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# Climato-Economic Context of Regional Crime and Corruption Across the Russian Federation

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## Abstract

Cross-national research claims that the crime-and-corruption gap between relatively poor and relatively rich countries is larger in more demanding climates that require more cash and capital to cope with the climate. However, this claim is premature because countries differ in many confounding ways including histories and politics. We, therefore, re-tested the climato-economic context of violent crime and corruption within Russia, a country with considerable regional differences in climate and income. Across the eighty-five administrative units of Russia, the crime-and-corruption gap between relatively poor and relatively rich regions is smaller in more demanding climates. Harsher climates are so strongly associated with higher crime levels that the potential influence of differences in wealth becomes negligible. Furthermore, harsher climates are so strongly associated with higher corruption rates in poorer regions but lower corruption rates

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in richer regions that the potential influence of the climatic demands as such becomes negligible.

### **Keywords**

climate, economy, corruption, crime, basic values

### **Introduction**

Violent crime and corruption are broadly based on sociocultural, economic, and historical factors (Barr & Serra, 2010; Davis & Ruhe, 2003; Eisner, 2003; Glaser, 1979; Seleim & Bontis, 2009; Treisman, 2000; Zedner, 2006), all of which are associated with the overarching ecological context (e.g., Burns, 2000). What is particularly intriguing is the role of the climate (e.g., Mares & Moffett, 2019; Rotton & Cohn, 2003), given that monocausal explanations of psychosocial functioning offered by climatic determinism are firmly rejected nowadays (Van de Vliert, 2013a, 2013b). Instead, recent evidence supports the novel proposition that “climatic demands cannot meaningfully predict variation in shared culture as long as income conditions are left out of consideration” (Van de Vliert, 2013b, p. 504). For example, fear and distrust, as covariates of violent crime and corruption, are considerably higher in countries with more demanding climates to the extent that the inhabitants are poorer (Van de Vliert et al., 2019). In this vein, while rejecting both climatic and economic determinism, we investigated whether climatic demands and wealth resources also modify each other’s effect on violent crime and corruption.

Many contemporary scientists have reasonably pointed out that, with time, individual reactions to the climate become collective habits. Thus, the residents of the same habitat, exposed to the same climatic conditions and having the same standards of living, form common cultural syndromes of stress, threat, and comfort. These factors shape the structure of the people’s needs, and, therefore, their goals as the manifestation of values, means as the manifestation of beliefs, and results as the manifestation of behavioral practices and their consequences (Hofstede, 2001; House et al., 2004; Leung & Bond, 2004; Schwartz, 2006; Triandis, 1995; Van de Vliert, 2013a). The climate-economic theory of culture proposes that climatic demands placed on people are a double-edged sword, having detrimental effects on the daily life of poor people, but beneficial effects on the daily life of rich people (Van de Vliert, 2013a). Alternatively formulated, the poor are better off in more temperate climates, whereas the rich are better off in harsher climates. This is so because

poorer people appraise greater climatic demands as more threatening, develop higher existential needs, and tend to make more use of others as tools to meet their own survival goals. By contrast, richer people appraise greater climatic demands as more challenging, develop higher growth needs, and tend to treat others more as fellow human beings with respectable needs, goals, and rights. As a consequence, antisocial attitudes, such as fear and distrust, and antisocial habits, such as crime and corruption, tend to thrive in more demanding climatic habitats to the extent that the inhabitants become poorer.

For several explanatory and methodological reasons to be discussed in a later section, we scrutinized the climato-economic context of crime and corruption in distinct habitats within Russia.

## **Crime and Corruption as Consequences of Climate and Economy**

The framework of the climato-economic theory of culture is thought to apply to both heat and cold demands. One telling example is the concerted impact of tropical heat and poverty on the prevalence of domestic conflict, press repression, and the business costs of crime and violence (Van de Vliert & Daan, 2017). The reported cross-national study showed that climate is not a direct predictor of the level of aggression, but that the influence of climatic heat on aggression is completely mediated and modified by economic poverty. Although the sizable impact of poverty on aggression is only slightly modified by heat (an increase from 43% to 47%), higher levels of poverty are significantly associated with decreasingly higher levels of aggression at increasingly higher levels of heat (Van de Vliert & Kong, 2019). The interaction of a more severe hot climate and a higher level of poverty inhibits aggression, which, however, remains high compared to the levels of aggression in wealthier regions. All in all, a more threatening climato-economic situation in a country or region is definitely associated with antisocial behavior.

Other cross-national studies have shown that the psychosocial foundations of two other antisocial habits, namely nepotism and corruption, may also depend on the economic characteristics of a society and the climatic conditions in which it resides. Nepotism was measured as the preference given to relatives over other people in employment (Van de Vliert, 2011). In countries with a higher income level and a harsher cold climate, (e.g., Canada and Finland), the level of nepotism is low, while in countries with a lower income level and a harsher cold climate (e.g., Kazakhstan and Mongolia), the level of nepotism is high. Thus, the interaction of climatic demands and economic wealth affects the level of nepotism. We now turn to the level of corruption as another form of favoring oneself or one's own group through illegal means.

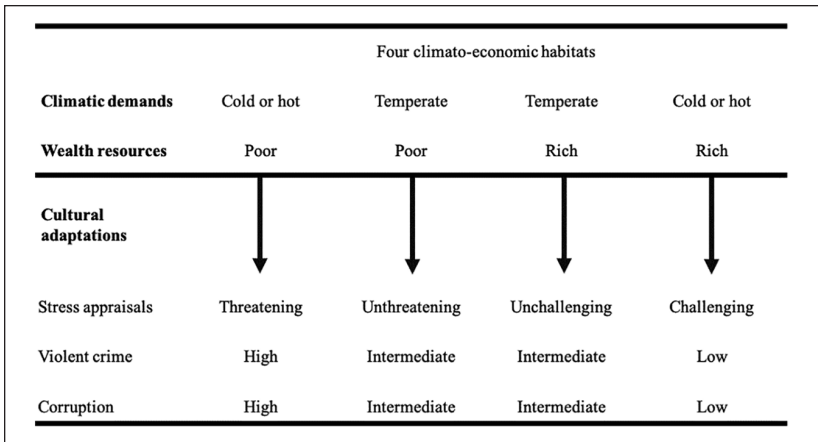
The corruption perceptions index, provided by Transparency International (2020), has a positive relationship with more northern (thus hotter and poorer) latitudes in the southern hemisphere and a positive relationship with more southern (thus hotter and poorer) latitudes in the northern hemisphere (Van de Vliert & Kong, 2019). Thermal demands (8%), economic poverty (49%), and their interaction (4%) account for 61% of the worldwide variation in corruption across 174 countries (Van de Vliert & Kong, 2019). Poorer populations coping with more extreme temperatures experienced as threatening are increasingly prone to corruption, whereas richer populations coping with more extreme temperatures experienced as positively challenging, are increasingly averse to corruption.

Although we reject climatic determinism, we must admit the existence of direct empirical links between thermal climate and human personality that might drive deviant behavior in the form of crime and corruption. In two large-scale multilevel studies, Wei et al. (2017), have convincingly shown that both Chinese and Americans, who grew up in regions with harsher climates—colder or hotter than 22°C (~72°F), tend to be less conscientious and more close-minded, introvert, neurotic, and antagonistic. In this article, personality traits are left aside but we will follow Wei et al. (2017), in adopting 22°C as a benchmark for temperature clemency and optimal psychosocial functioning in its wake.

Summing up the results of previous research and theoretical assumptions, we show schematically in Figure 1 the observed cross-national effects of various combinations of climatic demands and wealth resources on violent crime and corruption. However, Figure 1 rests on shaky ground because countries differ in many confounding ways, including national histories and politics. In the search for more solid ground, we re-tested the theory presented in Figure 1, across the 85 administrative regions of Russia. Specifically, we tested the hypotheses that climatic demands are related to more crime in poorer regions, but less crime in richer regions (Hypothesis 1), and to more corruption in poorer regions, but less corruption in richer regions (Hypothesis 2).

## **Choice of Russia**

Each of the theoretical pillars, on which we have built our analysis, namely climate, economy, and antisocial behavior, provide reasons for why Russia is a uniquely appropriate country to contextualize crime and corruption. Climatically, Russia has the advantage of large temperature differences, not only between and within regions, but also between winters and summers. The eighty-five administrative units are located in seven climatic zones: arctic,



**Figure 1.** The climato-economic theory of culture applied to violent crime and corruption.

subarctic, temperate continental, continental, sharply continental, monsoon, and subtropical zones with considerable seasonal differences.

Economically, the regions of Russia also differ in specialization and, as a consequence, in the level of Gross Regional Product (GRP) per capita. For example, cities such as Moscow and St. Petersburg are the country’s relatively rich financial centers. Regions of the Central Federal District (Kaluga and Voronezh) specialize in mechanical engineering and agriculture (Educational portal “Science.Club”, 2019). The Far Eastern regions of Russia (Magadan, Kamchatka, and Sakhalin) are engaged in the extraction of mineral resources, in particular oil. Volga-Vyatka economic region (Kirov, Nizhny Novgorod, the Republic of Mari-El, the Republics of Chuvashia and Mordovia) engage in the ferrous metal industry and electricity production (Science.Club, 2019). Table 1 shows the ten richest and ten poorest regions of Russia in 2017 (Federal Statistical System “EMISS”, 2017).

Due to the high climatic and economic heterogeneity of a large number of administrative units, Russia represents a unique field for research into the possible impact of climato-economic contexts on antisocial behavior. In addition, alternative explanations for the climato-economic covariations of crime and corruption, in terms of historical and political differences, that is, colonial past, international wars, financial system, judicial regulations, and governmental practices are made less likely because of the within-country analysis. This is not to say that our research results and conclusions will be generalizable to other large countries, such as Canada or the United States. It

**Table 1.** The Top 10 and Bottom 10 Russian Regions by Maximum and Minimum Gross Regional Product (GRP) per Capita (20 Out of 85).

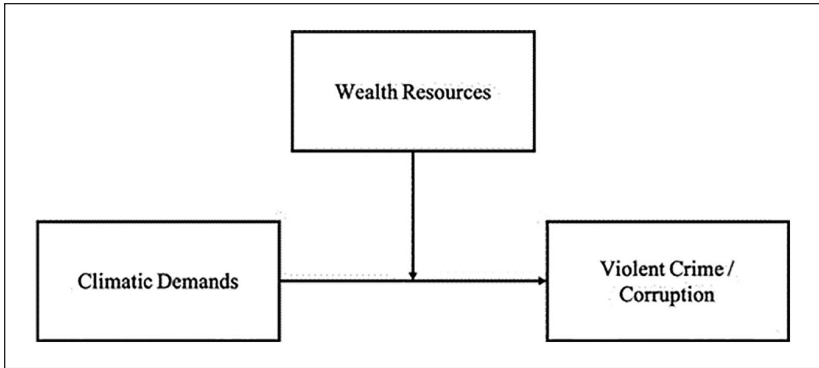
Top 10 regions	Maximum GRP per capita		Bottom 10 regions	Minimum GRP per capita	
	USD	RUR		USD	RUR
Tyumen	32,596	1,900,323	Ingush	1,970	114,844
Sakhalin	27,065	1,577,910	Chechnya	2,152	125,471
Chukotka	23,775	1,386,085	Kabardino-Balkar	2,746	160,077
Moscow	21,676	1,263,698	Karachay-Cherkess	2,746	160,111
Magadan	18,668	1,088,347	Sevastopol	2,830	164,978
Sakha (Yakutia)	16,316	951,220	Ivanovo	3,129	182,398
Saint Petersburg	12,474	727,211	North Ossetia-Alania	3,131	182,519
Komi	11,649	679,163	Tuva	3,167	184,593
Krasnoyarsk	11,227	654,514	Crimea	3,220	187,726
Arkhangelsk	10,991	640,788	Dagestan	3,503	204,197

is important to keep in mind that, although there is considerable income variation across Russian regions, internationally, Russia has to be classified as a poor country. It is also important to note that, although corruption formally is a nonviolent crime in Russia, paying a bribe can be seen by people as an acceptable way to solve problems where official laws do not work well. Therefore, in the minds of many Russians, corruption is a less severe violation of the law than violent crime because Russians have a relatively higher-level tolerance to corruption (Zhuravlev & Jurevich, 2014) and cheating (Magnus et al., 2002).

## Method

### Research Design

Figure 2 schematically places the core variables in the conceptual research model. Data were collected for the 85 regions of Russia, distinguishing them from each other in terms of the levels of climatic demands, wealth resources, violent crime, and corruption. The time interval in these data is 21 years (from 1996 to 2017). This relatively wide time interval was chosen because the formation of some psychosocial characteristics unfolds slowly, and the results only become noticeable after sufficient time (Van de Vliert, 2003).



**Figure 2.** Conceptual research model.

### *Dependent Variables*

*The level of violent crime.* This index is based on the total number of violent crimes per 10,000 population in each of the 85 administrative units of Russia in 2017 (Russian.Duck.Consulting, 2017a).

*The level of corruption (number of bribery cases).* This index is based on the number of prosecutions for bribery, under article 291 of the Russian Penal Code per 10,000 population, in each of the 85 administrative units of Russia in 2017 (Russian.Duck.Consulting, 2017b).

### *Independent Variables*

*Regional climatic demands.* Following Wei et al. (2017), in employing the thermometer for livability (Van de Vliert, 2017), the climate in the administrative units was considered as more demanding, to the extent that temperatures deviate from 22°C. Unlike Celsius or Fahrenheit scales, the Livability thermometer is based on the fundamental fact that plants and animals—and certainly humans, who feed on plants and animals—do not respond to average temperature levels, but to deviations from biologically optimal temperature levels. Agricultural, physiological, and psychological evidence suggests that, for humans, the level of ambient temperature is optimal, in the range between 17°C and 27°C, where existential needs for thermal comfort, nutrition, and health can be easily met (Van de Vliert & Van Lange, 2019). The midpoint of that range, 22°C, serves as the zero point on the thermometer for livability (Van de Vliert, 2017). Consequently, regional climates are deemed



more demanding to the extent that local winters are colder than 22°C and local summers hotter than 22°C.

On the grounds of these considerations, the index of regional climatic demands was operationalized as the sum of four absolute deviations, from 22°C for the average values for the hottest and coldest temperatures in January and July. For example, in the Republic of Sakha, the average temperature range, in January, in 1996, was between -44.9°C and -22°C, while the average temperature range in July was between 5°C and 34.2°C. Accordingly, the climatic demands of the Republic of Sakha in 1996 were equal to  $140.1 = |-44.9 - 22.0| + |-22.0 - 22.0| + |5.0 - 22.0| + |34.2 - 22.0|$ . The temperature data were taken from the Geoinformation System “Meteo-Measurements Online” (1996) and the information resource “Climate Energy” (1996).

*Gross regional product per capita.* The index of wealth resources of the regions is based on the GRP per capita for 2016, taken from the Federal Statistical System “EMISS” (2016a).

### **Control Variables**

We controlled potentially confounding demographic variables, as well as indicators of the quality of life that can help prevent inferential biases.

*Population density.* This index is based on the number of people per square kilometer in each of the 85 administrative units of Russia in 2017 (Federal State Statistic Service, 2017).

*Population growth.* The difference between the total birth and total death rates for 2016, taken from the Federal Statistical System “EMISS” (2016b).

*Education level (percentage).* The proportion of respondents over 15 years old, with a completed secondary education or postgraduate qualification (2010-year census) (Russian.Duck.Consulting, 2010).

### **Data Processing**

The data analysis was carried out using the statistical software package SPSS 22.0 and the PROCESS plugin version 3.3. Regression analysis with standardized data was used for investigating the relations between climatic demands and the levels of violent crime and corruption, taking into account the moderator, that is, wealth resources (see Figure 2).

**Table 2.** The Joint Relationship of Regional Climatic Demands and Gross Regional Product (GRP) per Capita with the Level of Violent Crime ( $N=85$ ).

The level of violent crime						
Predictors and control variables	$\beta$	SE	$t$	VIF	$R^2/\Delta R^2$	$f^2/\Delta f^2$
<b>Controls</b>						
Population density	-.14	0.11	-1.02	2.02		
Population growth	-.07	0.10	-0.69	1.15	.03/<.01	0.0009/<0.01
Education level	-.09	0.14	0.06	2.08		
<b>Predictors</b>						
RCD	.41***	0.10	3.98	1.09		
GRP	.40*	0.16	2.4	1.25	.21/.18	0.05/0.034
<b>Interaction</b>						
RCD $\times$ GRP	-.49***	0.14	-3.5		.32/.11	0.11/0.012

Note. RCD=regional climatic demands; GRP=gross regional product per capita;  $\beta$ =standardized regression coefficient; SE=standard error;  $t$ =statistical hypothesis test; VIF=variance inflation factor;  $R^2$ =coefficient of determination;  $\Delta R^2$ =change in coefficient of determination;  $f^2$ =Cohen's effect size;  $\Delta f^2$ =change in Cohen's effect size.  
\* $p < .05$ . \*\*\* $p < .001$ .

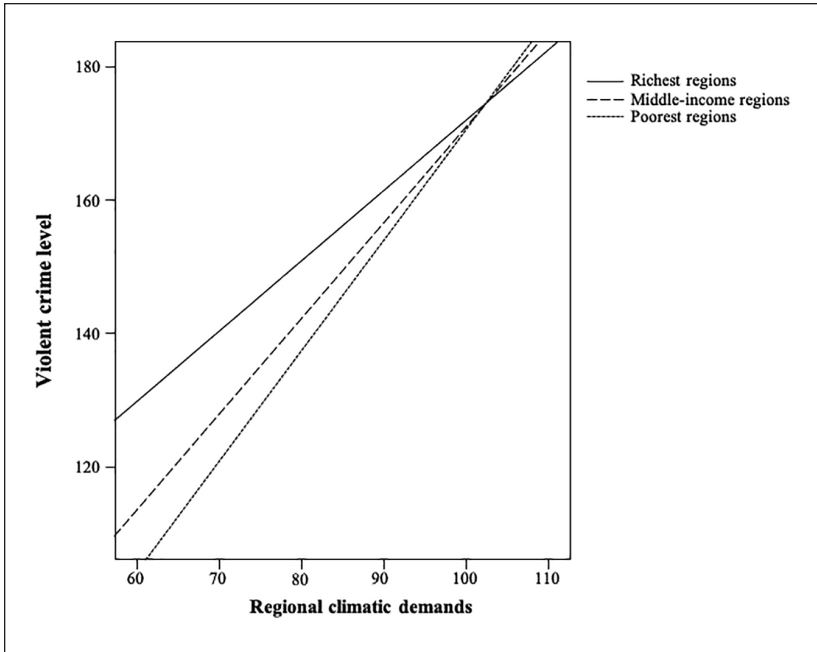
## Results

### Violent Crime

Table 2 reports that climatic demands ( $\beta=0.41, p < .001$ ), GRP as our indicator of wealth resources ( $\beta=0.40, p < .05$ ) and the three control variables, explain 32% variance of violent crime in the regions. The interaction of climatic demands and GRP ( $\beta=-0.49, p < .001$ ) explains 11% variance of violent crime. The control variables do not have a statistically significant relationship with the level of violent crime.

We also evaluated the effect size ( $f^2$ ) for the predictors and control variables together, as well as separately for the climatic demands and GRP interaction. For predictors, controls, and interaction  $f^2 = .11$ , indicating a medium effect size. If we separately estimate the change in effect size for the climatic demands and GRP interaction ( $\Delta R^2 = .11$ ), it is small ( $\Delta f^2 = 0.012$ ). However, we should not forget that the level of statistical significance of this moderation effect is high ( $\beta = -.49, p < .001$ ) and deserves not to be neglected.

Figure 3 illustrates the interaction effect. The harsher the climate, the higher the violent crime rate. The graph further demonstrates that, with an increase in GRP per capita, the regression slope becomes less steep, that is, the relation between climate and crime attenuates, as predicted by the



**Figure 3.** A graphical presentation of the finding that regional climatic demands are associated with more violent crime to the extent that the region is poorer.

climato-economic theory of culture. However, this theory suggests that, across equally low climatic demands, poor and rich regions must have equal crime levels, which is clearly not the case in Russia. Here, we come across Russia's domestic peculiarities, which are displayed in detail in Table 3, replacing the more arbitrary pick-a-point approach in Figure 3, with the more exact Johnson-Neyman technique (Hayes, 2017; Montoya, 2019). This procedure, revealing where in the distribution of wealth resources, climatic demands do and do not exert, significant or marginally significant, effects on the level of crime, is in need of some clarification.

The pick-a-point approach requires the selection of values of  $W$  (moderator), at which the conditional effect of  $X$  (predictor) on  $Y$  (outcome) can be estimated. Different choices lead to different claims, and the choice is often made arbitrarily. We can escape the arbitrariness of the choice of  $W$ -values by using the Johnson-Neyman technique (Hayes, 2017). This method identifies important transition points, where the effect of  $X$  on  $Y$  shifts from significant to nonsignificant, or vice versa (Montoya, 2019).

**Table 3.** The Conditional Effect of Climatic Demands on Violent Crime at Distinct Values of Gross Regional Product (GRP) per Capita.

GRP per capita (thousands of Rubles)	Effect	SE	t	p Value	95% CI
107.00	0.65	0.11	5.91	<.01	[0.43 0.87]
392.75	0.45	0.10	4.73	<.01	[0.26 0.64]
678.50	0.25	0.11	2.39	.02	[0.04 0.46]
726.93	0.22	0.11	1.99	.05	[0.00 0.43]
964.25	0.05	0.13	0.38	.70	[-0.22 0.32]
1,250.00	-0.15	0.17	-0.86	.39	[-0.49 0.20]
1,535.75	-0.35	0.22	-1.61	.11	[-0.78 0.08]
1,755.22	-0.50	0.25	-1.99	.05	[-1.00 0.00]
1,821.50	-0.55	0.26	-2.09	.04	[-1.07 -0.03]
2,107.25	-0.75	0.31	-2.42	.02	[-1.36 -0.13]
2,393.00	-0.94	0.36	-2.65	.01	[-1.65 -0.23]
2,678.75	-1.14	0.40	-2.83	.01	[-1.95 -0.34]
2,964.50	-1.34	0.45	-2.96	<.01	[-2.24 -0.44]
3,250.25	-1.54	0.50	-3.07	<.01	[-2.54 -0.54]
3,536.00	-1.74	0.55	-3.16	<.01	[-2.84 -0.64]
3,821.75	-1.94	0.60	-3.23	<.01	[-3.13 -0.74]

Note. GRP=gross regional product per capita; Effect=conditional effect; SE=standard error; t=statistical hypothesis test; p=statistical significance; CI=confidence interval.

Table 3 illustrates that harsher climates have significant crime-increasing effects in the poorest regions, significant crime-reducing effects in the majority of richer regions, and negligible effects in the moderately wealthy regions.

### Corruption

Table 4 reports that climatic demands ( $\beta = -.04$ , *n.s.*) GRP as our indicator of wealth resources ( $\beta = .58$ ,  $p < .01$ ), and the three control variables, explain 14% variance of corruption in Russia's regions. The interaction of climatic demands and GRP ( $\beta = -.32$ ,  $p < .05$ ) explains 5% variance of corruption across Russia's regions. The control variables do not have a statistically significant relationship with the level of corruption. Again, we evaluated the effect size for the predictors and control variables together, as well as separately for the climatic demands and GRP interaction. For predictors and controls,  $f^2 = .012$ , indicating a small effect size. However, the 14% of the explained variance that creates this effect is mainly due to one variable, that is GRP, since only this variable showed a statistically significant effect.

**Table 4.** The Joint Relationship of Regional Climatic Demands and Gross Regional Product (GRP) per Capita With the Level of Corruption ( $N=85$ ).

The level of corruption						
Predictors and control variables	$\beta$	SE	$t$	VIF	$R^2/\Delta R^2$	$f^2/\Delta f^2$
Controls						
Population density	-.11	0.16	-0.74	2.03		
Population growth	-.03	0.12	-0.22	1.15	.03/<.01	0.0009/<0.01
Education level	-.08	0.16	-0.47	2.09		
Predictors						
RCD	-.04	0.12	-0.32	1.08		
GRP	.58**	0.19	3.12	1.23	.11/.09	0.012/0.008
Interaction						
RCD $\times$ GRP	-.32*	0.16	-2.05		.14/.05	0.02/0.003

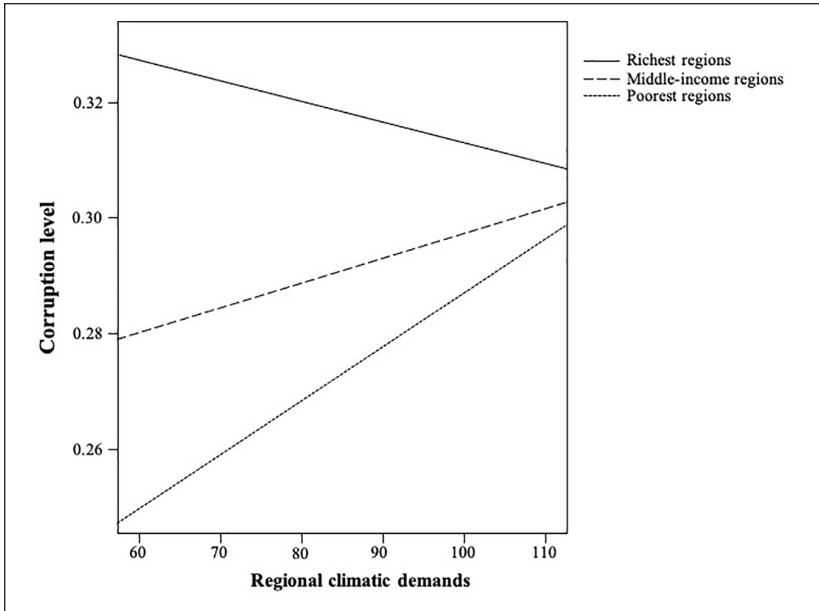
Note. RCD = regional climatic demands; GRP = gross regional product per capita;  $\beta$  = standardized regression coefficient; SE = standard error;  $t$  = statistical hypothesis test; VIF = variance inflation factor;  $R^2$  = coefficient of determination;  $\Delta R^2$  = change in coefficient of determination;  $f^2$  = Cohen's effect size;  $\Delta f^2$  = change in Cohen's effect size.  
\* $p < .05$ . \*\* $p < .01$ .

Therefore, we believe that this main effect deserves attention and further analysis.

If we separately estimate the change in effect size for the climatic demands and GRP interaction ( $R^2 = .05$ ), it is small  $f^2 = 0.003$ . However, given that the moderation effect does reach significance ( $\beta = -.32$ ,  $p < .05$ ), it deserves not to be neglected.

Figure 4 clarifies why there is no main effect of climatic demands on the level of corruption. In middle-income regions, the climate-corruption correlation tends to be zero; in regions with a lower GRP per capita, the climate-corruption relation is positive, whereas in regions with a higher GRP per capita, the climate-corruption relation is negative. This confirms Hypothesis 2.

Interestingly, as for violent crime, where climate conditions become more demanding, the differences between poorer and richer regions become smaller. Table 5 again supplements the pick-a-point approach with the more exact Johnson-Neyman method of effect estimation (Hayes, 2017; Montoya, 2019). This provides the insight, that harsher climates have increasingly significant and strikingly stepwise corruption-reduction effects in increasingly richer regions.



**Figure 4.** A graphical presentation of the finding that regional climatic demands are associated with more corruption in poorer regions but less corruption in richer regions.

## Discussion

In some ways, the main ideas expressed in the climato-economic theory of culture are confirmed for Russia: a harsher climate does contribute to higher violent crime and corruption rates, at least in poorer regions, and increased financial resources reduce the detrimental role that harsh climates play in the development of these socially negative phenomena.

The central tenet of the climato-economic theory of culture is that climatic demands and wealth resources influence each other's impact on human functioning (Van de Vliert, 2009). No support for this tenet can be derived from lower or higher levels of violent crime or corruption in Russian regions, with either more demanding climates or greater wealth resources. In contrast, there is clear support for the climato-economic theory of culture in our core finding, that Russian regions are plagued more by violent crime and corruption, to the extent that the population faces higher climatic demands in conjunction with greater poverty. However, this is only part of the story, because

**Table 5.** The Conditional Effect of Climatic Demands on Corruption at Distinct Values of Gross Regional Product (GRP) per Capita.

GRP per capita (thousands of Rubles)	Effect	SE	t	p Value	95% CI
107.00	0.13	0.13	0.98	.33	[-0.14 0.40]
392.75	0.00	0.12	0.02	.98	[-0.23 0.23]
678.50	-0.13	0.13	-0.99	.33	[-0.38 0.13]
964.25	-0.25	0.16	-1.56	.12	[-0.58 0.07]
1,250.00	-0.38	0.21	-1.82	.07	[-0.80 0.04]
1,535.75	-0.51	0.26	-1.94	.06	[-1.03 0.01]
1,755.04	-0.61	0.30	-1.99	.05	[-1.21 0.00]
1,821.50	-0.64	0.32	-2.01	.05	[-1.27 -0.00]
2,107.25	-0.76	0.37	-2.04	.05	[-1.51 -0.02]
2,393.00	-0.89	0.43	-2.06	.04	[-1.75 -0.03]
2,678.75	-1.02	0.49	-2.08	.04	[-2.00 -0.04]
2,964.50	-1.15	0.55	-2.09	.04	[-2.24 -0.05]
3,250.25	-1.28	0.61	-2.09	.04	[-2.49 -0.06]
3,536.00	-1.40	0.67	-2.10	.04	[-2.74 -0.07]
3,821.75	-1.53	0.73	-2.10	.04	[-2.98 -0.08]

Note. GRP=gross regional product per capita; Effect=conditional effect; SE=standard error; t=statistical hypothesis test; p=statistical significance; CI=confidence interval.

the theory can be broken down into three predictions (see Figure 1): populations residing in more demanding climates face higher levels of violent crime and corruption if they are poor (confirmed); populations residing in more demanding climates face lower levels of violent crime and corruption if they are rich (unconfirmed for violent crime, confirmed for corruption); populations of poorer regions face neither lower nor higher levels of violent crime and corruption if they are located in temperate climates (unconfirmed).

Thus, our hypotheses are partially confirmed, because only three from eight specific predictions (see Figure 1) are confirmed in the Russian within-country context. However, most of the specific predictions (five out of eight) were not confirmed. What could possibly explain these unexpected results?

Though Russian regions differ by their collective income, Russia cannot be generally classified as a rich country. Russia features a high level of income inequality, which is the reason why the living standards of the majority of its residents are not particularly high. Although Russia (1,699,877 US \$million) and Canada (1,736,426 US \$million) have almost the same gross domestic product (The World Bank, 2019), the average yearly salary in Canada (94,500 USD) (Salary Explorer, n.d.) is almost ten times higher than

in Russia (10,200USD; Financial Social Platform “Financial Opportunity,” n.d.). Consequently, and not surprisingly, the combination of high regional climatic demands with relative poverty will generally promote crime in Russia. Irrespective of climate, in richer regions, where there are financial resources, the crime rate is higher than in poorer regions, most likely because competing for these resources gives a better pay off. This would explain why, in relatively rich regions with high climatic demands, the crime rate is high rather than low. Historically, climatically harsh Russian regions in the north were the exile destinations for criminals and other prisoners, and even today, some of these regions still have an unfavorable violent crime situation (Institute of Regional Problems, 2019) compared to the central part of Russia. This deportation policy may have contributed considerably to the fact that, in many of Russia’s northern and Siberian regions, facing significant regional climatic demands, crime levels are higher than in Central Russia.

Income inequality, as such, might also be a determinant of the crime rate in Russia’s regions, given that the level of inequality in Russia is high, when viewed in the global context (US Census Bureau World Population, 2020). There is also significant variation in the level of inequality between the regions of Russia (Fedotov, 2019). One study showed a strong link between crime and the Gini coefficient of income inequality from a cross-regional perspective: the correlation coefficients, after a period of 4 years, averaged .63 (Fedotov, 2019).

In the case of corruption, the Russian rates are historically relatively high (Transparency International, 2020). Although corruption is also a violation of the law, it is viewed as more benign by the population, and is sometimes even seen as simply “greasing the wheels of the economy” (Méon & Sekkat, 2005), where the legislation is ineffective. That the regional correlation between the level of violent crime and the level of corruption in our study is low ( $r = .20$ ), suggests that corruption is not a serious violent crime in the minds of Russians. As we have noted, Russia’s standards of living are modest, while regional climatic demands are usually high. This makes people’s lives more difficult and, consequently, increases their suffering. There is considerable research demonstrating that suffering is related to cheating and law-breaking (McParland & Eccleston, 2013; Poon et al., 2013; Sullivan et al., 2012). In this way, people strive to subconsciously restore justice and compensate for their suffering (Kouchaki & Desai, 2015). Allowing oneself to compensate for difficult climatic conditions by breaking the law may be perceived as a restoration of justice by the poor and the rich alike. However, why is the level of corruption even higher among the rich, residing in more favorable climates?



Cross-cultural research reveals that a Russian perceives “truth” or “justice” on the one hand, and “law” on the other, as two different things rather than equivalents; where laws are perceived as unfair, law-breaking may be thought of as morally justified, if it restores justice (Znakov, 1993). Therefore, a Russian may morally justify corruption as a way to offset imperfections in the rule of law. As a result, the availability of material resources may “fuel” instead of restrict corruption. As a matter of fact, the highest corruption levels are found in regions with relatively favorable climates that allow implementing numerous social relief programs and projects, generously supported by the state’s finances. When local authorities adopt certain budget-funded programs, they keep commercial interests in mind (Institute for Complex Strategic Studies, 2018).

The harsh climate still forces people in Russia to use resources, partly for their intended purposes in life, since they are objectively necessary to overcome the difficulties associated with the demanding climate. In the more temperate regions, the consequences of corruption are not strongly felt, forming a potential pathway to higher corruption. According to our point of view, the cultural phenomena, in particular the values of Russians, may also partly contribute to higher corruption in regions with a favorable climate and more resources.

Corruption is lower in cultures that emphasize values of autonomy and egalitarianism (Schwartz, 2014). Therefore, high national levels of corruption among public officials go hand in hand with the opposite cultural values of embeddedness and hierarchy, which have been shown to dominate the value system of Russians (Lebedeva & Tatarko, 2007). Hence, Russian corruption may partly be triggered by these values, fostered by a high GRP per capita, and more so in regions with lower climatic demands. Alternatively, it may be much more difficult for people in regions with high climatic demands to use material resources for corruption, because coping with difficult climate conditions requires a lot of money, so bribery becomes more easily noticeable.

It is important to emphasize that we are not trying to explain the violent crime and corruption rates by climato-economic predictors only. Apart from the economic situation and the climate, the violent crime rate in a region is, of course, also affected by cultural and historical variables (Barr & Serra, 2010; Davis & Ruhe, 2003; Seleim & Bontis, 2009; Treisman, 2000). We believe that the role of cultural variables may be quite high, as Russia is a multicultural state, with 22 national republics (with their own presidents), and four autonomous national regions. Since crime and corruption are also related to values, and the values of various ethnic groups differ, we can expect an additional effect of sociocultural variables on the antisocial habits of crime and corruption. Nonetheless, the objective of our study was not to consider

all regional specifics to explain the levels of corruption and violent crime. Our more modest objective was to test the climato-economic theory of culture, as it applies to Russia. Therefore, in our study, we limited ourselves to the predictors of climatic demands and wealth resources.

If resources, from a global perspective, can be used to compensate for unfavorable environments, there will be no need to break the law. In Russia, by contrast, resources may be used “to restore justice,” and only in harsh environments, where there are no other options, will people use resources to meet existential needs, as intended, while reducing corruption. Such Russian-internal factors, as fundamentally low levels of social welfare, generally high regional climatic demands across the country, and the suffering resulting from these difficulties, along with the peculiarities of the country’s cultural values, can explain the results that run contrary to the predictions of the climato-economic theory of culture (see Figures 3 and 4).

## Conclusion

At the between-country level, the climato-economic theory of culture has considerable explanatory potential. In this study, we tested the applicability of this framework to explain violent crime and corruption in 85 regions of Russia. Our study showed that the theory can partially explain the negative social phenomena in question, revealing Russian peculiarities. In particular, the following predictions, based on the ideas of the climato-economic theory, were confirmed in the Russian context: populations of regions in more demanding climates face higher levels of violent crime and corruption if these regions are poor; populations of regions in more demanding climates face a lower level of corruption if these regions are rich.

The unconfirmed predictions were as follows: populations of regions in more demanding climates face lower levels of violent crime if these regions are rich; populations of poorer regions face neither lower nor higher levels of violent crime and corruption if these regions are located in temperate climates. We made efforts to explain the unconfirmed predictions by the relatively low level of economic well-being of Russians, socio-historical phenomena, such as high levels of income inequality, the presence of prison facilities in regions with cold climates, and cultural phenomena, such as tolerant attitudes toward corruption. These supplementary explanations emphasize, once again, that we do not consider climate and economy as the only and leading factors that account for interregional differences in crime and corruption. Still, other factors that explain interregional differences include selective migration patterns (Rentfrow et al., 2008), historical determinants of regional psychological differences (Obschonka et al., 2018), and local physical factors such as physical topology (Götz et al., 2020).

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