressions the R-squared values were maximum around 0.66-0.68, which is not high enough to raise the suspicion for overfitting.

At this stage, the regression equation we estimate via the stepwise regressions looks as follows:

$$y_{i,t} = \alpha + \beta_1 CD_{1,i}^j + \beta_2 CD_{2,i}^j + \delta_1 MV_{1,i,t-1} + \delta_2 MV_{2,i,t-1} + \cdots + \delta_m MV_{m,i,t-1} + \varepsilon_{i,t} \qquad (1)$$

where $y_{i,t}$ is the OECD consumer confidence index (or its percentage difference in some models) of country i at time t, $CD_{1,i}^j$ and $CD_{2,i}^j$ are the scores for the first and second cultural dimensions of country i *regarding the j*'th model of culture, and $MV_{s,i,t-1}$ for *s=1,…,m* are the macroeconomic variables of country i at time $t-1$. Our macroeconomic variables are listed in Table 1. The time t is specified as the year 2007, 2009, 2020, 2021 or a pool of these as explained in *Section 2*. We use four different two-dimensional models of culture, namely, Kaasa and Minkov (2022) Inglehart and Welzel (2021) Minkov and Kaasa (2022) Beugelsdijk and Welzel (2018).

Another method for handling the multicollinearity in regressions is the principal component regressions method. This method uses the correlation matrix of the variables to extract orthogonal vectors of principal components. The first k principal components, where k is less than the number of variables, explain a large percentage of the variation in the original data. Typically, the principal components whose corresponding eigenvalue is larger than one are retained. Since, by construction, the principal components extracted from the variables are orthogonal to each other, it is possible to use these k principal components in a regression. This way, one can avoid the multicollinearity problem. The downside of this method is that the principal components may only sometimes be interpretable, and it is not possible to construct causality relation with the original variables. If these variables are only control variables, one can do the regression with the treatment variables and the principal components obtained from the control variables.

With the principal components we calculate, we estimate the following regression equation:

$$y_{i,t} = \alpha + \beta_1 CD_{1,i}^j + \beta_2 CD_{2,i}^j + \delta_1 PC_{1,i,t-1} + \delta_2 PC_{2,i,t-1} + \cdots + \delta_k PC_{k,i,t-1} + \varepsilon_{i,t} \qquad (2)$$

where $PC_{s,i,t-1}$ for *s=1,…,k* are the principal components corresponding to country i at time $t-1$, and the rest of the notation is as explained above.

It is also possible to use a Lasso estimation to reduce the number of variables (Hastie et al., 2009). Lasso method uses a penalty term to punish the inclusion of the variables with a small impact. Therefore, all the variables with smaller impacts have zero coefficients. After finding out the regressors, one could apply OLS estimation. The problem with this approach is

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that Lasso regression pushes the coefficients too much towards zero and, therefore, could lead to a biased selection of the variables. In fact, as mentioned in Ranstam and Cook (2018), Lasso regression trades off bias for better predictions. Hence, the coefficients found in the Lasso regression results are not individually interpretable. In addition, Lasso might be very restricting, and we may be skipping important variables. When we use OLS afterwards, we may end up with omitted variable biases because of skipping important variables. However, we tried applying OLS regressions after Lasso regressions and our OLS estimations ended up with very few regressors. The coefficients we obtained were sometimes with unexpected sign and the goodness of fit measures were very poor.

We also ruled out panel data methods. Culture forms over many years and is slow to change Roland (2004). If we would use the panel data approach and try to remove country - specific impact, we would be removing the impact of the cultural dimensions which are specific to each country. Moreover, there would also be the issue of which regressors to select and multicollinearity between the regressors.

It is also worth mentioning here that consumer confidence indicators are not likely to impact the cultural dimensions for the same reason that cultural values change very slowly. We also assume that the consumers look at the last available macroeconomic data, among other information, to form their future expectations. Hence, we do not expect a reverse causality problem in our regressions.

4. Results

4.1. The impact of cultural dimensions on levels and changes in CCI

We first conducted analysis with the levels of CCI and the macroeconomic control variables. Later, we estimated the same regressions with the percentage changes in these variables. We added the cultural variables set by set into the analysis and fixed them to be always present in the model.

Our results show no consistent results when analysing our data year by year (see *Table A5* in Appendix). However, we see some interesting results when we pool the samples of the good times, meaning January 2007 and January 2020 and the samples of bad times, namely January 2009 and January 2021 (see *Table 2*). We find that in backward stepwise regressions, responsibility (vs faith), secular (vs traditional), and individualism (vs collectivism) of Minkov dimensions appear to be significantly and negatively related to the CCI in bad times. Hence, in cultures with more responsible and independent attitudes, consumer confidence in bad times is lower compared to cultures with opposite attitudes, where people rather hope for others or authorities to help them. Regarding the individualism dimension, the same is indicated also for good times. More independence might mean more realistic understanding of the situation or even more cautious attitudes about the economic situation.

Next, we focus on how the cultural dimensions might affect the changes in the CCI levels given the change in the economic conditions. By the latter, we mean the 2007-2008 financial crisis and the Covid-19 crisis, which impacted the economies in 2020. We present the coefficients of the cultural dimensions in *Table 2*. The CCI levels decreased from 2007 to 2009 and from 2020 to 2021. Both backward and forward stepwise regressions show that freedom (vs concern) and self-expression (vs survival) dimensions appear to be positively related to the change of CCI during the Covid-19 crisis. The forward regression analysis confirms the result for freedom (vs concern), but p-value for coefficient of self-expression (vs survival) dimension remains slightly beyond the 0.10 significance level. The same tendency is also demonstrated

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for the financial crisis, but coefficients remain non-significant. Hence, in countries with cultures valuing freedom and self-expression, the decline in CCI during the crises, especially the Covid-19 crisis, has been smaller. In addition, the joy (vs duty) dimension of Beugelsdijk and Welzel (2018) appears to be positively related to the change of CCI during the financial crisis, meaning that in countries valuing joy as the opposite of duty more, the decline of CCI might have been smaller. This is logical, knowing that the joy (vs duty) dimension is very close to the freedom (vs concern) and self-expression (vs survival) dimensions in the comparison by Kaasa and Minkov (2022). The individualism dimension by Beugelsdijk and Welzel (2018) is placed on the other side of those two dimensions, a bit more far. However, according to the backwards regression results, it appears to be positively related to the change of CCI during the Covid-19 crisis.

Generally, it can be assumed that in countries with more stress on freedom, self-expression and joy, people tend to be more optimistic about the economic situation than in countries where focus is on concern, survival, and duty. However, our results indicate that the situations in the two crises have been different, and thus, different mechanisms have worked in those cases regarding the possible impact of culture on the CCI. First, in the case of the Covid-19 crisis, culture has been clearly more relevant for the change in CCI. Second, while during the Covid-19 crisis, what seems to have made people more optimistic is freedom (vs concern) and self-expression (vs survival), during the financial crisis, it is better captured by the opposition of joy vs duty. While the former is rather close to openness and more trusting attitudes, for example, the latter is rather close to monumentalism and being proud of oneself. Self-confidence might indeed let people see the economic situation in a better light. However, during the Covid-19, freedom-oriented countries with more trusting environments might have allowed people to be less pessimistic.

4.2. On the impact of the macroeconomic control variables

In *Table A6* in the Appendix, we present a summary of the results by stating which variables were significant in general in the regressions for CCI levels and changes for different years. Although the results vary over the years and pooled samples, some common observations exist.

It is very interesting that being a member of the BRICS or OECD is negatively associated with the CCI levels. This could be due to the sample at hand, rather than a causal relationship. We also noticed that the GDP growth rate is positively impacting CCI levels. Similarly, gross savings per capita had a positive and significant coefficient in many regressions. On the other hand, the exchange rate and inflation rate negatively influenced the CCI levels in most of the years. Another interesting point is that consumption expenditure had a negative impact on the CCI levels in 2009, while it had a positive impact in 2021. GDP per capita had a negative impact in 2009, while it had a positive impact in 2021. In addition, in 2021 gross savings per capita had a positive and significant impact. These results could point to the different nature of the crises in 2007-2008 and 2020, as the former was a financial crisis where less consumption was preferred. The latter was due to Covid-19 restrictions where people were isolated at home and did a lot of online shopping (See for example Adibfar et al., 2022; Nguyen et al., 2020; O'Connell, De Paula, and Smith, 2021; and Dunn, Hood, and Driessen, 2020, among others).

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Table 2: Summary of the stepwise regression results for OECD consumer confidence index, standardized coefficients, good years and bad years, levels and changes.

CCI levels		Kaasa and Minkov (2022)		Inglehart and Welzel (2021)		Minkov and Kaasa (2022)		Beugelsdijk and Welzel (2018)	
		frdm/conc	resp/faith	sexp/surv	secl/trad	indv/coll	flex/monm	indv/coll	joy/duty
2007 & 2020	BW-SW	-0.160(0.194)	-0.108(0.367)	-0.068(0.598)	-0.058(0.622)	**-0.300(0.076)**	0.122(0.334)	0.084(0.535)	-0.126(0.285)
	FW-SW	-0.095(0.415)	-0.018(0.872)	0.025(0.834)	0.078(0.491)	0.008(0.951)	0.101(0.415)	0.172(0.145)	-0.141(0.245)
2009 & 2021	BW-SW	-0.144(0.351)	**-0.282(0.075)**	0.018(0.906)	**-0.250(0.084)**	**-0.443(0.024)**	-0.159(0.277)	0.022(0.876)	0.057(0.648)
	FW-SW	-0.024(0.845)	-0.120(0.312)	0.001(0.995)	-0.129(0.301)	-0.232(0.153)	-0.209(0.116)	-0.033(0.806)	0.057(0.650)

CCI % diff.		Kaasa and Minkov (2022)		Inglehart and Welzel (2021)		Minkov and Kaasa (2022)		Beugelsdijk and Welzel (2018)	
		frdm/conc	resp/faith	sexp/surv	secl/trad	indv/coll	flex/monm	indv/coll	joy/duty
2007 & 2020	BW-SW	0.281(0.166)	-0.102(0.561)	0.341(0.102)	-0.199(0.295)	-0.338(0.194)	-0.177(0.382)	-0.063(0.789)	0.288(0.167)
	FW-SW	0.106(0.532)	-0.191(0.276)	0.167(0.355)	-0.241(0.204)	0.016(0.934)	-0.158(0.425)	-0.215(0.291)	**0.350(0.092)**
2009 & 2021	BW-SW	**0.424(0.016)**	0.253(0.179)	**0.457(0.023)**	0.123(0.537)	0.106(0.670)	-0.342(0.150)	**0.396(0.089)**	0.166(0.404)
	FW-SW	**0.335(0.047)**	0.043(0.786)	0.279(0.139)	-0.038(0.834)	0.272(0.178)	-0.196(0.326)	0.154(0.384)	0.181(0.325)

Notes: The dependent variables are the OECD CCI levels and CCI percentage differences. BW-SW stands for backwards stepwise and FW-SW forwards stepwise regression. Abbreviations for cultural dimensions: frdm: freedom, conc: concern, resp: responsibility, sexp: self-expression, surv: survival, secl: secular, trad: traditional, indv: individualism, coll: collectivism, flex: flexibility, monm: monumentalism. Coefficients and p-values (in brackets) are in bold if p-value is 0.10 or below. Source: Authors' calculations.

Looking at the results with the changes in CCI values, we see that larger consumption expenditure and unemployment worsened the decrease in the CCI. At the same time, bigger GDP per capita alleviated it. During the pandemic, more inwards FDI and higher exchange rates lessened the decline in CCI levels. Interestingly, being a member of BRICS, Eurozone, or OECD made the decrease in CCI values worse during the financial crisis and the pandemic.

4.3. Robustness analysis

We also used the principal components regressions, which is another way to control for the multicollinearity between the regressors. Conventionally, the rule of thumb is to retain the principal components whose corresponding eigenvalues are larger than one. Afterwards, one can use these principal components as regressors in an OLS model without facing multicollinearity problem. The few first principal components typically explain most of the variation in the original data, but sometimes, perhaps one would like to do more than that. In our paper, we consider principal component regressions with few first principal components, and also with all of the principal components. In the latter approach, the principal components explain the whole variation in the original data, and they are orthogonal to each other by construction. However, using all the principal components in the regression taxes the degrees of freedom heavily but enables it to explain more in the regression and hence reduces the variance of the error term. In *Tables A7* and *A8* in the Appendix, we present the results of our estimations with all and with the few first principal components. When using the first few principal components, fewer coefficients appeared to be significant. Indeed, using all the principal components enables to explain more in the regression.

The results in *Table A7* in the Appendix confirm that no consistent pattern appears when analysing our data year by year, and even fewer coefficients turned out to be statistically

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significant. The results in *Table A8* in the Appendix confirm our previous result about Minkov's individualism (vs collectivism) being negatively related to the CCI in both good and bad times, but not the other results regarding good or bad times. However, the results show flexibility (vs monumentalism) to be significantly and negatively related to the CCI in bad times. (In *Table 2,* the p-value of the respective coefficient remains slightly beyond the 0.10 significance level). This indicates that in a more flexible culture acknowledging the need to improve, consumer confidence in bad times is lower compared to monumentalist cultures, where people are proud of themselves. Concerning the changes of CCI, the results about freedom (vs concern) and self-expression (vs survival) dimensions being positively related to the change of CCI during the Covid-19 crisis are confirmed by the principal component regressions.

Using stepwise regressions means that every model ends up with a different set of macroeconomic variables next to the cultural dimensions. In order to check whether this might be the explanation for not consistent results for different years, we tried the following approach. We chose seven macroeconomic variables that turned out to be significant in most models, also controlling for the fact that they are not strongly correlated. Those variables were GDP growth, consumer expenditures, exchange rate, inflation, unemployment, and membership in OECD and BRICS. We then ran OLS regressions, including only those variables next to cultural dimensions. Then, we also performed again the principal component regressions, now using only the selected macroeconomic variables.

However, the results regarding year-by-year analysis still do not show any more consistent patterns: even fewer coefficients appeared to be statistically significant. The results about good times and bad times show flexibility (vs monumentalism) to be significantly and negatively related to the CCI in bad times, confirming our previous results. Regarding the changes in CCI, the regressions with selected macroeconomic variables, our previous result showing freedom (vs concern) and self-expression (vs survival) dimensions to be positively related to the change of CCI during the Covid-19 crisis were confirmed. In addition, the responsibility (vs faith) dimension also turned out to be positively related to the change of CCI during the Covid-19 crisis.

This indicates that during the Covid-19 crisis, people tended to be more optimistic about the economy in countries with more stress on responsibility. This result seems to contradict the previous result indicating that in cultures that have more responsible and independent attitudes, consumer confidence in bad times is lower compared to cultures with opposite attitudes, where people rather hope for others or authorities to help them. It is possible that the Covid-19 crisis created a different situation, where this does not apply. However, this result can also be caused by some misspecification in the model when entering only certain macroeconomic variables. As the secular (vs traditional) dimension by Inglehart and Welzel (2021) did not show any significant coefficients, it seems that although conceptually similar to the responsibility (vs faith) dimension by Kaasa and Minkov (2022), it seems to capture somewhat different aspects.

5. Discussion

Based on all our estimations, our strongest conclusions are the following. First, individualism (vs collectivism) appeared to be negatively related to the CCI in bad times, and dimensions of responsibility (vs faith) and secular (vs traditional) that tap similar aspects were shown to have the same relationship in some models. We propose that this is related to more responsible and independent attitudes that cause consumer confidence in bad times to be lower than in countries where people rely more on their group members or authorities in coping with bad times. Second, flexibility (vs monumentalism) was demonstrated to be negatively related to the CCI in bad times. This can be explained by the need to improve in flexible cultures, which

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causes consumer confidence in bad times to be lower than in cultures where being proud of oneself is important. As the flexibility (vs monumentalism) dimension is close to the responsibility (vs faith) and secular (vs traditional) dimensions in the system offered by Kaasa and Minkov (2022), those two results are in accordance with each other.

Third, regarding the change of CCI during the crises, especially the Covid-19 crisis, freedom (vs concern) and self-expression (vs survival) dimensions appear to be positively related to the change of CCI, and the joy (vs duty) dimension of Beugelsdijk and Welzel (2018) that covers similar aspects were shown to have the same relationship in some models. It seems that in countries with cultures valuing freedom, self-expression, and joy, people tend to be more optimistic about the economic situation, and the amount of decline in CCI during the crisis has been smaller than in countries where the focus is on concern, survival, and duty. Fourth, the situation of the two crises seems to have been different, so different mechanisms have worked when we think about the possible impact of culture. In the Covid-19 crisis, culture has been clearly more relevant for the change in CCI than in the financial crisis. While during the Covid-19, freedom-oriented countries with more trusting environments might have allowed people to be less pessimistic, during the financial crisis people in joy-oriented countries with more stress on self-confidence might have seen the economic situation in a better light.

Regarding the comparison of different sets of cultural dimensions, dimensions from all sets might be helpful in explaining the CCI. However, the dimensions from the sets by Inglehart and Welzel (2021) and Kaasa and Minkov (2022), as well as Minkov's two dimensions (Kaasa and Minkov, 2022) seem to do a better job than dimension from Beugelsdijk and Welzel (2018). Our results also show that when some dimensions from different sets are close rotations of each other, they all explain the levels or changes in CCI similarly.

Conclusion

In this paper, we investigate if the cultural dimensions of the two-dimensional cultural models, along with macroeconomic variables, could explain some of the cross-country variations in CCI and their reactions to economic shocks. To analyse this question, we used OECD CCI for the January 2007 (before the 2008 financial crisis), 2009 (during the financial crisis), of 2020 (before the Covid-19), and of 2021 (during the Covid-19). Our list of regressors consisted of eleven macroeconomic indicators, membership of the countries to economic organizations of cooperation (OECD, Eurozone and BRICS) and the cultural dimensions. Since the macroeconomic variables are intercorrelated, we used approaches which are robust to possible multicollinearity issues, namely forward and backward stepwise regressions and principal components regressions.

Our results indicate that in cultures that are characterised by individualism (vs collectivism), responsibility (vs faith), secular (vs traditional), and flexibility (vs monumentalism). We also found that during the crises, especially the Covid-19 crisis, in cultures characterized by freedom (vs concern), self-expression (vs survival), and joy (vs duty) the amount of decline in consumer confidence during the crises has been smaller than in countries on the opposite. The situation of the two crises seems to have been different: in the Covid-19 crisis, culture has been clearly more relevant for the change in consumer confidence than in the financial crisis.

This paper can be extended in multiple ways. To start with, a similar study can be conducted with the Eurostat CCI levels. These CCI levels are available at the sectoral level for industry, services, retail trade, construction, and consumers. Unfortunately, the number of countries is limited to European, EU and EU candidate countries. Another interesting point is regional clusters of consumer sentiments or spillovers of consumer sentiments. Nowzohour and

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Stracca (2020) suggested that sentiments are correlated across countries, meaning whether there is a common global factor behind them or there are sizable sentiment spillovers. Neighbouring countries tend to share similar cultural values; hence, perhaps the spillovers or regional clusters can be explained by culture.

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Appendix

Figure A1: Scatterplot of the two dimensions of Kaasa and Minkov (2022), standardized values. (Abbreviations of country names are given in *Table A1*.) Source: own calculations.

Figure A2: Scatterplot of the two dimensions of Inglehart and Welzel (2021), standardized values. (Abbreviations of country names are given in *Table A1*.) Source: own calculations.

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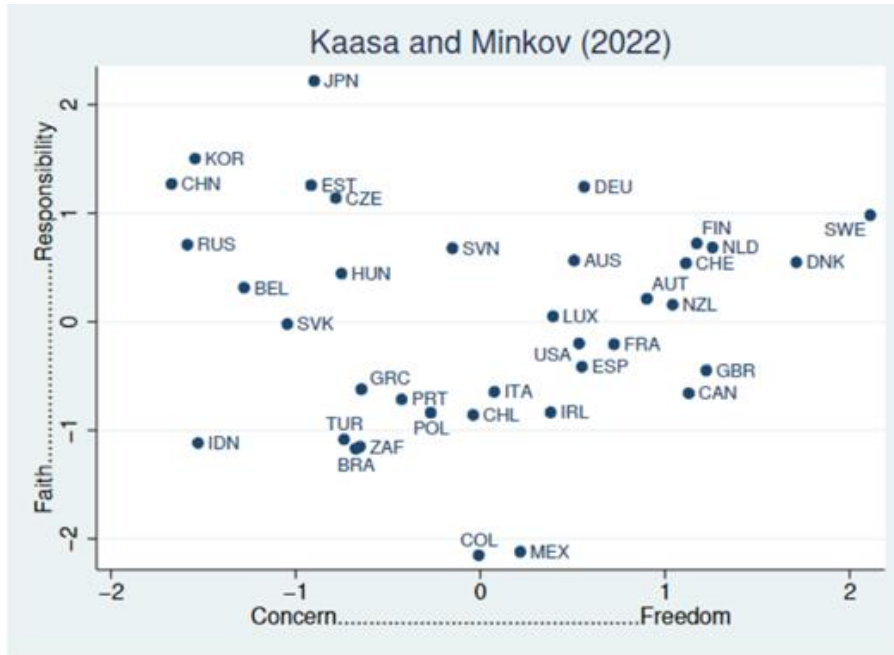**RECENT ISSUES IN ECONOMIC DEVELOPMENT**

Figure A3: Scatterplot of the two dimensions of Minkov and Kaasa (2022), standardized values. (Abbreviations of country names are given in *Table A1*.) Source: own calculations.
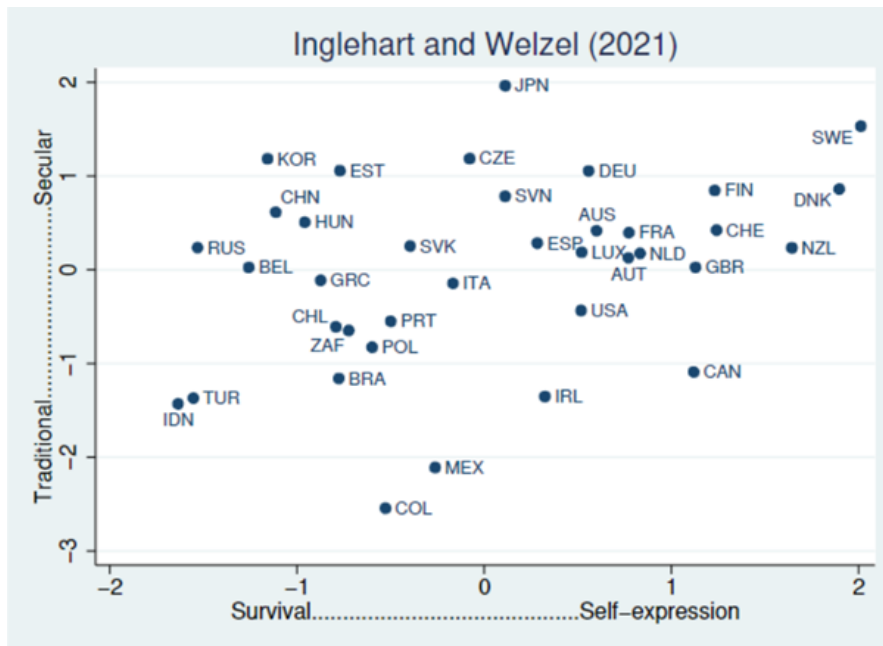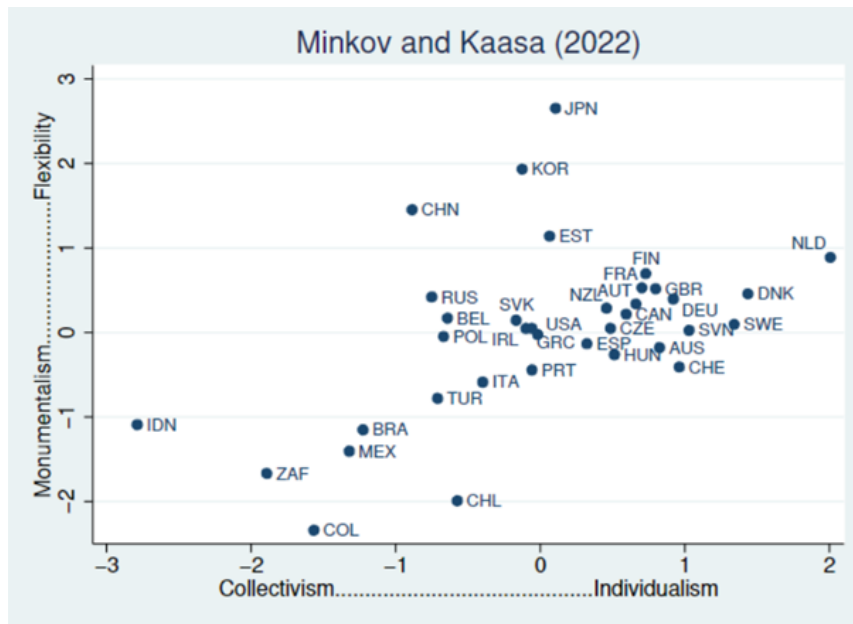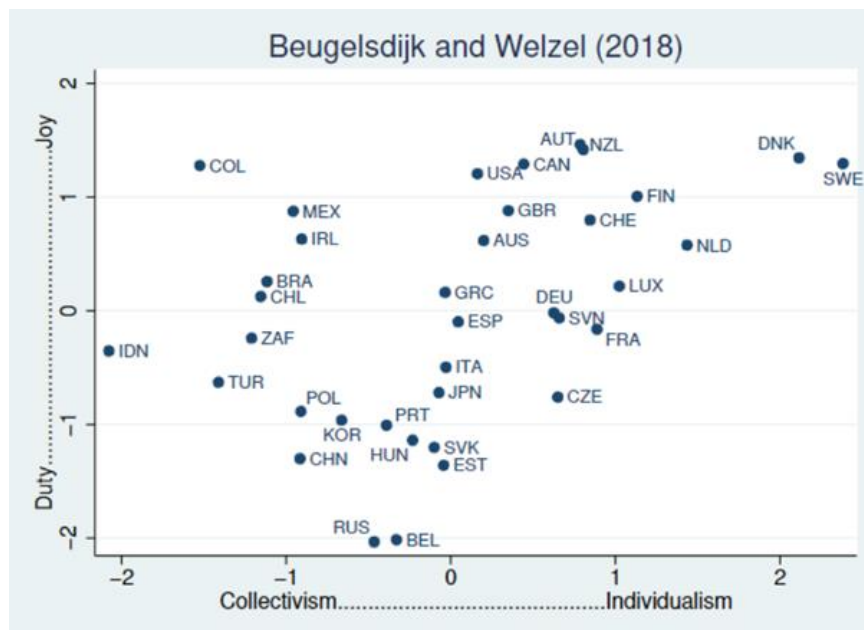

Figure A4: Scatterplot of the two dimensions of Beugelsdijk and Welzel (2018), standardized values. (Abbreviations of country names are given in *Table A1*.) Source: own calculations.

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Table A1. Descriptive statistics of the macroeconomic variables.

Dependent var.	Stats	2007	2009	2020	2021	2007 & 2020	2009 & 2021	Pooled
CCI	M:	101.49	97.20	100.62	99.02	101.05	98.11	99.58
(of January of	St:	1.68	1.96	1.80	1.59	1.78	1.99	2.39
the corresponding	Mn:	97.7	91.51	95.95	95.9	95.95	91.51	91.51
year)	Mx:	107.72	100	104.88	104.66	107.72	104.66	107.72
Regressors	Stats	2006	2008	2019	2020	2006 & 2019	2008 & 2020	Pooled
ConsExp %	M:	72.71	72.98	72.72	73.113	72.72	73.05	72.88
	St:	7.75	8.20	9.35	10.20	8.53	9.19	8.4
	Mn:	51.40	48.64	41.22	37.70	41.22	37.70	37.70
	Mx:	84.91	88.09	89.12	92.62	89.12	92.62	92.62
FDIin %	M:	7.83	6.35	3.27	5.43	5.55	5.89	5.72
	St:	14.20	9.62	11.20	23.46	12.91	17.81	15.50
	Mn:	-0.05	-0.39	-18.60	-34.21	-18.60	-34.21	-34.21
	Mx:	75.09	47.42	60.24	109.33	75.09	109.33	109.33
GDPpc	M:	28.17	31.31	43.57	43.07	35.87	37.19	36.53
(PPP based, in thousands of $)	St:	14.33	15.79	21.08	21.60	19.51	19.70	19.55
	Mn:	5.84	7.58	12.31	12.07	5.84	7.58	5.84
	Mx:	78.88	90.98	117.34	117.85	117.34	117.85	117.85
GDF %	M:	25.30	25.78	24.19	23.52	24.75	24.65	24.70
	St:	5.19	4.52	7.43	6.52	6.39	5.69	6.03
	Mn:	17.82	17.44	12.61	12.75	12.61	12.75	12.61
	Mx:	39.91	42.27	54.70	43.37	54.70	43.37	54.70
GS %	M:	24.92	23.94	24.47	24.34	24.69	24.14	24.42
	St:	6.98	7.50	7.06	7.24	6.97	7.33	7.13
	Mn:	12.78	10.10	10.29	7.31	10.29	7.31	7.31
	Mx:	48.26	51.79	43.77	44.01	48.26	51.79	51.79
Indus %	M:	27.71	27.07	24.78	24.75	26.26	25.94	26.10
	St:	6.97	7.00	6.49	6.50	6.85	6.82	6.81
	Mn:	13.52	12.81	11.71	11.18	11.71	11.18	11.18
	Mx:	47.56	48.06	38.95	38.25	47.56	48.06	48.06
Excloc	M:	0.37	0.37	0.54	0.56	0.45	0.47	0.46
(in thousands	St:	1.54	1.62	2.37	2.45	1.99	2.07	2.02
of local	Mn:	0.00	0.00	0.00	0.00	0.00	0.00	0.00
currency, 1$=)	Mx:	9.16	9.70	14.15	14.58	14.15	14.58	14.58
Infann	M:	3.27	5.11	2.28	1.52	2.78	3.32	3.05
	St:	2.55	2.83	2.46	2.27	2.54	3.12	2.85
	Mn:	0.25	1.38	0.25	-1.25	0.25	-1.25	-1.25
	Mx:	13.11	14.11	15.18	12.28	15.18	14.11	15.18
Unemp	M:	7.36	6.61	6.57	7.69	6.96	7.13	7.05
	St:	4.441	3.04	4.73	4.71	4.56	3.95	4.25
	Mn:	3.25	2.96	2.01	2.55	2.01	2.55	2.01
	Mx:	28.34	19.51	25.54	24.34	28.34	24.34	28.34
GDPgr	M:	4.85	1.57	2.27	-4.13	3.56	-1.28	1.14
	St:	2.36	2.83	1.47	3.49	2.34	4.26	4.20
	Mn:	1.37	-5.13	-0.24	-10.82	-0.24	-10.82	-10.92
	Mx:	12.72	9.65	5.95	5.87	12.72	9.65	12.72

Notes: % sign is used to indicate that the variable is measured as a percentage of the GDP.
Source: Own calculations.

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Table A2. The abbreviations of country names

Country name	Country code	Country name	Country code	Country name	Country code	Country name	Country code
Australia	AUS	Germany	DEU	Ireland	IRL	Russia	RUS
Austria	AUT	Denmark	DNK	Italy	ITA	Slovakia	SVK
Belgium	BEL	Spain	ESP	Japan	JPN	Slovenia	SVN
Brasil	BRA	Estonia	EST	South Korea	KOR	Sweden	SWE
Canada	CAN	Finland	FIN	Luxemburg	LUX	Turkiye	TUR
Switzerland	CHE	France	FRA	Mexico	MEX	United States	USA
Chile	CHL	United Kingdom	GBR	Netherlands	NLD	South Africa	ZAF
China	CHN	Greece	GRC	New Zealand	NZL		
Columbia	COL	Hungary	HUN	Poland	POL		
Czechia	CZE	Indonesia	IDN	Portugal	PRT		

Source: own calculations.

Table A3. The features which the cultural dimensions present, part 1

Source	Cultural Dimension	What it represents
Kaasa and Minkov (2022)	cd1: Freedom vs. concern	- Freedom of speech - Freedom to live one's own life - Freedom from work duty - Freedom to enjoy leisure vs. - Concern for unfamiliar - Concern for maintaining order - Concern for resources
	cd2: Responsibility vs. faith	- Valuing independence - Taking control of one's own life - Being able to cope on one's own vs. - Faith in God - Faith in one's nation - Faith in authority and its ability to sort everything out when obeyed - Faith in traditions
Inglehart and Welzel (2021)	cd1: Self-expression vs. survival (in case of survival: opposite)	- Self-expression and quality of life is more important than economic and physical security - Feeling of happiness - Being ready to sign a petition - Homosexuality is acceptable - People are trustable
	cd2: Secular vs. traditional (in case of traditional: opposite)	- God is not very important in one's life - Children should learn about independence and determination, rather than obedience and religion - Abortion is justifiable - Weak sense of national pride - Less respect for authority

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Table A4. The features which the cultural dimensions present, part 2

Source	Cultural Dimension	What it represents
Minkov and Kaasa (2022)	cd1: Individualism vs. collectivism	- Considerable individual freedom - Protection of individual rights - Sexual freedom - Rule of law - Innovative thinking vs. - Strict rules of behaviour - Deviations from collective norms not allowed - Deviations from heterosexuality banned - Extramarital sex punishable, arranged marriages imposed - Nepotism and privileges for powerful individuals - Low concern for safety - Less innovative
	cd2: Flexibility vs. monumentalism	- Thrift is prioritized, consistent delay of gratification - Self sufficiency is advocated - Flexible/adaptable self to changing circumstances - Depressed positive feelings, self esteem and pride - Space for self improvement, personal development through education - Flexible and humble self vs. - Thrift is deemphasized. - Children are taught to share and help others - Invariant self, consistent behaviour - Positive feelings, self esteem and pride, which may dampen the effort for self improvement - A self that resembles a perennial and proud monument
Beugelsdijk and Welzel (2018)	cd1: Individualism vs. collectivism	- More anonymous dependence on impartial institutions and universal norms - People are free from the obligations of the extended family - Communal affiliations are chosen, rather than imposed - People set their own goals - High tolerance for deviations from group norms, low emphasis on conformity and obedience vs. - People closely linked in-group - People follow the norms and duties of the group as prevalent - High importance to the relationships with other members of the group
	cd2: Joy vs. duty	- Tend to live in big cities - Good income is not the important aspect of a job - Embrace democracy - Imagination is an important child quality vs. - Hard work is an important child quality - People are in need because they are lazy

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Table A5. Summary of the stepwise regression results, standardized coefficients for OECD consumer confidence index, for each year, and all years together

CCI levels		Kaasa and Minkov (2022) frdm/conc	resp/faith	Inglehart and sexp/surv	Welzel (2021) secl/trad	Minkov and Kaasa (2022) indv/coll	flex/monm	Beugelsdijk and indv/coll	Welzel (2018) joy/duty
2007	BW-SW 0.005(0.979)		0.013(0.934)	0.235(0.199)	-0.024(0.879)	-0.250(0.291)	0.063(0.706)	0.161(0.379)	-0.069(0.689)
	FW-SW 0.061(0.726)		-0.017(0.907)	0.175(0.320)	-0.090(0.540)	-0.115(0.575)	0.083(0.625)	0.112(0.535)	-0.020(0.906)
2009	BW-SW 0.106(0.636)	-	0.154(0.464)	-0.023(0.926)	0.116(0.569)	**-0.611(0.071)**	0.061(0.795)	0.255(0.297)	0.009(0.966)
	FW-SW 0.024(0.888)		-0.176(0.305)	0.063(0.754)	-0.007(0.970)	-0.246(0.265)	-0.293(0.125)	-0.080(0.669)	0.178(0.344)
2020	BW-SW **0.405(0.011)**	**-**	**-0.398(0.046)**	-0.209(0.217)	-0.254(0.184)	**-0.579(0.017)**	**0.089(0.614)**	**-0.490(0.062)**	0.131(0.465)
	FW-SW **0.280(0.082)**	**-**	-0.034(0.828)	-0.101(0.537)	0.195(0.222)	-0.139(0.416)	**0.366(0.043)**	0.202(0.207)	-0.228(0.165)
2021	BW-SW 0.078(0.756)	-	**-0.659(0.049)**	0.169(0.499)	**-0.516(0.071)**	-0.542(0.106)	-0.072(0.712)	0.316(0.169)	0.090(0.632)
	FW-SW **0.323(0.067)**		0.165(0.338)	**0.343(0.070)**	0.034(0.851)	-0.058(0.854)	-0.059(0.822)	**0.421(0.020)**	0.030(0.863)
All years	BW-SW **0.219(0.018)**	**-**	**-0.173(0.069)**	-0.111(0.200)	-0.032(0.679)	**-0.307(0.011)**	0.049(0.594)	0.004(0.967)	-0.102(0.198)
	FW-SW **0.137(0.073)**	**-**	-0.082(0.285)	-0.131(0.111)	-0.045(0.570)	**-0.180(0.062)**	-0.052(0.541)	-0.045(0.587)	-0.083(0.291)

Notes: BW-SW stands for backwards stepwise and FW-SW forwards stepwise regression. Abbreviations for cultural dimensions: frdm: freedom, conc: concern, resp: responsibility, sexp: self-expression, surv: survival, secl: secular, trad: traditional, indv: individualism, coll: collectivism, flex: flexibility, monm:monumentalism. Coefficients and p-values (in brackets) are in bold if p-value is 0.10 or below. Source: Own calculations.

Table A6. A summary on the impact of the macroeconomic control variables

	2007	2009	2020	2021	2007&2020	2009&2021	All
CCI LEVELS	GDPpc, pos Excloc, neg GDPgr, pos BRICS, neg OECD, neg	ConsExp, neg GDPpc, neg GDF, neg Indus, neg Infann, neg GDPgr, pos BRICS, neg	GDF, neg GS, pos Excloc, neg Infann, neg GDPgr, pos BRICS, neg OECD, neg	ConsExp, pos FDIin, pos GDPpc, pos GDF, neg GS, pos Indus, neg Excloc, neg GDPgr, pos BRICS, neg OECD, neg	Excloc, neg Infann, neg Unemp, neg GDPgr, pos BRICS, neg OECD, neg	ConsExp, pos FDIin, pos GDPpc, pos GDF, neg GS, pos Infann, neg GDPgr, pos BRICS, neg OECD, neg	ConsExp, neg GDF, neg GS, pos Indus, neg Infann, neg GDPgr, pos BRICS, neg OECD, neg

	2007->2009	2020->2021	All years				
CCI CHANGES	ConsExp, neg GDPpc, pos Unemp, neg BRICS, neg OECD, neg	ConsExp, neg FDIin, pos Excloc, pos Unemp, neg GDPgr, neg BRICS, neg Eurozone, neg	ConsExp, neg GDPpc, pos Indus, neg Excloc, pos Infann, neg GDPgr, neg BRICS, neg				

Notes: The variables and their signs as they appeared in the stepwise regression results of different years and for cultural dimensions of different sources. pos. and neg. indicate positive and negative coefficients significant at least at 10%.
Source: own calculations.

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Table A7. Summary of the PCA regression estimation results for the values of CCI. Good years and bad years

	Using all principal components							
CCI levels	Kaasa and Minkov (2022)		Inglehart and Welzel (2021)		Minkov and Kaasa (2022)		Beugelsdijk and Welzel (2018)	
	frdm/conc	resp/faith	sexp/surv	secl/trad	indv/coll	flex/monm	indv/coll	joy/duty
2007 & 2020	**-0.200(0.089)**	-0.119(0.495)	-0.063(0.596)	-0.052(0.749)	**-0.400(0.038)**	0.184(0.301)	0.049(0.802)	-0.118(0.400)
2009 & 2021	-0.166(0.394)	-0.291(0.112)	-0.112(0.570)	-0.192(0.262)	**-0.499(0.028)**	-0.165(0.281)	-0.045(0.849)	-0.028(0.851)

CCI % diff.	Kaasa and Minkov (2022)		Inglehart and Welzel (2021)		Minkov and Kaasa (2022)		Beugelsdijk and Welzel (2018)	
	frdm/conc	resp/faith	sexp/surv	secl/trad	indv/coll	flex/monm	indv/coll	joy/duty
2007->2009	0.183(0.440)	-0.158(0.585)	0.276(0.372)	-0.182(0.519)	-0.260(0.502)	-0.086(0.815)	-0.072(0.834)	0.227(0.480)
2020->2021	0.443(0.111)	0.247(0.330)	0.443(0.164)	0.028(0.895)	0.148(0.718)	-0.312(0.350)	0.321(0.342)	0.181(0.556)

	Using selected principal components							
CCI levels	Kaasa and Minkov (2022)		Inglehart and Welzel (2021)		Minkov and Kaasa (2022)		Beugelsdijk and Welzel (2018)	
	frdm/conc	resp/faith	sexp/surv	secl/trad	indv/coll	flex/monm	indv/coll	joy/duty
2007 & 2020	-0.071(0.516)	0.023(0.884)	0.022(0.865)	0.068(0.656)	-0.112(0.458)	0.157(0.373)	0.217(0.213)	-0.156(0.251)
2009 & 2021	-0.021(0.878)	-0.149(0.279)	0.026(0.863)	-0.133(0.317)	-0.266(0.121)	**-0.264(0.034)**	-0.036(0.834)	0.085(0.488)

CCI % diff.	Kaasa and Minkov (2022)		Inglehart and Welzel (2021)		Minkov and Kaasa (2022)		Beugelsdijk and Welzel (2018)	
	frdm/conc	resp/faith	sexp/surv	secl/trad	indv/coll	flex/monm	indv/coll	joy/duty
2007->2009	0.173(0.425)	-0.124(0.653)	0.235(0.396)	-0.156(0.591)	0.078(0.782)	-0.176(0.504)	-0.058(0.844)	0.281(0.350)
2020->2021	**0.502(0.038)**	0.166(0.328)	0.463(0.125)	-0.011(0.953)	0.297(0.294)	-0.177(0.328)	0.276(0.216)	0.208(0.381)

Notes: Presents the results with all and selected principal components used as control variables. Selected principal components are those whose eigenvalues exceed one. Abbreviations for cultural dimensions: frdm: freedom, conc: concern, resp: responsibility, sexp: self-expression, surv: survival, secl: secular, trad: traditional, indv: individualism, coll: collectivism, flex: flexibility, monm: monumentalism. Coefficients and p-values (in brackets) are in bold if p-value is 0.10 or below. *Source*: Own calculations.

Table A8. Summary of the PCA regression estimation results for the values of CCI. Each year and all years

	Using all principal components							
CCI levels	Kaasa and Minkov (2022)		Inglehart and Welzel (2021)		Minkov and Kaasa (2022)		Beugelsdijk and Welzel (2018)	
	frdm/conc	resp/faith	sexp/surv	secl/trad	indv/coll	flex/monm	indv/coll	joy/duty
2007	-0.006(0.977)	0.006(0.975)	0.189(0.412)	-0.030(0.885)	-0.392(0.199)	0.173(0.413)	0.188(0.487)	-0.129(0.543)
2009	-0.099(0.778)	0.164(0.510)	0.018(0.959)	0.131(0.577)	-0.593(0.181)	0.101(0.731)	0.300(0.343)	-0.137(0.576)
2020	-0.309(0.142)	-0.395(0.265)	-0.106(0.587)	-0.283(0.391)	-0.420(0.313)	0.084(0.782)	-0.352(0.398)	0.244(0.328)
2021	-0.089(0.781)	-0.664(0.124)	0.064(0.859)	-0.547(0.141)	-0.569(0.163)	-0.058(0.873)	-0.093(0.847)	0.240(0.385)
All years	**-0.218(0.022)**	**-0.197(0.073)**	**-0.166(0.083)**	-0.114(0.270)	**-0.401(0.003)**	0.016(0.881)	-0.055(0.670)	-0.097(0.300)

	Using selected principal components							
CCI levels	Kaasa and Minkov (2022)		Inglehart and Welzel (2021)		Minkov and Kaasa (2022)		Beugelsdijk and Welzel (2018)	
	frdm/conc	resp/faith	sexp/surv	secl/trad	indv/coll	flex/monm	indv/coll	joy/duty
2007	0.131(0.406)	0.014(0.945)	0.192(0.313)	-0.020(0.920)	0.126(0.636)	-0.068(0.739)	0.241(0.281)	-0.037(0.875)
2009	0.097(0.647)	-0.044(0.823)	0.238(0.346)	-0.080(0.636)	-0.158(0.596)	**-0.306(0.054)**	0.211(0.357)	0.113(0.543)
2020	-0.262(0.118)	0.042(0.870)	-0.168(0.346)	0.119(0.627)	-0.239(0.425)	0.324(0.189)	0.159(0.529)	-0.224(0.211)
2021	0.270(0.275)	0.029(0.881)	0.307(0.275)	-0.035(0.859)	0.0610(0.863)	-0.085(0.756)	0.361(0.113)	0.082(0.704)
All years	-0.022(0.794)	-0.056(0.605)	0.039(0.670)	-0.021(0.838)	-0.141(0.249)	-0.033(0.785)	0.087(0.456)	-0.022(0.816)

Notes: Presents the results with all and selected principal components used as control variables. Selected principal components are those whose eigenvalues exceed one. Abbreviations for cultural dimensions: frdm: freedom, conc: concern, resp: responsibility, sexp: self-expression, surv: survival, secl: secular, trad: traditional, indv: individualism, coll: collectivism, flex: flexibility, monm: monumentalism. Coefficients and p-values (in brackets) are in bold if p-value is 0.10 or below. *Source*: Own calculations

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[i] https://www.federalreserve.gov/econres/notes/feds-notes/financial-and-macroeconomic-indicators-of-recession-risk-20220621.htm

ii These dates are selected considering the values before and during the dips of CCI in Figure 1.

iii https://www.federalreserve.gov/econres/notes/feds-notes/financial-and-macroeconomic-indicators-of-recession-risk-20220621.htm

iv OECD (2022), Consumer confidence index (CCI) (indicator). doi: 10.1787/46434d78-en (Accessed on 11 July 2022)

v The values are demeaned, and divided by the standard deviation.