



Article

Exploring the Predictors of Co-Nationals' Preference over Immigrants in Accessing Jobs—Evidence from World Values Survey

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Abstract: This paper presents the results of an exploration of the most resilient influences determining the attitude regarding prioritizing co-nationals over immigrants for access to employment. The source data were from the World Values Survey. After many selection and testing steps, a set of the seven most significant determinants was produced (a fair-to-good model as prediction accuracy). These seven determinants (a hepta-core model) correspond to some features, beliefs, and attitudes regarding emancipative values, gender discrimination, immigrant policy, trust in people of another nationality, inverse devoutness or making parents proud as a life goal, attitude towards work, the post-materialist index, and job preferences as more inclined towards self rather than community benefits. Additional controls revealed the significant influence of some socio-demographic variables. They correspond to gender, the number of children, the highest education level attained, employment status, income scale positioning, settlement size, and the interview year. All selection and testing steps considered many principles, methods, and techniques (e.g., triangulation via adaptive boosting (in the Rattle library of R), and pairwise correlation-based data mining-PCDM, LASSO, OLS, binary and ordered logistic regressions (LOGIT, OLOGIT), prediction nomograms, together with tools for reporting default and custom model evaluation metrics, such as ESTOUT and MEM in Stata). Cross-validations relied on random subsamples (CVLASSO) and well-established ones (mixed-effects). In addition, overfitting removal (RLASSO), reverse causality, and collinearity checks succeeded under full conditions for replicating the results. The prediction nomogram corresponding to the most resistant predictors identified in this paper is also a powerful tool for identifying risks. Therefore, it can provide strong support for decision makers in matters related to immigration and access to employment. The paper's novelty also results from the many robust supporting techniques that allow randomly, and non-randomly cross-validated and fully reproducible results based on a large amount and variety of source data. The findings also represent a step forward in migration and access-to-job research.

Keywords: immigration; access to employment; regression and classification models; collinearity and reverse causality checks; performance comparisons and reporting; triangulation; cross-validations; full support for replication of results

MSC: 60-02

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1. Introduction

A well-known saying by Andrew Smith states: "People fear what they don't understand and hate what they can't conquer." Migration is a generalized phenomenon as old as humanity [1]. Moreover, it seems to belong to all historical periods and all continents.

Mathematics 2023, 11, 786 2 of 28

Consequently, it became an issue of growing public concern [2]. In today's highly globalized and knowledge-based economies [3], migration is responsible for affecting individuals and societies multi-dimensionally [4]. According to Kanbur and Rapoport (2005) [5], its effects apply to both countries of origin and destination, and some of them relate to brain drain and widening income gaps [6].

In terms of migration motivations, the search for jobs [7,8] is one of them and the basis for the hope of a stable [9], if not better, life [10]. The latter seems natural to human beings [11]. Sensitivity to immigration, a process that affects both the immigrants and the native population [12], depends significantly on the country under consideration [13]. A well-known example of negative public perception is related to the concern that immigrants take the jobs of native-born workers [14–16]. Additionally, this will be translated into negative feelings of native residents towards immigrants and even less supportive attitudes towards pro-immigration policies [17], more as an expression of fear. These labor-market-related concerns [18] considered together with some other economic worries, such as the competition for economic and political power, social status, and the concern for crimes affecting individual security and material welfare form a large category known as realistic threats [19], the latter perhaps is even an expression of hatred.

In the same category of realistic threats (many of macroeconomic nature), we can find another explanation for negative perceptions of immigrants. This explanation seems to be related to the competition for limited resources [20–22] as a primary source of the conflict of interests between groups [23], mainly focused on cost–benefit reasons coupled with some other considerations such as geographical disproportions [24].

Other studies are more focused on socio-demographic and individual features. They show that women and those with higher education and income were more positive toward immigration, whereas older people and people with more seniority at work were considerably more negative [25]. The latter is confirmed in studies focused on comparing young people with adults in such specific terms [26]. Still, recent studies indicate that younger generations may, in fact, harbor more negative attitudes towards immigrants [27]. In addition, people who subscribe to conservative political ideologies are more likely to show negative attitudes toward immigrants [28]. Moreover, some personality traits, such as social domination orientation and right-wing authoritarianism, which reflect attitudes toward social hierarchy, equality, respect for authority, and traditional values, can condition individual perceptions of immigrants as inferior or even a threat [29,30].

Regarding another category of threats, namely the symbolic ones, Mangum and Block (2018) [31] consider that social identity affects public opinion on immigration and immigrants. In these terms, cultural differences coupled with the size of the minority group can act as threats to the values and identity of the majority [32]. Closely related to individual traits, other scholars [33] have shown that more educated people place a much higher value on the cultural diversity of society, believing that immigration generates benefits for society. The latter suggests that education is a transformative force capable of changing individual and collective values, and also encouraging people to be more confident, tolerant, and open [34].

Therefore, in addition to apparent reasons such as fear or hatred, attitudes towards immigrants and their access to jobs depend to a large extent on a whole range of more complex reasons related to individual and group characteristics, including personality traits, age, level of education, values and attitudes transmitted and developed, cultural diversity, and policies related to these phenomena. And this, of course, without claiming that this list is exhaustive.

The article further reviews the literature on the perceptions related to both migration and migrants as potential occupants of jobs. Then, it describes the data and methodology used, before presenting and discussing the main findings in a dedicated section. The latter captures the focus of the current study, namely the discovery of the determinants of the

Mathematics 2023, 11, 786 3 of 28

public perception's preference for citizens over immigrants regarding access to jobs. Additionally, this is achieved by insisting on emphasizing causal relations and eliminating redundancies after performing many robustness checks in advance.

2. Related Work

According to Ambrosini (2013) [35], at a certain point, many local governments developed a policy of excluding immigrants, motivated by reasons of security, the priority of national citizens' access to various social benefits, and the defense of the cultural identity of the territory. Additionally, the opposite could work here, which means that such policies inevitably generate some perceptions [36] and indirectly change the public perception of immigrants. In some cases, they can destabilize the moral panics nurtured by it [37]. However, the relationship between the two exists and was a source of some debates and discussions in the literature [2,38,39]. Ivarsflaten (2005) [40] even compared the impact that some elites exert, which has the potential to impact change in the public perception that diversity poses a threat. This author concluded that the former would undoubtedly be less significant.

Regarding the Big Five personality traits and their potential impact on immigration acceptance, Rueda (2018) [41] stated that altruism is an important omitted variable in many political economy studies, which focuses on self-interest rather than on aversion to inequality. Stafford (2020) [42] examined the relationship between attitudes towards immigration and the Big Five personality traits. She found that personality traits, especially those related to altruism, are not just simple influences but essential determinants of attitudes toward immigrants, even with controls for political predispositions and socio-demographic characteristics.

Kunst et al. (2015) [43] discuss the common identity notion, which seems to be crucial for securing the altruistic efforts of the majority to integrate immigrants and, thus, for achieving functional multiculturalism. Still, some research on multicultural beliefs [44] has shown that multiculturalism can cause negative reactions against immigrants and minority groups. This is because the members of the majority sometimes perceive it as threatening their position and identity [45]. Moreover, other studies [46,47] suggest a strong relation between immigration acceptance and emancipative and democratic values. The latter is not necessarily incompatible with the idea of multiculturalism [48]. On the other hand, the perceived high discrimination and lack of acceptance hinder the positive impact of any integration guidelines [49].

In terms of interpersonal trust, according to Pellegrini et al. (2021) [50], this is a mediator between the experienced social exclusion and anti-immigrant attitudes. The experience of being socially excluded reduces feelings of generalized interpersonal trust that, in turn, promote hostile attitudes towards immigrants. Rustenbach (2010) [51] found this type of trust to be a strong predictor of anti-immigrant attitudes.

According to Ensign and Robinson (2011) [52], conventional thinking suggests that immigrants have no choice but to work as entrepreneurs or be self-employed, which is somehow to the detriment of the idea that entrepreneurial attitudes make them migrate. Moreover, it is worth mentioning that employers assign particular meanings to the migrant identity [53], which allows them to enjoy the benefits of cheap, exploitable, and hard-working employees. In some cases, migrants use this identity to obtain jobs, enduring exploitation, including the peculiar form of working below their skill level. Still, accepting hard work at lower wages [54] is explained by the dreams of future self-employment of the immigrant workers.

Therefore, considering the arguments presented here and in the Introduction section, the main hypotheses of this paper are:

H1. The opinion on immigration policy is closely related to or even a determinant of the level of public acceptance of immigrants as potential job occupants [35,55].

Mathematics 2023, 11, 786 4 of 28

H2. Those who subscribe to altruism [56], including working in the benefit of large communities, emancipative values [57], and against any discrimination no matter the type [58], ideologies including multiculturalism [59], and trust in people no matter their origins, are more inclined to accept immigrants when it comes to access to jobs.

H3. The ones being more attached to their cultural values and traditions [60] as part of their national identity [61–63] are more likely to be against immigrants as potential job occupants.

H4. The attitude towards work and entrepreneurship (as an expression of independence) could be a determinant for this specific type of immigrant acceptance [64–66].

H5. The respondent's socio-demographic features are also significant predictors for this kind of acceptance [67,68].

3. Materials and Methods

This article started from one of the most comprehensive datasets of the World Values Survey (WVS). The latter (version 1.6, WVS_TimeSeries_stata_v1_6.dta) includes 1045 variables and 426,452 observations. Its .csv export followed the simple binary derivation (C002bin) of the original variable to analyze (C002, Jobs scarce: Employers should prioritize nation people than immigrants). Additionally, this was achieved by considering the two extremes of its original three-point scale (Agree, Disagree, Neither—Tables A1 and A2, Appendix A). The option to generate numerical values for labeled variables was enabled when exporting.

The next step was to load this .csv export into the Rattle data mining interface (version 5.4.0) of R, then set C002bin as the target, ignore its source (C002) from the list of inputs and apply the adaptive boosting technique for the decision tree classifiers [69]. This step was performed [70,71] using default settings (Figure 1) to discover the most important related variables. The latter was the 1st data mining and selection round.

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Лах Depth:	6	Min Split:	20	Compl	exity:	0.0100	X Val:	10	•	Continu
earning Rate	0.3	Threads	2	‡ Iteratio	ns	50	Objective	binary:logistic	~	
requency o	f variable	s actuall	y used:							
Y022A	E143	G017	Y022	S016	G015	B DO63_	_B G016			
27	14	13	10	9		8	7 7			
S021	S020	Y020	A124_06	D066_B	S01	O A124_0	D7 A165			
5	4	4	3	3		3	2 2			
C004	C009	C038	G007_36_B	G027A	G06	1 500	03 SOO6			
2	2	2	2	2		2	2 2			
S007	S018	Y011	Y022B	A124_09	A19	1 COO1_0	D1 E226			
2	2	2	2	1		1	1 1			
E247	F118	G015	G059	SurvSlgg	X048IS	0				
1	1	1	1	1		1				

Figure 1. The results of the first selection round using adaptive (Ada) boosting in Rattle.

A consolidation of the set of variables used followed. It involved the ones remaining after the previous step. In some cases, such as with aggregate indexes, it included their sources.

The 2nd selection round stood on a set of filters applied. First, they met a minimum threshold of 0.1 [72] for the absolute values of pairwise correlation coefficients [73] between each recoded variable from the previous step and the one that was to be analyzed. In addition, there was a minimum value of the corresponding significance (min p = 0.001)

Mathematics 2023, 11, 786 5 of 28

and a minimum support afferent to a minimum number of valid observations (at least a third of the total number) for each pair.

A processing/recoding phase followed. It involved all remaining variables (after the 2nd selection phase). Additionally, some socio-demographic ones for control and cross-validations purposes benefited this treatment. It mostly meant removing the missing and DK/NA (do not know/no answer) values [74] and reversing the scales in the case of larger values which do not reflect higher intensities, but vice versa.

Next, the 3rd selection phase occurred using mixed-effects modeling [75–77] in Stata 17 MP (64-bit version). The latter included both fixed-effects (the remaining variables after the 2nd selection phase and recoded at the previous step—top of Table A1, Appendix) and random effects (clusters on gender, age, marital status, number of children, education level, income level, professional situation, region, settlement size, and survey year—bottom of Tables A1 and A2, Appendix A). Only those variables not losing significance no matter the clustering criteria and the mixed-effects regression type (both the melogit for the binary form of the response variable and the meologit for the one having values on a scale) resulted in this selection point.

Next, the 4th selection round took place also in Stata. It consisted of successive invocations (stages) of two powerful commands in the LASSO [78] package (CVLASSO to perform random cross-validations and RLASSO for controlling overfitting) until there was no loss in selections.

At the next step (5th round), reverse causality checks served the selection. The latter meant using pairs of individual models built by taking only each of the remaining influences and the variable to analyze (wished roles) and by reversing their roles (the response becomes an input and vice versa or reversed roles). Only some resulted after using ordered logit regressions. It is about the ones generating more explanatory power [79]/larger R-squared (or pseudo R-squared in the form of McFadden's R-squared as reported by Stata for non-OLS regressions such as logit, ologit, meologit, etc.—explanations by Professor Richard Williams of the University of Notre Dame, https://www3.nd.edu/~rwilliam/stats3/L05.pdf (accessed on 25 January 2023) and more information gain/smaller values for both AIC and BIC [80] for the wished roles vs. the reversed ones. They acted as determinants (predictors).

The 6th selection phase focused on testing the existing collinearity between the remaining influences (those emerging after the 3rd phase) and the selected predictors (those resulting after the 4th). Ordinary least squares (OLS) regressions served, and the computed VIF (variance inflation factor) stood against (Equation (1)) the maximum accepted VIF threshold of the model [81,82]. In addition, the maximum absolute values from the matrices with correlation coefficients (maxAbsVPMCC) [83] corresponding to both influences and predictors were objects of evaluation [72,84].

Model's maximum accepted VIF =
$$1/(1 - \text{model's R-squared})$$
 (1)

Additionally, a prediction nomogram [85] resulted when using the *nomolog* command (after its previous installation using the following command: *net install st0391_1*, replace from (http://www.stata-journal.com/software/sj15-3), and considering the most stalwart remaining predictors).

Finally, each socio-demographic variable previously used for cross-validations served controlling purposes (new models). The latter meant adding them one by one on top of the existing most robust model. They included the most resilient predictors emerging after the previous selection round.

All data processing and tests took place on a Windows Server Datacenter virtual machine (Intel Xeon Gold 6240 CascadeLake CPU and ~32 Gigabytes of memory) in a private cloud. The reporting of the results mainly benefited from the *estout* prerequisite package (*ssc install estout, replace*) with support for both the *eststo* and *esttab* commands [86,87], allowing the direct generation of tables (in the console and as external files, respectively)

Mathematics 2023, 11, 786 6 of 28

with default performance metrics, as well as some additional ones [83] of well-known statistical models.

As the reviewers of this manuscript have suggested (and I thank them very much for this observation), there are significant differences between data mining and statistics. Among others, they concern the approaches and techniques used, the propositions and hypothesis statement (loosely vs. well-defined), and the considered type and volume of data (all available vs. sample; several million to a few billion data points vs. hundreds to thousands). In addition, there are also consistent differences between exploratory approaches and those specific to empirical science. This paper benefits from the advantages of all these categories. The letter is coupled with those emerging when comparing the results obtained this way with the ones from the existing scientific theory.

4. Results

After performing the first selection step using adaptive boosting (in the Rattle library —https://rattle.togaware.com of R, accessed on 22 October 2022), a set of 38 variables resulted (Figure 1).

As seen in Figure 1, one way to look at the importance of the resulting variables is by considering their corresponding frequencies of use in the tree construction.

The next concern before going to the second selection step, dedicated to filters on absolute values of pairwise correlation coefficients, was to find and keep (consolidation) only the sources of the following variables:

- (a) Y011 as DEFIANCE—Welzel defiance sub-index with three components (AUTHOR-ITY or inverse respect for it, NATIONALISM or inverse national pride, and DEVOUT or Inverse Devoutness) derived from E018 (Future changes: Greater respect for the authority), G006 (How proud of nationality), and D054 (One of the main goals in life has been to make my parents proud);
- Y020 (b) RESEMAVAL—Welzel emancipative index values (https://www.worldvaluessurvey.org/WVSContents.jsp?CMSID=welzelidx&CMSID=welzelidx, accessed on 22 October 2022) with four classes of components dedicated to AUTONOMY (A029 as Important child qualities: independence, A034 as Important child qualities: imagination, and A042 as Important child qualities: obedience), EQUALITY (C001_01 as Jobs scarce: Men should have more right to a job than women, D059 as Men make better political leaders than women do, and D060 as University is more important for a boy than for a girl), CHOICE (F118 as Justifiable: Homosexuality, F120 as Justifiable: Abortion, and F121 as Justifiable: Divorce), and VOICE (E001 as Aims of the country: first choice, E002 as Aims of the country: second choice, E003 as Aims of respondent: first choice, and E004 as Aims of respondent: second choice);
- (c) Y022 as EQUALITY—Welzel equality sub-index as C001, D059, and D060;
- (d) SurvSAgg that served to build the cultural map (https://www.worldvaluessurvey.org/WVSContents.jsp?CMSID=tradrat&CMSID=tradrat, accessed on 22 October 2022) starting from a set of source variables:
 - A008 (Feeling of happiness).
 - A165 (Can most people be trusted?).
 - E018 (Future changes such as greater respect for authority).
 - E025 (Political action such as signing a petition).
 - F063 (How important is God in your life?).
 - F118 (Is homosexuality justifiable?).
 - F120 (Is abortion justifiable?).
 - G006 (How proud of nationality?).
 - Y002 (Post-materialist index 4-item).
 - Y003 (Autonomy index).

Mathematics 2023, 11, 786 7 of 28

After this consolidation point, 51 unique variables resulted: A008 (subSection 4.d above), A029, A034, and A042 (subSection 4.b above), A124_06 (Neighbors: Immigrants/foreign workers), A124_07 (Neighbors: People who have AIDS), A124_09 (Neighbors: Homosexuals), A165 (subSection 4.d above), A191 (It is important to this person living in secure surroundings), C001 01 (subSection 4.b above), C004 (Jobs scarce: older people should be forced to retire) C009 (First choice, if looking for a job), C038 (People who don't work turn lazy), D054 (subSection 4.a above), D059, and D060 (subSection 4.b above), D063 B (Job best way for women to be independent), D066 B (Problem if women have more income than husband), E001, E002, E003, and E004 (subSection 4.b above), E018 (subSections a and above), E025 (subSection 4.d above), E143 (Immigrant policy), E226 (Democracy: People choose their leaders in free elections), E247 (Priority: Global poverty versus National problems), F063, F118, and F120 (subSection 4.d above), F121 (subSection 4.b above), G006 (subSection 4.d above), G007_36_B (Trust: People of another nationality), G015 and G015B (citizenship), G016 (Language at home), G017 (birth country), G027A (Respondent immigrant), G059 (Effects of immigrants on the development of own country), G061 (Measures taken by the government when people from other countries are coming here to work), S003 (ISO 3166-1 numeric country code), S006 (Original respondent number), S007 (Unified respondent number), S010 (Total length of interview), S016 (Language in which interview was conducted), S018 (weight), S020 (Year of survey), S021 (Country-wave-study-set-year), X048ISO (Counties and Country Macroregions ISO 3166-2), Y002, and Y003 (subSection 4.d above).

After performing the second phase meant for filters starting from pairwise correlation coefficients as absolute values (> = 0.1), together with their significance (p < 0.001) and support (at least a third of the data or N > 142,150), 19 variables resulted as indicated in Table 1. The same results were more easily achieved using the PCDM command (Stata script at https://tinyurl.com/25pd6mx6, accessed on 30 January 2023) in Stata [73] and three parameters (minacc (0.1) minn (142,150) maxp (0.001)) corresponding to those three filters above.

Table 1. Tabular view of the results of the second selection round based on magnitude of correlation coefficients, support, and significance.

Outcome(y)	Input(x)	Correl.Coef.(CC)	Abs.Val.CC(ACC)	No.Obs.(Nobs)	Signif.(p)
C002bin	A124_06	0.107909689	0.107909689	319909	0
C002bin	A124_07	0.142095439	0.142095439	317298	0
C002bin	A124_09	0.149715072	0.149715072	311613	0
C002bin	A165	0.100856547	0.100856547	318679	0
C002bin	C001_01	-0.127478411	0.127478411	327400	0
C002bin	C009	-0.134529402	0.134529402	154481	0
C002bin	C038	-0.160784424	0.160784424	150894	0
C002bin	D054	-0.138970602	0.138970602	297639	0
C002bin	D059	-0.207249289	0.207249289	292549	0
C002bin	D060	-0.136010212	0.136010212	298000	0
C002bin	E025	0.142892051	0.142892051	298829	0
C002bin	E143	0.162277299	0.162277299	162113	0
C002bin	F063	0.138614001	0.138614001	314495	0
C002bin	F118	-0.215562546	0.215562546	298557	0
C002bin	F120	-0.158791514	0.158791514	309204	0
C002bin	F121	-0.132066862	0.132066862	316046	0
C002bin	G007_36_B	0.15077934	0.15077934	181140	0
C002bin	Y002	-0.133265316	0.133265316	316151	0
C002bin	Y003	-0.104665323	0.104665323	326701	0

Mathematics 2023, 11, 786 8 of 28

The next concern before going to the third selection step (dedicated to cross-validations on specified criteria) was to recode ("nt" call sign meaning null treatment) the remaining variables (all 19 in Table 1). In addition to these, the ones to be used as clustering criteria in cross-validations or for further controls were recorded as well. The main concern here was to remove missing and DK/NA answers and adapt the scales to the original meaning of the source questions (Listing A1 and Tables A1 and A2, Appendix A).

The results after the third selection phase relied on mixed-effects modeling. They consisted of discovering and emphasizing the resisting influences (ten from 19, Table A3) no matter the chosen clustering criteria from the set of socio-demographic variables (bottom of Listing A1, lines 49–70, Appendix A section), including the year of the survey (S020, which did not require processing). Just ten influences from the previous list of 19 proved to be robust in this third selection round (Table A3), namely: A124_06nt, C001_01nt, C009nt, C038nt, D054nt, D059nt, E143nt, F118nt, G007_36_Bnt, and Y002nt. The remaining eight influences failed at least in one scenario (A124_07nt-models 6, 9, 11–22; A124_09nt-models 6, 7, 10, 11, and 22; A165nt-model 11; D060nt-models 2–11, 21, and 22; E025nt-models 1–8, 10–19, 21, and 22; F063nt-models 9, and 20; F120nt-models 9, 20, and 22; F121nt-models 9, 11, 20, and 22; Y003nt-models 1–11, 12–15, and 17–22).

The fourth selection round (Stata script at https://tinyurl.com/4x3ez5y9, accessed on 30 January 2023) used CVLASSO and RLASSO and the remaining ten variables. It encountered no loss in selection.

The fifth selection round dedicated itself to reversing causality checks. In addition, it removed one influence from the remaining ten (ordered logit—Table A4) when focusing on the predictors/determinants (the sense of the influences was counted). It gave up A124_06Cnt (Neighbors: Immigrants/foreign workers).

The sixth selection round, responsible for discovering evidence of collinearity (OLS max.Comput.VIF overpassing OLS max.Accept.VIF), further eliminated two variables (D059nt and F118nt—Table A5). Consequently, four matrices with correlation coefficients (only for the predictors in Models 1 and 2, 5 and 6, 9 and 10, and 15—Figure 2) additionally resulted. D054nt was temporarily removed (Models 9 and 10) because of being collinear with F118nt. The latter brought a higher accuracy and an R-squared value (Model 7 vs. Model 8 in Table A5). However, later, after removing F118nt (collinear with C001_01nt, Models 11 and 12), D054nt was added back (Logit Model 15 had the highest accuracy—AUCROC = 0.7852) and generated no collinearity (Table A5—Model 16).

When cross-validating again (second stage: Stata script at https://tinyurl.com/mwb6nher, accessed on 30 January 2023) starting from these seven remaining determinants and the same clustering criteria for cross-validations (including counties and country macroregions—X048WVSnt), no loss in selection occurred.

In terms of support (Stata script at https://tinyurl.com/f868yab4, accessed on 30 January 2023), more than 45,000 observations corresponding to a single wave served in most cases. Additionally, this is because all seven predictors and the response variable were considered simultaneously only in Wave 5 (2005–2009).

A prediction nomogram (Figure 3, nomolog command in Stata) starting from binary logistic regressions (Table A5—Model 15) served visual interpretations for all seven remaining determinants. This model, which has seven predictors, generated an R^2 of 0.1799 and a fair-to-good accuracy (AUCROC of 0.7852). The maximum theoretical probability for the most advantageous combination of variable values (Figure 3) is more than 0.99. The latter corresponds to a total score of 39.55 (second X-axis—bottom of Figure 3) as the top-down sum of 3.5, 6.75, 7.6, 4.6, 4.4, 2.7, and 10, values determined relatively easily after drawing perpendiculars to the first X-axis (Score). For other combinations of values (e.g., right edge of Figure 3), these seven predictors were identified as the most important ones; lower total scores emerged (e.g., 21.95). They indicated less critical cases and a lower corresponding probability (e.g., >0.8) of prioritizing the nation's people to the detriment of immigrants regarding access to jobs. This nomogram also suggests the magnitude of the marginal effects (visually as segments corresponding to the unit difference

Mathematics 2023, 11, 786 9 of 28

on any scale—Figure 3 and Model 1, Table A7, Appendix A) for those seven robust determinants. In addition, it serves to understand the cumulated effect size by considering the amplitude of any scale visible in this representation.

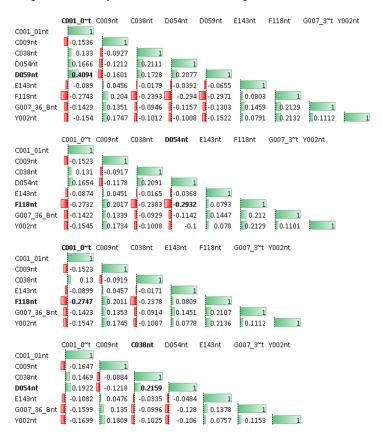


Figure 2. Assessing collinearity using consecutive matrices with correlation coefficients only for predictors (Stata script at https://tinyurl.com/ueefxfmd, accessed on 30 January 2023).

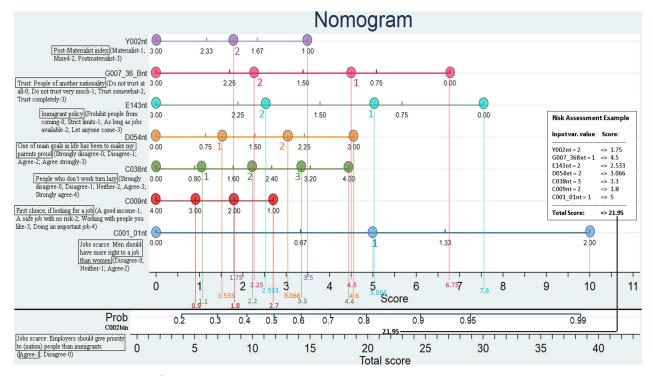


Figure 3. Risk prediction nomogram corresponding to the most resilient predictors (generated using the *nomolog* command in Stata).

Mathematics 2023, 11, 786 10 of 28

Further controls (Table A6, Appendix A) are based on all seven most resilient predictors (Figure 3) and each of those eleven socio-demographic variables already used in cross-validations. All confirmed the robustness of the already identified hepta-core base model (Figure 3 and Models 1 and 13, Table A6, Appendix A), but only seven of them (Models 2, 6–9, 11, 12, 14, 18–21, 23, and 24, Table A6, Appendix A) proved to be significant. The best models here are those additionally emphasizing the role of the settlement size (X049nt, Model 11, based on a logit regression, and Model 23, based on an ologit one, Table A6, Appendix A). They have the highest McFadden's pseudo R-squared (0.1937 for logit and 0.1108 for ologit), AUC-ROC (0.7946), and the lowest AIC (29162.5254 and 58024.8556) and BIC (29238.7119 and 58110.7761) if compared to the base ones (containing only those seven predictors—Models 1 and 13, Table A6, Appendix A).

Moreover, only for these seven additional confirmed influences were the corresponding models also reported using coefficients computed as average marginal effects (Table A7, Appendix A) and containing direct references to the hypothesis codes. The performance metrics (e.g., pseudo R-squared, AUC-ROC, AIC, and BIC) are the same as in the case of Models 1, 2, 6–9, 11, and 12, Table A6, Appendix A). The interpretation of the coefficients in Table A7 (Appendix A, immediately above the errors reported between round parentheses) follows a simple rule. Each such value indicates the effect of an increase (for positive coefficients)/decrease (for negative ones) by one unit in the value of the corresponding variable (for a given model) on the target variable. This effect translates into the probability of finding it acceptable for employers to prioritize their employees over immigrants increasing by the same value (as the one of the coefficient) but in percentage points.

5. Discussion

The most important of these seven predictors is magnitude (the descending order of scale amplitudes as a visual representation can be found in Figure 3), which corresponds to the attitude towards gender inequality in terms of jobs. It indicates that people agreeing that men should have more rights to a job than women. It is a fact that they are also more likely to accept the idea that employers should prioritize co-nationals than immigrants in case of job scarcity (positive influence or the maximum value of 2 on the right—Figure 3). The latter means that the attitude to the first type of inequality regarding access to jobs (the gender-related one) is the best predictor of the one towards the second type (the immigration-related one). This finding is in line with the already documented relations between gender and migration when it comes to various kinds of discrimination, as mentioned in the scientific literature [88–90].

The second most important determinant when considering the same magnitude criterion seems to correspond to the permissiveness level of the immigration policy. As expected, the latter shows that the ones manifesting a lower level of this type of permissiveness are also more likely (negative influence or the minimum value of 0 on the right—Figure 3) to accept the idea of prioritizing citizens over immigrants in the event of job shortages (validation of H1). Although this finding seems almost obvious, the relationship between migration policy and job discrimination is a complex and well-studied one [91–93].

The third most potent predictor found (Figure 3 and Model 15 in Table A5) is related to the level of trust in people of another nationality. It means that the people with a lower level for this type of trust are also more likely (negative influence or the minimum value of 0 on the right—Figure 3) to accept that employers should prioritize citizens over immigrants in case of lack of jobs. The latter is in line with the findings of other scholars [94–96] and contributes to the validation of H2.

The fourth mightiest determinant corresponds to extrinsic motivations (one of the principal life goals of the respondents is to make their parents proud, also known as devoutness and partially related with traditions due to the interpretation of familism as one of their foundations [97]). That has a positive influence on the response variable. Its maximum value of 3 on the right is observable in Figure 3. It means that people more motivated this way (or devoted to parents in these terms) are also more likely to prioritize their

Mathematics 2023, 11, 786 11 of 28

co-nationals in case of job shortages. This finding also stands when considering the existing scientific literature [98,99]. Additionally, it applies if starting from the connection of both items with the notion of power distance. More specifically, the question specifying whether agreeing with making one's own parents proud is assumed to extend to the family. Moreover, it captures the obedience and hierarchy in the family concepts. The one as to whether nationals are privileged over immigrants when jobs are scarce is directly related to the definition of power distance. The particular way the devoutness works contributes to validating H3.

The next most important predictor (fifth) relates to the acceptance level regarding the idea that people who do not work turn lazy (also with a positive influence—the maximum value of 4 on the right, as seen in Figure 3). The latter shows that people more inclined to accept this attitude towards work are also more protective of the nation's people's access to jobs. This finding complements other findings in the scientific literature, revealing the limitations of migrant working identity [53,100].

The sixth most potent determinant concerns the post-materialist index (the version with four items), which has a negative influence (the minimum of 1 on the right—Figure 3). The latter refers to people with a lower appetite for postmaterialist values or less need for independence and fulfillment of personal objectives in life [101]. They are also more likely to prioritize their co-nationals at the expense of immigrants as access to employment. This finding is in line with the ones of [102], through the concept of subjective well-being associated with endorsement of democracy, greater emphasis on postmaterialist values, and less intolerance (more tolerance) of immigrants and members of different racial and ethnic groups.

The specific way these two predictors function means a complete validation of H4.

The last most important predictor in terms of magnitude corresponds to the variable measuring the preference regarding a job with benefits for the community rather than individual ones (negative influence—the minimum value of 1 on the right—Figure 3). It indicates that people are less likely to prefer community-oriented jobs; on the contrary, they are more oriented towards individual benefits when it comes to a job or are simply more selfish [103]. They are more inclined to protect the nation's people in case of job shortages. The latter contributes to the full validation of H2.

Next, all seven resilient predictors previously found (Figure 3) stood as a strong base for further controls (Table A6, Appendix A). Those used all socio-demographic criteria involved in cross-validations. Only seven of those criteria indicated significance.

First, the gender influence (Models 2 and 14, Table A6, Appendix A) indicates that female respondents are more protective of citizens than immigrants regarding access to jobs. It means that women are more likely to consider it more justifiable for employers to prioritize the people of their nation than men. The latter is in line with some findings in the literature [104,105] and contradicts others [106].

An additional socio-demographic variable was found significant (income scale, Models 9 and 21, Table A6, Appendix A). By its sign (negative), the latter indicates that those who earn more are less inclined to consider it justifiable for employers to prioritize nationals than immigrants. This idea stands in the light of the findings of Chandler and Tsai (2001) [107], Tucci (2005) [108], Tavakoli and Chatterjee (2021) [109], and Ruhs (2018) [110]. For the last author, this is especially true for high-skilled migrants. The same applies to those with a higher education level (Models 7 and 19, Table A6, Appendix A). Additionally, this is also in line with the findings of Tavakoli and Chatterjee (2021) [109]. They concluded that an additional level of education on the earnings of an individual and his family income will bring better financial welfare and security. In turn, the latter will reduce the perception of the economic threat of immigrants. The same is true for those with an employment status more near a full-time job (Models 8 and 20, Table A6, Appendix A) and the opposite (positive coefficient sign) for the ones having more children (Models 6 and 18, Table A6, Appendix A). These last two findings are consistent with those on the income dependence of the response variable. The latter state that people in higher-income

Mathematics 2023, 11, 786 12 of 28

groups are more tolerant towards immigrants [111], more positive in their attitudes to them [112], and show significantly lower levels of welfare chauvinism [113].

Another significant control variable corresponds to the settlement size (Models 11 and 23, Table A6, Appendix A). The latter contributes to the best models (largest McFadden pseudo R-squared, AUC-ROC, and lowest AIC and BIC) with eight predictors (heptacore plus each additional control), as already emphasized at the end of the Results section above. Due to its sign (negative), it shows that people from larger communities (bigger cities) are also less inclined to consider it acceptable for employers to prioritize nationals to the detriment of immigrants. In the case of Europe, this finding stands, and such respondents are more likely to have more tolerant attitudes towards immigrants [111]. Similarly, with direct reference to the case of Canada, other scholars [114] highlighted a particularity of large urban areas when compared with the small ones, namely, the existence of immigrant service providers and language-training venues. By contrast, in Russia, for example, people living in the countryside are the least xenophobic, while the population of big cities is the most xenophobic [115]. All these mean the partial validation of H5, when considering that some socio-demographic variables were not found to be significant (e.g., age, marital status).

Due to its positive coefficient sign, the last significant control variable (the survey year, Models 12 and 24, Table A6, Appendix A) indicates a relevant finding. Despite the undeniable globalization and the rise of multiculturalism, over time, people have increasingly come to believe that it is more acceptable for employers to prioritize citizens over immigrants. The latter contradicts studies focused on general attitudes towards immigration [116] or integration of immigrants [117] based on considering specific regions and expanding for a shorter time.

As expected, due to its nature (nominal numerical codes originally unrelated to a specific intensity scale), the variable corresponding to the counties and country macroregions (X048WVS—in the given form) in which the interview took place did not prove to be statistically significant as a control variable. Still, it has proven to be extremely important [118,119] for cross-validations. The same argument (numerical codes originally unrelated to an intensity scale but useful for cross-validation) applies to the values of the variable corresponding to the country code (S003-ISO 3166-1 numeric country code). Still, the latter was identified in the first selection round (adaptive boosting—right side of Figure 1). Therefore, differences among countries are expected beyond these seven common predictors, referred to as a hepta-core model. However, the specific features of countries and particular regions (e.g., a dummy variable referring to whether a country is excommunist or not [120], some country-dependent measures of economic activity such as GDP or the ratio between stock market capitalization and GDP defined in The World Bank Data Catalog or even the Worldwide Governance Indicators defined by Kaufmann et al. in 2010 [121] and used in many other studies, including recent ones [122,123]) will be the object of future research on the same topic but with more focus on certain local peculiarities.

6. Conclusions

An accurate model with seven strong influences emerged in this paper. These act more as determinants because of passing reverse causality checks. They indicate a specific type of world values survey respondents. It is about the ones less likely to consider it acceptable for employers to prioritize their people over immigrants. These are as follows: those who believe in emancipative values, namely, the ones of gender equality for jobs, those choosing a profession more relevant for the community than for themselves, those disagreeing that people who do not work will turn lazy, the ones with higher values if inverse devoutness (less inclined to make their own parents proud), the ones agreeing with a less prohibitive immigrant policy, those who trust more in people of another nationality, and the ones with a profile corresponding to a higher value for the post-materialist index. In addition, some controls generally emphasized the positive roles of three socio-demographic variables. There are the female gender, the number of children, and

Mathematics 2023, 11, 786 13 of 28

the survey year. It is also worth mentioning the negative ones, which are education level, employment status in terms of involvement in a full-time job, income scale, and settlement size (the most important control variable in terms of performance added to the basic hepta-core model), when considering whether it is justifiable for employers to prioritize the people of their nation rather than immigrants. By allowing visual interpretations corresponding to the seven most resilient determinants, the prediction nomogram presented in this paper serves both as a powerful probability identification instrument and as a decision support tool that serves management systems under conditions of uncertainty and risk. All conclusions related to the identified determinants stand on models with fair-to-good classification accuracy. They resulted after performing many selection rounds and robustness checks.

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Institutional Review Board Statement: The data used in this study belongs to the World Values Survey, which conducted surveys following the Declaration of Helsinki.

Informed Consent Statement: The World Values Survey obtained informed consent from all subjects involved in the study.

Data Availability Statement: The dataset used in this study belongs to the World Values Survey is the .dta file inside the "WVS TimeSeries 1981 2020 Stata v1 6.zip" archive (https://www.worldvaluessurvey.org/WVSDocumentationWVL.jsp, accessed on 22 October 2022, the "Data and Documentation" menu, the "Data Download" option, the "Timeseries (1981–2022)" entry).

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Appendix A

Listing A1. Recoding the remaining variables using a Stata script with numbered lines—numbers displayed separately, as when opened with the Stata editor (Stata script at: https://tinyurl.com/5n6bdfss, accessed on 30 January 2023).

- 1. use "F:\WVS_TimeSeries_stata_v1_6.dta" //19x: A124_06 A124_07 A124_09 A165 C001_01 C009 C038 D054 D059 D060 E025 E143 F063 F118 F120 F121 G007_36_B Y002 Y003
- 2. generate C002nt=.
- 3. replace C002nt=2 if C002==1
- 4. replace C002nt=0 if C002==2
- 5. replace C002nt=1 if C002==3 // or Jobs scarce: Employers should give priority to (nation) people than immigrants
- 6. gen C002bin=.
- 7. replace C002bin=1 if C002==1
- 8. replace C002bin=0 if C002==2 // or Jobs scarce: Employers should give priority to (nation) people than immigrants
- gen A124_06nt =.
- 10. replace A124_06nt=A124_06 if A124_06!=. & A124_06>=0 //or Neighbors: Immigrants/foreign workers
- 11. gen A124_07nt =.
- 12. replace A124_07nt=A124_07 if A124_07!=. & A124_07>=0 //or Neighbors: People who have AIDS

Mathematics 2023, 11, 786 14 of 28

- 13. gen A124_09nt =.
- 14. replace A124_09nt=A124_09 if A124_09!=. & A124_09>=0 //or Neighbors: Homosexuals
- 15. generate A165nt=.
- 16. replace A165nt=2-A165 if A165!=. & A165>0 //or Most people can be trusted
- 17. generate C001_01nt=.
- 18. replace C001_01nt=2 if C001_01==1
- 19. replace C001_01nt=0 if C001_01==2
- 20. replace C001_01nt=1 if C001_01==3 //or Jobs scarce: Men should have more right to a job than women (source for Y022A=WOMJOB- Welzel equality-1: Gender equality: job)
- 21. generate C009nt=.
- 22. replace C009nt=C009 if C009!=. & C009>0 //or First choice, if looking for a job:1.good income,2.safe job,3.wrk &people u like,4.Do an import.job,5.Do someth.for community
- 23. generate C038nt = .
- 24. replace C038nt=5-C038 if C038!=. & C038>0 //or People who don't work turn lazy
- 25. generate D054nt = ...
- 26. replace D054nt=4-D054 if D054!=. & D054>0 //or One of main goals in life has been to make my parents proud (source for Y011C=DEVOUT- Welzel defiance-3: Inverse devoutness)
- 27. generate D059nt=.
- 28. replace D059nt=4-D059 if D059!=. & D059>0 //or Men make better political leaders than women do (source for Y022B=WOMPOL- Welzel equality-2: Gender equality: politics)
- 29. generate D060nt=.
- 30. replace D060nt=4-D060 if D060!=. & D060>0 //or University is more important for a boy than for a girl (source for Y022C=WOMEDU- Welzel equality-3: Gender equality: education)
- 31. generate E025nt=.
- 32. replace E025nt=3-E025 if E025!=. & E025>0 //or Political action: Signing a petition
- 33. generate E143nt = ...
- 34. replace E143nt=4-E143 if E143!=. & E143>0 //or Immigrant policy: 1 Let anyone come . 4 Prohibit people from coming
- 35. generate F063nt=.
- 36. replace F063nt=F063 if F063!=. & F063>0 //or How important is God in your life
- 37. generate F118nt=.
- 38. replace F118nt=F118 if F118!=. & F118>0 //or Justifiable: Homosexuality
- 39. generate F120nt=.
- 40. replace F120nt=F120 if F120!=. & F120>0 //or Justifiable: Abortion
- 41. generate F121nt=.
- 42. replace F121nt=F121 if F121!=. & F121>0 //or Justifiable: Divorce
- 43. generate G007_36_Bnt=.
- 44. replace G007_36_Bnt=4-G007_36_B if G007_36_B!=. & G007_36_B>0 //Trust: People of another nationality (B)
- 45. generate Y002nt=.
- 46. replace Y002nt=Y002 if Y002!=. & Y002>0 //or Post-Materialist index 4-item: 1 Materialist, 2 Mixed, 3 Postmaterialist
- 47. generate Y003nt=.
- 48. replace Y003nt=2+Y003 if Y003!=. & Y003>-5 //or Autonomy Index: -2 Obedience/Religious Faith .. 2 Determination, perseverance/Independence
- 49. *FOR BUILDING CLUSTERS WHEN PERFORMING CROSS-VALIDATIONS:
- 50. generate X001nt = .
- 51. replace X001nt=X001 if X001!=. & X001>0 //Gender

Mathematics 2023, 11, 786 15 of 28

- 52. generate X003nt = .
- 53. replace X003nt=X003 if X003!=. & X003>0 //Age
- 54. generate X007nt = .
- 55. replace X007nt=8-X007 if X007!=. & X007>0 //Marital status
- 56. generate X007bin=.
- 57. replace X007bin=1 if X007==1 | X007==2
- 58. replace X007bin=0 if X007!=. & X007>2 //Marital status as with someone or not
- 59. generate X011nt=.
- 60. replace X011nt=X011 if X011!=. & X011>=0 //How many children do you have
- 61. generate X025nt=.
- 62. replace X025nt=X025 if X025!=. & X025>0 //Highest educational level attained
- 63. generate X028nt=.
- 64. replace X028nt=8-X028 if X028!=. & X028>0 & X028<9 //Employment status
- 65. generate X047nt=.
- 66. replace X047nt=X047 if X047!=. & X047>0 //Scale of incomes
- 67. generate X048WVSnt=.
- 68. replace X048WVSnt=X048WVS if X048WVS!=. & X048WVS>0 //Regions
- 69. generate X049nt=.
- 70. replace X049nt=X049 if X049!=. & X049>0 //Settlement size

Table A1. The most relevant items of this study.

Variable	Short Description	Coding Details
C002		<0 for Do not know/No Answer/Not applicable/Not Asked/Missing
	(nation) people than immigrants (original format)	(DK/NA/M); 1-Agree; 2-Disagree; 3-Neither
C002nt	The same as above but with a reversed scale and	Null (.)-DK/NA/M; 2-Agree; 1-Neither; 0-Disagree
	with null and DK/NA/M treatment	
C002bin	The same as above in its binary form and with null	Null (.)-DK/NA/M or Neither; 1-Agree; 0-Disagree
	and DK/NA/M treatment	ivali (.)-Dis/iv/ij/vi of iveluler, 1-1/gree, 0-Disagree
A124_06	Neighbors: Immigrants/foreign workers (original	<0 for DK/NA/M; 1-Mentioned; 0-Not mentioned
	format)	o for Digitality, I Methorea, o that methorea
A124_06nt	The same as above with null and DK/NA/M	Null (.)-DK/NA/M; 1-Mentioned; 0-Not mentioned
	treatment	Titul (i) Biginiqui, i nontrolled, o i tot mentioned
A124_07	Neighbors: People who have AIDS (original format)	<0 for DK/NA/M; 1-Mentioned; 0-Not mentioned
A124_07nt	The same as above with null and DK/NA/M	Null (.)-DK/NA/M; 1-Mentioned; 0-Not mentioned
	treatment	
A124_09	Neighbors: Homosexuals (original format)	<0 for DK/NA/M; 1-Mentioned; 0-Not mentioned
A124_09nt	The same as above with null and DK/NA/M treatment	Null (.)-DK/NA/M; 1-Mentioned; 0-Not mentioned
		<0 for DK/NA/M; 1-You can trust most people; 2-Need to be very
A165	Most people can be trusted (original format)	careful
A 1 (F)	The same as above but with a reversed scale and	Null (.)-DK/NA/M; 1-You can trust most people; 0-Need to be very
A165nt	with null and DK/NA/M treatment	careful
C001 01	Jobs scarce: Men should have more rights to a job	co for DV/NIA/M. 1 A reserve 2 Discourse 2 Nighthorn
C001_01	than women (original format)	<0 for DK/NA/M; 1-Agree; 2-Disagree; 3-Neither
C001_01nt	The same as above but with a reversed scale and	Null (.)-DK/NA/M; 2-Agree; 1-Neither; 0-Disagree
C001_0111t	with null and DK/NA/M treatment	Null (.)-DK/NA/Ni, 2-Agree, 1-Neither, 0-Disagree
	The first choice, if looking for a job (original	<0 for DK/NA/M; 1-A good income; 2-A safe job with no risk; 3-
C009	format)	Working with people you like; 4-Doing important work; 5-Do
	ionnat)	something for the community
C009nt	The same as above with null and DK/NA/M	Null (.)-DK/NA/M; 1-A good income 5-Do something for the
	treatment	community
C038	People who do not work turn lazy (original format)	<0 for DK/NA/M; 1-Strongly agree; 2- Agree; 3-Neither agree nor
	1 copie who do not work turn lazy (original format)	disagree; 4-Disagree; 5-Strongly disagree

Mathematics 2023, 11, 786 16 of 28

C038nt	The same as above but with a reversed scale and with null and DK/NA/M treatment	Null (.)-DK/NA/M; 0-Strongly disagree 4-Strongly agree
D054	One of my main goals in life has been to make my parents proud (original format)	<0 for DK/NA/M; 1-Strongly agree; 2- Agree; 3-Disagree; 4- Strongly disagree
D054nt	The same as above but with a reversed scale and with null and DK/NA/M treatment	Null (.)-DK/NA/M; 0-Strongly disagree 3-Strongly agree
D059	Men make better political leaders than women do (original format)	<0 for DK/NA/M; 1-Strongly agree; 2- Agree; 3-Disagree; 4- Strongly disagree
D059nt	The same as above but with a reversed scale and with null and DK/NA/M treatment	Null (.)-DK/NA/M; 0-Strongly disagree 3-Strongly agree
D060	University is more important for a boy than for a girl (original format)	<0 for DK/NA/M; 1-Strongly agree; 2- Agree; 3-Disagree; 4- Strongly disagree
D060nt	The same as above but with a reversed scale and with null and DK/NA/M treatment	Null (.)-DK/NA/M; 0-Strongly disagree 3-Strongly agree
E025	Political action: Signing a petition (original format)	<0 for DK/NA/M; 1-Have done; 2- Might do; 3-Would never do
E025nt	The same as above but with a reversed scale and with null and DK/NA/M treatment	Null (.)-DK/NA/M; 0-Would never do; 1- Might do; 2-Have done
E143	Immigrant policy (original format)	<0 for DK/NA/M; 1-Let anyone come; 2- As long as jobs available; 3-Strict limits; 4-Prohibit people from coming
E143nt	The same as above but with a reversed scale and with null and DK/NA/M treatment	Null (.)-DK/NA/M; 0-Prohibit people from coming 3-Let anyone come
F063	How important is God in your life (original format)	<0 for DK/NA/M; 1-Not at all important 10-Very important
F063nt	The same as above with null and DK/NA/M treatment	Null (.)-DK/NA/M; 1-Not at all important 10-Very important
F118	Justifiable: Homosexuality (original format)	<0 for DK/NA/M; 1-Never justifiable 10-Always justifiable
F118nt	The same as above with null and DK/NA/M treatment	Null (.)-DK/NA/M; 1-Never justifiable 10-Always justifiable
F120	Justifiable: Abortion (original format)	<0 for DK/NA/M; 1-Never justifiable 10-Always justifiable
F120nt	The same as above with null and DK/NA/M treatment	Null (.)-DK/NA/M; 1-Never justifiable 10-Always justifiable
F121	Justifiable: Divorce (original format)	<0 for DK/NA/M; 1-Never justifiable 10-Always justifiable
F121nt	The same as above with null and DK/NA/M treatment	Null (.)-DK/NA/M; 1-Never justifiable 10-Always justifiable
G007_36_B	Trust: People of another nationality (original format)	<0 for DK/NA/M; 1-Trust completely; 2- Trust somewhat; 3-Not very much; 4-Not at all
G007_36_Bn t	The same as above but with a reversed scale and with null and DK/NA/M treatment	Null (.)-DK/NA/M; 0-Not at all 3-Trust completely
Y002	Post-Materialist index 4-item (original format)	<0 for DK/NA/M; 1-Materialist; 2- Mixed; 3-Postmaterialist
Y002nt	The same as above with null and DK/NA/M treatment	Null (.)-DK/NA/M; 1-Materialist; 2- Mixed; 3-Postmaterialist
Y003	Autonomy index (original format)	<0 for DK/NA/M; -2-Obedience/Religious Faith 2-Determination, perseverance/Independence
Y003nt	The same as above but with a positive (raised) scale and with null and DK/NA/M treatment	
X001	Gender (original format)	<0 for DK/NA/M; 1-Male; 2-Female
X001nt	The same as above with null and DK/NA/M treatment	Null (.)-DK/NA/M; 1-Male; 2-Female
X003	Age (original format)	<0-DK/NA/M
X003nt	The same as above with null and DK/NA/M treatment	Null (.)-DK/NA/M
X007		<0-DK/NA/M; 1-Married; 2-Living together as married; 3- Divorced; 4-Separated; 5-Widowed; 6-Single/Never married; 7 and 8-other values
		considered the most distant from the status of a married person

The same as above but with a reversed scale and with null and DK/NA/M treatment	Null (.)-DK/NA/M; 0 and 1-other values considered the most distant from the status of a married person; 2-Single/Never married 7-Married
The same as above in its binary form and with null and DK/NA/M treatment	Null (.)-DK/NA/M; 1-Married/ Living together as married; 0- Otherwise
How many children do you have (original format)	<0-DK/NA/M; 0-No child; 1-1 child; 2-2 children 5-5 children or more
The same as above with null and DK/NA/M treatment	Null (.)-DK/NA/M; 0-No child 5-5 children or more
The highest educational level attained (original format)	<0-DK/NA/M; 1-Inadequately completed elementary education; 2- Completed (compulsory) elementary education; 3-Incomplete secondary school: technical/vocational type; 4-Complete secondary school: technical/vocational type; 5-Incomplete secondary: university-preparatory type; 6-Complete secondary: university- preparatory type; 7-Some university without degree/Higher education-lower-level; 8-University with degree/Higher education- upper-level tertiary
The same as above with null and DK/NA/M treatment	Null (.)-DK/NA/M; 1-Inadequately completed elementary education 8-University with degree/Higher education-upper-level tertiary
Employment status (original format)	<0-DK/NA/M; 1-Full time; 2-Part time; 3-Self employed; 4-Retired; 5-Housewife; 6-Students; 7-Unemployed; 8-Other
The same as above but with a reversed scale and with null and DK/NA/M treatment	Null (.)-DK/NA/M; 0-Other 7-Full time
The scale of incomes (original format)	<0-DK/NA/M; 1-Lowest step; 2-Second step 10-Tenth step; 11- Highest step
The same as above with null and DK/NA/M treatment	Null (.)-DK/NA/M; 1-Lowest step 11-Highest step
Counties and Country Macroregions (numeric code) where the interview was conducted (original format)	<0-DK/NA/M; 8001 Albania: Tirana 7360013 SD: River Nile
The same as above with null and DK/NA/M treatment	Null (.)-DK/NA/M; 8001 Albania: Tirana 7360013 SD: River Nile
Settlement size (original format)	<0-DK/NA/M; 1—Under 2000; 2—2000—5000; 3—5000—10,000; 4—10,000—20,000; 5—20,000—50,000; 6—50,000—100,000; 7— 100,000—500,000; 8—500,000 and more
The same as above with null and DK/NA/M treatment	Null (.)-DK/NA/M; 1-Under 2,000 8-500,000 and more
Year of survey (original format)	Years between 1981 and 2020 (limited to 2017-2020-non-NULL observations for the response variable)
	with null and DK/NA/M treatment The same as above in its binary form and with null and DK/NA/M treatment How many children do you have (original format) The same as above with null and DK/NA/M treatment The highest educational level attained (original format) The same as above with null and DK/NA/M treatment Employment status (original format) The same as above but with a reversed scale and with null and DK/NA/M treatment The scale of incomes (original format) The same as above with null and DK/NA/M treatment Counties and Country Macroregions (numeric code) where the interview was conducted (original format) The same as above with null and DK/NA/M treatment Settlement size (original format) The same as above with null and DK/NA/M treatment

Source: WVS data.

Table A2. Descriptive statistics for the most relevant WVS items used in this study.

Variable	n	Mean	Std.Dev.	Min	0.25	Median	0.75	Max
C002nt	377,345	1.55	0.75	0	1	2	2	2
C002bin	330,509	0.82	0.39	0	1	1	1	1
A124_06nt	396,205	0.21	0.41	0	0	0	0	1
A124_07nt	384,956	0.44	0.5	0	0	0	1	1
A124_09nt	376,865	0.5	0.5	0	0	1	1	1
A165nt	409,115	0.26	0.44	0	0	0	1	1
C001_01nt	395,652	0.97	0.91	0	0	1	2	2
C009nt	183,875	2.15	1.12	1	1	2	3	5
C038nt	175,111	2.86	1.09	0	2	3	4	4
D054nt	360,660	2.27	0.78	0	2	2	3	3

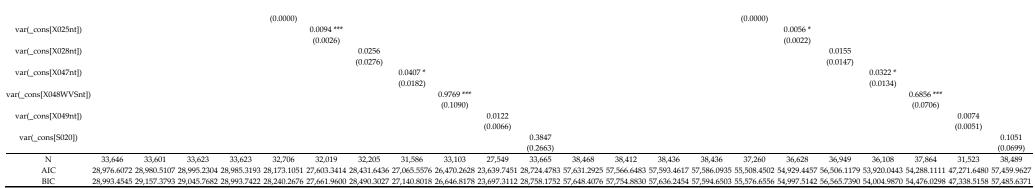
Mathematics 2023, 11, 786 18 of 28

D059nt	357,860	1.53	0.98	0	1	1	2	3
D060nt	364,765	1.04	0.92	0	0	1	1	3
E025nt	379,840	0.83	0.81	0	0	1	2	2
E143nt	186,246	1.54	0.84	0	1	2	2	3
F063nt	402,066	7.7	3.02	1	6	10	10	10
F118nt	380,939	3.21	3.04	1	1	1	5	10
F120nt	398,878	3.37	2.85	1	1	2	5	10
F121nt	403,700	4.65	3.1	1	1	5	7	10
G007_36_Bnt	220,047	1.19	0.86	0	1	1	2	3
Y002nt	396,977	1.77	0.62	1	1	2	2	3
Y003nt	414,123	2.05	1.16	0	1	2	3	4
X001nt	421,634	1.52	0.5	1	1	2	2	2
X003nt	421,892	41.14	16.23	13	28	39	53	103
X007nt	421,264	5.34	2.18	0	3	7	7	7
X007bin	421,264	0.64	0.48	0	0	1	1	1
X011nt	410,849	1.89	1.81	0	0	2	3	24
X025nt	300,306	4.71	2.23	1	3	5	6	8
X028nt	413,665	4.69	2.16	0	3	5	7	7
X047nt	389,150	4.65	2.3	1	3	5	6	10
X048WVSnt	380,027	450,000	260,000	8,001	230,000	420,000	700,000	890,000
X049nt	303,252	4.95	2.51	1	3	5	7	8
S020	426,452	2005.05	9.57	1981	1998	2006	2012	2020

Source: own calculation in Stata (Stata script at https://tinyurl.com/yt872hcs, accessed on 31 January 2023).

Table A3. The results of cross-validations on some socio-demographic variables using mixed-effects binary (first 11 models) and ordered logit (last 11 ones).

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
Input/Response	C002bin	C002bin	C002bin	C002bin	C002bin	C002bin	C002bin	C002bin	C002bin	C002bin	C002bin	C002nt	C002nt	C002nt	C002nt	C002nt	C002nt	C002nt	C002nt	C002nt	C002nt	C002nt
A124_06nt	0.3156 ***	0.3183 ***	0.3171 ***	0.3174 ***	0.2965 ***	0.3479 ***	0.2960 ***	0.3014 ***	0.3032 ***	0.3361 ***	0.3568 **	0.2430 ***	0.2459 ***	0.2434 ***	0.2440 ***	0.2257 ***	0.2784 ***	0.2154 ***	0.2335 ***	0.2628 ***	0.2499 ***	0.2665 ***
	(0.0173)	(0.0633)	(0.0174)	(0.0082)	(0.0563)	(0.0607)	(0.0230)	(0.0414)	(0.0800)	(0.0740)	(0.1285)	(0.0256)	(0.0447)	(0.0200)	(0.0172)	(0.0329)	(0.0392)	(0.0350)	(0.0379)	(0.0576)	(0.0624)	(0.0652)
A124_07nt	0.1272 ***	0.1336 **	0.1349 ***	0.1343 ***	0.1374 **	0.1329	0.1169 *	0.1444 ***	0.1287	0.1065 *	0.0669	0.0095	0.0125	0.0141	0.0131	0.0121	0.0181	-0.0013	0.0254	0.0652	0.0021	-0.0187
	(0.0194)	(0.0408)	(0.0329)	(0.0094)	(0.0502)	(0.0717)	(0.0544)	(0.0296)	(0.0673)	(0.0488)	(0.1044)	(0.0246)	(0.0322)	(0.0436)	(0.0176)	(0.0424)	(0.0468)	(0.0422)	(0.0255)	(0.0527)	(0.0389)	(0.0791)
A124_09nt	0.1110 ***	0.1024 **	0.1017 ***	0.1022 ***	0.1007 ***	0.1000	0.0990	0.1023 *	0.1201 *	0.0759	0.1518	0.1284 ***	0.1236 ***	0.1235 ***	0.1244 ***	0.1194 ***	0.1122 *	0.1170 *	0.1194 **	0.1189 **	0.1063 *	0.1534
	(0.0102)	(0.0356)	(0.0262)	(0.0123)	(0.0213)	(0.0696)	(0.0517)	(0.0498)	(0.0550)	(0.0655)	(0.1279)	(0.0359)	(0.0299)	(0.0328)	(0.0083)	(0.0191)	(0.0526)	(0.0484)	(0.0381)	(0.0414)	(0.0469)	(0.0942)
A165nt	-0.2369 ***	-0.2373 ***	-0.2371 ***					-0.2394 ***	-0.1810 **	-0.3095 ***	-0.2136		-0.2433 ***			-0.2568 ***	-0.2501 ***	-0.2496 ***	-0.2405 ***	-0.1825 ***	-0.3178 ***	-0.2331 **
C001 01m4	(0.0360) 0.6993 ***	(0.0356) 0.6935 ***	(0.0282) 0.6920 ***	(0.0174) 0.6916 ***	(0.0160) 0.6833 ***	(0.0662) 0.6821 ***	(0.0415) 0.6755 ***	(0.0406) 0.6897 ***	(0.0623) 0.6808 ***	(0.0586) 0.7529 ***	(0.1122) 0.7011 ***	(0.0237) 0.4944 ***	(0.0269) 0.4910 ***	(0.0095) 0.4913 ***	(0.0020) 0.4905 ***	(0.0199) 0.4882 ***	(0.0458) 0.4832 ***	(0.0341) 0.4726***	(0.0325) 0.4870 ***	(0.0469) 0.5007 ***	(0.0480) 0.5017 ***	(0.0894) 0.4946 ***
C001_01nt	(0.0797)	(0.0208)	(0.0325)	(0.0209)	(0.0216)	(0.0257)	(0.0378)	(0.0265)	(0.0397)	(0.0619)	(0.0731)	(0.0933)	(0.0159)	(0.0287)	(0.0201)	(0.0136)	(0.0222)	(0.0272)	(0.0107)	(0.0307)	(0.0318)	(0.0363)
C009nt		-0.1225 ***	-0.1236 ***	× /	-0.1180 ***	-0.1258 ***	-0.1234 ***	-0.1134 ***	-0.0956 ***	-0.1034 ***	-0.1188 ***	-0.0809 ***	-0.0798 ***	-0.0800 ***		-0.0757 ***	-0.0823 ***	-0.0801***	-0.0732 ***	-0.0667 ***	-0.0652 ***	-0.0779 ***
C009111	(0.0066)	(0.0117)	(0.0092)	(0.0032)	(0.0104)	(0.0106)	(0.0195)	(0.0155)	(0.0158)	(0.0209)	(0.0159)	(0.0002)	(0.0098)	(0.0086)	(0.0065)	(0.0126)	(0.0110)	(0.0128)	(0.0169)	(0.0135)	(0.0149)	(0.0140)
C038nt	0.1510 ***	0.1494 ***	0.1483 ***	0.1482 ***	0.1496 ***	0.1508 ***	0.1538 ***	0.1456 ***	0.1249 ***	0.1343 ***	0.1555 ***	0.1383 ***	0.1377 ***	0.1372 ***	0.1369 ***	0.1384 ***	0.1378 ***	0.1386 ***	0.1354 ***	0.1100 ***	0.1217 ***	0.1420 ***
Cosoni	(0.0143)	(0.0147)	(0.0210)	(0.0300)	(0.0197)	(0.0177)	(0.0188)	(0.0129)	(0.0196)	(0.0121)	(0.0129)	(0.0140)	(0.0124)	(0.0123)	(0.0151)	(0.0169)	(0.0136)	(0.0172)	(0.0093)	(0.0162)	(0.0137)	(0.0025)
D054nt		0.1102 ***	0.1095 ***	0.1106 ***	0.1069 ***	0.1060 ***	0.1079 ***	0.1177 ***	0.0730 *	0.1187 ***	0.1329 ***	0.1357 ***	0.1358 ***	0.1334 ***		0.1336 ***	0.1313 ***	0.1335 ***	0.1455 ***	0.0929 ***	0.1404 ***	0.1521 ***
	(0.0158)	(0.0206)	(0.0053)	(0.0022)	(0.0211)	(0.0321)	(0.0285)	(0.0208)	(0.0318)	(0.0314)	(0.0361)	(0.0018)	(0.0173)	(0.0063)	(0.0078)	(0.0159)	(0.0241)	(0.0184)	(0.0181)	(0.0248)	(0.0247)	(0.0278)
D059nt	0.2016 ***	0.1930 ***	0.1917 ***	0.1920 ***	0.1926 ***	0.1984 ***	0.1928 ***	0.2068 ***	0.1640 ***	0.2075 ***	0.1895 ***	0.1911 ***	0.1857 ***	0.1842 ***	0.1844 ***	0.1835 ***	0.1917 ***	0.1842 ***	0.1979 ***	0.1562 ***	0.1937 ***	0.1820 ***
	(0.0570)	(0.0217)	(0.0346)	(0.0127)	(0.0260)	(0.0214)	(0.0268)	(0.0337)	(0.0288)	(0.0186)	(0.0348)	(0.0549)	(0.0172)	(0.0264)	(0.0068)	(0.0223)	(0.0223)	(0.0241)	(0.0291)	(0.0232)	(0.0152)	(0.0448)
D060nt	0.0347 **	0.0250	0.0242	0.0240	0.0215	0.0195	0.0342	0.0243	-0.0073	-0.0144	0.0268	-0.0424 ***	-0.0474 **	-0.0469 ***	-0.0472 **	-0.0498 ***	-0.0612 *	-0.0382 *	-0.0488 *	-0.0710 *	-0.0737	-0.0447
	(0.0134)	(0.0232)	(0.0272)	(0.0421)	(0.0241)	(0.0362)	(0.0272)	(0.0292)	(0.0357)	(0.0383)	(0.0278)	(0.0006)	(0.0161)	(0.0118)	(0.0173)	(0.0143)	(0.0258)	(0.0171)	(0.0231)	(0.0295)	(0.0376)	(0.0309)
E025nt	0.0122	0.0092	0.0064	0.0060	-0.0109	0.0035	0.0127	0.0165	0.0894 **	-0.0127	0.0196	0.0173	0.0164	0.0149	0.0144	0.0039	0.0157	0.0199	0.0260	0.0767 **	0.0085	0.0229
	(0.0074)	(0.0194)	(0.0216)	(0.0099)	(0.0239)	(0.0239)	(0.0160)	(0.0197)	(0.0344)	(0.0472)	(0.0259)	(0.0101)	(0.0166)	(0.0163)	(0.0139)	(0.0162)	(0.0235)	(0.0160)	(0.0155)	(0.0275)	(0.0404)	(0.0323)
E143nt	-0.4764 ***	-0.4779 ***	-0.4783 ***	-0.4780 ***	-0.4587 ***	-0.4700 ***	-0.4748 ***	-0.4701 ***	-0.5082 ***	-0.4906 ***	-0.4423 ***		-0.4098 ***			-0.3980 ***	-0.4104 ***	-0.4057 ***	-0.4007 ***	-0.4263 ***	-0.4163 ***	-0.3819 ***
	(0.0416)	(0.0214)	(0.0307)	(0.0390)	(0.0241)	(0.0622)	(0.0550)	(0.0187)	(0.0440)	(0.0581)	(0.1056)	(0.0226)	(0.0165)	(0.0263)	(0.0248)	(0.0199)	(0.0453)	(0.0423)	(0.0178)	(0.0351)	(0.0450)	(0.0740)
F063nt	0.0180 ***	0.0222 ***	0.0220 **	0.0219 ***	0.0190 ***	0.0232 ***	0.0230 ***	0.0214 ***	0.0006	0.0284 **	0.0214 **	0.0245 ***	0.0268 ***	0.0266 ***	0.0265 ***	0.0244 ***	0.0276 ***	0.0264 ***	0.0270 ***	0.0108	0.0306 ***	0.0280 ***
E110 .	(0.0005)	(0.0052)	(0.0073)	(0.0038)	(0.0050)	(0.0067)	(0.0066)	(0.0055)	(0.0085)	(0.0098)	(0.0082)	(0.0020)	(0.0046)	(0.0061)	(0.0053)	(0.0042)	(0.0077)	(0.0049)	(0.0062)	(0.0077)	(0.0086)	(0.0078)
F118nt	-0.0482 ***	-0.0459 ***	-0.0461 ***	-0.0461 ***	-0.0455 ***	-0.0464 ***	-0.0456 ***	-0.0427 ***	-0.0340 ***	-0.0469 **	-0.0427 ***	-0.0439 ***	-0.0428 ***			-0.0430 ***	-0.0436 ***	-0.0427 ***		-0.0348 ***	-0.0435 ***	-0.0398 ***
F120nt	(0.0119)	(0.0068) -0.0410 ***	(0.0043) -0.0411 ***	(0.0043)	(0.0036) -0.0432 ***	(0.0058) -0.0405 ***	(0.0086) -0.0404 ***	(0.0063) -0.0394 ***	(0.0090) -0.0149	(0.0145) -0.0461 **	(0.0038) -0.0391 *	(0.0089)	(0.0057) -0.0356 ***	(0.0025)	(0.0007) -0.0359 ***	(0.0032) -0.0376 ***	(0.0065) -0.0360 ***	(0.0097) -0.0350 ***	(0.0059) -0.0336 ***	(0.0079) -0.0123	(0.0112) -0.0418 ***	(0.0022) -0.0349
F1201tt	(0.0062)	(0.0079)	(0.00411	(0.0025)	(0.0038)	(0.0090)	(0.0075)	(0.0056)	(0.0090)	(0.0144)	(0.0194)	(0.0065)	(0.0061)	(0.0031)	(0.0024)	(0.0022)	(0.0081)	(0.0057)	(0.0060)	(0.0070)	(0.0115)	(0.0194)
F121nt	0.0217 *	0.0079)	0.0044)	0.0023)	0.0211 **	0.0184 *	0.0241 *	0.0206 *	0.0047	0.0266 **	0.0134)	0.0218 **	0.0001)	0.0214 ***	0.0024)	0.0208 ***	0.0198 **	0.0242 ***	0.0208 *	0.0070)	0.0239 ***	0.0194)
1121111	(0.0104)	(0.0063)	(0.0044)	(0.0007)	(0.0078)	(0.0084)	(0.0099)	(0.0081)	(0.0090)	(0.0101)	(0.0134)	(0.0073)	(0.0049)	(0.0053)	(0.0041)	(0.0049)	(0.0062)	(0.0069)	(0.0081)	(0.0073)	(0.0059)	(0.0131)
G007_36_Bnt	(-0.2695 ***	-0.2674 ***	(,	,	-0.2865 ***	-0.2725 ***	-0.2713 ***	-0.2258 ***	-0.3023 ***	-0.2938 **	,	-0.2614 ***	()	,	-0.2599 ***	` /	-0.2656 ***	,	-0.2344 ***	-0.2937 ***	-0.2764 ***
	(0.0164)	(0.0233)	(0.0261)	(0.0228)	(0.0344)	(0.0168)	(0.0373)	(0.0290)	(0.0328)	(0.0305)	(0.0968)	(0.0085)	(0.0187)	(0.0222)	(0.0177)	(0.0239)	(0.0188)	(0.0281)	(0.0207)	(0.0251)	(0.0251)	(0.0667)
Y002nt	-0.1737 ***	-0.1840 ***	-0.1800 ***	-0.1794 ***	-0.1828 ***	-0.1865 ***	-0.1835 ***	-0.1783 ***	-0.1491 ***	-0.1486 ***	-0.1664 ***	-0.1361 ***	-0.1414 ***	-0.1403 ***	-0.1394 ***	-0.1423 ***	-0.1383 ***	-0.1428 ***	-0.1327 ***	-0.1117 ***	-0.1216 ***	-0.1294 ***
	(0.0185)	(0.0238)	(0.0202)	(0.0142)	(0.0127)	(0.0449)	(0.0370)	(0.0417)	(0.0353)	(0.0384)	(0.0317)	(0.0168)	(0.0187)	(0.0141)	(0.0023)	(0.0079)	(0.0310)	(0.0257)	(0.0333)	(0.0276)	(0.0347)	(0.0106)
Y003nt	0.0018	0.0003	0.0019	0.0019	-0.0008	0.0008	0.0051	0.0004	0.0086	-0.0159	-0.0164	-0.0126 **	-0.0138	-0.0128	-0.0127	-0.0162 *	-0.0101	-0.0074	-0.0083	0.0035	-0.0224	-0.0223
	(0.0138)	(0.0140)	(0.0151)	(0.0157)	(0.0109)	(0.0144)	(0.0207)	(0.0215)	(0.0211)	(0.0148)	(0.0404)	(0.0045)	(0.0117)	(0.0106)	(0.0145)	(0.0073)	(0.0096)	(0.0119)	(0.0180)	(0.0161)	(0.0118)	(0.0264)
_cons	1.7391 ***	1.7618 ***	1.7621 ***	1.7606 ***	1.7858 ***	1.8108 ***	1.7951 ***	1.6056 ***	2.1114 ***	1.8087 ***	1.9660 ***											
	(0.3016)	(0.1248)	(0.1023)	(0.1674)	(0.0626)	(0.1440)	(0.2164)	(0.2091)	(0.2154)	(0.1656)	(0.5685)											
var(_cons[X001nt])	0.0068 **											0.0024										
	(0.0025)											(0.0019)										
var(_cons[X003nt])		0.0017											0.0012									
/ P/00= -:		(0.0023)	0.0005										(0.0016)	0.0007								
var(_cons[X007nt])			0.0003											0.0004								
([V007] : 1)			(0.0010)	0.0000										(0.0005)	0.0000							
var(_cons[X007bin])				0.0000											0.0000							
var(conc[V011=1])				(0.0000)	0.0000										(0.0000)	0.0000						
var(_cons[X011nt])					0.0000											0.0000						



Source: own calculation in Stata (Stata script at https://tinyurl.com/susvkppj, accessed on 30 January 2023). Notes: var (_cons []) relates to the cross-validation criterion. Robust standard errors are between round parentheses. The raw coefficients emphasized using *, **, and *** are significant at 5%, 1%, and 1‰. Red vs. green indicates a loss of significance (not selected variables) vs. the opposite (the selected ones).

Table A4. The results of the first stage of reverse causality checks using ordered logit.

Ologit Model

Ologit Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
Input/Response	C002nt	A124_06nt	C002nt	C001_01nt	C002nt	C009nt	C002nt	C038nt	C002nt	D054nt	C002nt	D059nt	C002nt	E143nt	C002nt	F118nt	C002nt	G007_36_Bnt	C002nt	Y002nt
A124_06nt	0.6082 ***																			
	(0.0095)																			
C001_01nt			0.6370 ***																	
			(0.0042)																	
C009nt					-0.2307 ***															
					(0.0048)															
C038nt							0.3211 ***													
							(0.0048)													
D054nt									0.3915 ***											
									(0.0047)											
D059nt											0.4651 ***									
											(0.0042)									
E143nt													-0.4734 ***							
													(0.0065)							
F118nt															-0.1426 ***					
															(0.0012)					
G007_36_Bnt																	-0.3915***			
																	(0.0058)			
Y002nt																			-0.4489***	
C002		0.0064.444		0 =04 = 444		0.0045744				0.04=4.444		0.0046.000		0.40=0.444		0.4048.444		0.004=444	(0.0060)	0.00=4.444
C002nt		0.3864 ***		0.7017 ***		-0.2817 ***		0.3957 ***		0.3454 ***		0.5046 ***		-0.4273 ***		-0.4942 ***		-0.3817 ***		-0.3374 ***
	244004	(0.0061)	200	(0.0045)	450 (5)	(0.0061)	454.005	(0.0062)	220 44 6	(0.0045)	222 424	(0.0043)	404 = 44	(0.0058)	244 ===	(0.0045)	200 404	(0.0056)		(0.0046)
N	364,886	364,886	373,890	373,890	173,676	173,676	171,085	171,085	339,416	339,416	333,481	333,481	181,744	181,744	341,555	341,555	209,101	209,101	359,823	359,823
chi^2	4,075.6756	4,077.5373	2,2654.9698	,	2,334.3676	2,124.2002	4,434.4490	4,132.8212	6,807.9723	5,946.5022	12,262.6181	13,692.4046	-,-	5,372.7167	14,504.4671	12,026.1077	4,612.6482	4,628.3237	5,633.7297	5,493.3756
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Pseudo R^2 (McFadden		0.0117	0.0402	0.0343	0.0090	0.0052	0.0169	0.0097	0.0129	0.0086	0.0252	0.0159	0.0199	0.0121	0.0272	0.0119	0.0145	0.0098	0.0103	0.0088
AIC		,		,				,				,		,		1,114,113.9416		506400.8567	561,172.6952	,
BIC	5/5,521.1451	. 380,518.7826	569,362.2513	743,820.1159	266,901.0341	445,341.2711	265,082.7930	458,624.3052	529,582.9411	732,497.5334	i 514,206.4533	8/4,521.0087	2/1,708.4159	441,/59.8811	532,523.9062	1,114,221.3543	335,414.4153	506441.8590	561,205.0753	663,358.6613

Source: own calculation in Stata (Stata script at https://tinyurl.com/4a278m42, accessed on 30 January 2023). Notes: robust standard errors are between round parentheses. The raw coefficients emphasized using *** are significant at 1‰. Colors are applied to emphasize better model scores and selected variables (green) and lower model scores and variables not selected (red).

Table A5. Identified collinearity issues.

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Regression type	Logit	OLS	Logit	Logit	Logit	OLS	Logit	Logit	Logit	OLS	Logit	Logit	Logit	OLS	Logit	OLS	Logit	OLS
Filter condition	N/A	N/A	C001_01nt!=.	D059nt!=.	N/A	N/A	D054nt!=.	F118nt!=.	N/A	N/A	C001_01nt!=.	F118nt!=.	N/A	N/A	N/A	N/A	N/A	N/A
C001_01nt	0.7088 ***	0.0808 ***		0.7867 ***	0.7829 ***	0.0908 ***	0.7938 ***	0.8391 ***	0.7941 ***	0.0928 ***		0.8651 ***	0.8960 ***	0.1021 ***	0.8647 ***	0.0967 ***	0.7967 ***	0.0947 ***
	(0.0211)	(0.0022)		(0.0204)	(0.0201)	(0.0021)	(0.0201)	(0.0199)	(0.0199)	(0.0020)		(0.0196)	(0.0186)	(0.0018)	(0.0189)	(0.0018)	(0.0191)	(0.0019)
C009nt	-0.1240 ***	-0.0229 ***	-0.1489 ***	-0.1320 ***	-0.1334 ***	-0.0243 ***	-0.1396 ***	-0.1619 ***	-0.1375 ***	-0.0248 ***	-0.1797 ***	-0.1735 ***	-0.1690 ***	-0.0291 ***	-0.1558 ***	-0.0275 ***	-0.1477 ***	-0.0270 ***
	(0.0122)	(0.0019)	(0.0120)	(0.0121)	(0.0120)	(0.0019)	(0.0119)	(0.0118)	(0.0119)	(0.0018)	(0.0115)	(0.0117)	(0.0112)	(0.0017)	(0.0114)	(0.0017)	(0.0114)	(0.0018)
C038nt	0.1451 ***	0.0244 ***	0.1493 ***	0.1570 ***	0.1555 ***	0.0257 ***	0.1727 ***	0.1928 ***	0.1714 ***	0.0286 ***	0.1937 ***	0.2235 ***	0.2239 ***	0.0354 ***	0.1922 ***	0.0299 ***	0.1812 ***	0.0303 ***
	(0.0121)	(0.0019)	(0.0118)	(0.0120)	(0.0119)	(0.0018)	(0.0117)	(0.0116)	(0.0116)	(0.0018)	(0.0112)	(0.0113)	(0.0109)	(0.0017)	(0.0112)	(0.0017)	(0.0113)	(0.0018)
D054nt	0.1594 ***	0.0276 ***	0.1824 ***	0.1791 ***	0.1771 ***	0.0304 ***		0.2532 ***							0.2629 ***	0.0429 ***	0.2474 ***	0.0429 ***
	(0.0174)	(0.0027)	(0.0171)	(0.0172)	(0.0170)	(0.0026)		(0.0165)							(0.0160)	(0.0024)	(0.0160)	(0.0025)
D059nt	0.2404 ***	0.0318 ***	0.4303 ***															
	(0.0177)	(0.0023)	(0.0165)															
E143nt	-0.4715 ***	-0.0626***	-0.4764***	-0.4673 ***	-0.4607 ***	-0.0617 ***	-0.4593 ***	-0.4663 ***	-0.4604 ***	-0.0618 ***	-0.4631 ***	-0.4668 ***	-0.4381 ***	-0.0543 ***	-0.4358 ***	-0.0535 ***	-0.4099 ***	-0.0547 ***
	(0.0183)	(0.0023)	(0.0178)	(0.0181)	(0.0179)	(0.0023)	(0.0178)	(0.0176)	(0.0177)	(0.0022)	(0.0169)	(0.0173)	(0.0163)	(0.0020)	(0.0167)	(0.0020)	(0.0169)	(0.0021)
F118nt	-0.0724 ***	-0.0148 ***	-0.0912 ***	-0.0825 ***	-0.0831 ***	-0.0162 ***	-0.0927 ***		-0.0928 ***	-0.0178 ***	-0.1280 ***							
	(0.0042)	(0.0007)	(0.0041)	(0.0041)	(0.0041)	(0.0007)	(0.0040)		(0.0040)	(0.0007)	(0.0038)							
G007_36_Bnt	-0.3044 ***	-0.0441 ***	-0.3252 ***	-0.3111 ***	-0.3108 ***	-0.0447 ***	-0.3198 ***	-0.3600 ***	-0.3185 ***	-0.0457 ***	-0.3500 ***	-0.3796 ***	-0.4114 ***	-0.0554 ***	-0.3906 ***	-0.0526 ***	-0.3636 ***	-0.0529 ***
	(0.0178)	(0.0023)	(0.0173)	(0.0177)	(0.0175)	(0.0023)	(0.0175)	(0.0173)	(0.0173)	(0.0023)	(0.0166)	(0.0171)	(0.0162)	(0.0020)	(0.0164)	(0.0020)	(0.0165)	(0.0022)
Y002nt	-0.2382 ***	-0.0394 ***	-0.2819 ***	-0.2543 ***	-0.2590 ***	-0.0419 ***	-0.2648 ***	-0.3170 ***	-0.2639 ***	-0.0423 ***	-0.3362 ***	-0.3348 ***	-0.3201 ***	-0.0494 ***	-0.3025 ***	-0.0473 ***	-0.2909 ***	-0.0479 ***
	(0.0223)	(0.0032)	(0.0219)	(0.0222)	(0.0220)	(0.0031)	(0.0219)	(0.0215)	(0.0217)	(0.0031)	(0.0212)	(0.0213)	(0.0204)	(0.0028)	(0.0207)	(0.0028)	(0.0207)	(0.0030)
A124_06nt																	0.4291 ***	0.0420 ***
																	(0.0397)	(0.0039)
_cons	2.0665 ***	0.8702 ***	2.4117 ***	2.3386 ***	2.3603 ***	0.9100 ***	2.7547 ***	1.9727 ***	2.7500 ***	0.9752 ***	3.5529 ***	2.4915 ***	2.5001 ***	0.9129 ***	1.9563 ***	0.8268 ***	1.8357 ***	0.8206 ***
	(0.0832)	(0.0118)	(0.0812)	(0.0805)	(0.0798)	(0.0114)	(0.0718)	(0.0760)	(0.0712)	(0.0099)	(0.0681)	(0.0689)	(0.0662)	(0.0089)	(0.0733)	(0.0100)	(0.0741)	(0.0106)
N	39,409	39,409	39,409	39,409	40,337	40,337	40,337f	40,337	41,042	41,042	41,042	41,042	47,618	47,618	46,794	46,794	43,679	43,679
chi^2	5,397.0323	0.0000	4,878.7274	5,263.4820	5,340.8593	0.0000	5,284.0049	4,874.1607	5,358.1703	0.0000	4,410.4134	4,788.2363	5,579.7515	0.0000	5,685.7433	0.0000	4,994.4131	0.0000
P	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R^2 (OLS) / McFadden's Pseudo R^2 (logit)	0.1853	0.1816 0.3759	0.1512	0.1806	0.1793	0.1759 0.3760	0.1768	0.1701	0.1769	0.1729 0.3765	0.1284	0.1648	0.1745	0.1574 0.3672	0.1799	0.1637 0.3659	0.1645	0.1549 0.3766
RMSE AIC	34.006.3629		35.424.2274	34.199.1829	34.899.1207	35,578,0705	35.001.8603	35.285.0073	35,573,9850	36.293.2589	37.667.6077	36.093.7725	39,348,4448	39.717.3424	38.428.2481	38.705.2740	37.842.0569	38.648.3166
BIC	,	34,733.5721	35,501.4632	. ,	34,899.1207	35,655.5157	35,001.8603	,	35,642.9638	,	37,727.9642	36,154.1289	,-	39,778.7392	,	,	. ,	38,726.4782
AUCROC	0.7844	34,819.3896	0.7506	0.7808	0.7799	33,633.3137	0.7789	35,353.8475 0.7759	0.7791	36,362.2377	0.7287	0.7736	0.7828	39,778.7392	0.7852	38,775.3021	0.7724	38,726.4782
chi^2 GOF	24,317.90		18,676.12	16,884.76	17,091.77		11,106.98	7,158.41	11,231.56		6291.07	3573.21	3592.05		7,381.92		10,453.02	
p GOF	0.0000		0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000		0.0000	
р GOF Max.Abs.VPMCC	0.4094	0.4094	0.0000	0.0000	0.2932	0.2932	0.0000	0.0000	0.2747	0.2747	0.2378	0.1745	0.1819	0.1819	0.0000	0.2159	0.0000	0.2022
OLSmax.Accept.VIF	0.4094	1.2219	0.2971	0.2940	0.2932	1.2134	0.2732	0.2091	0.2/4/	1.2090	0.2376	0.1743	0.1019	1.1868	0.2139	1.1957	0.2022	1.1833
OLSmax.Comput.VIF		1.3027				1.2741				1.2090				1.1000		1.1121		1.1012
OLSHIAX.Comput.vif		1.3027				1.2/41				1.2101				1.0711		1.1121		1.1012

Source and notes: same as in Table A4 (Stata scripts at https://tinyurl.com/yc26vjzd, accessed on 30 January 2023).

Table A6. Controlling using the most relevant seven remaining predictors (hepta-core) and most of the socio-demographic variables in logit (first 12) and ologit models (last 12).

Column C	Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
Column C	Input/Response	C002bin	C002bin	C002bin	C002bin	C002bin	C002bin	C002bin	C002bin	C002bin	C002bin	C002bin	C002bin	C002nt	C002nt	C002nt	C002nt	C002nt	C002nt	C002nt	C002nt	C002nt	C002nt	C002nt	C002nt
Section Sect	C001_01nt	0.8647 ***	0.8755 ***	0.8675 ***	0.8670 ***	0.8661 ***	0.8527 ***	0.8396 ***	0.8441 ***	0.8666 ***	0.8660 ***	0.9469 ***	0.8504***	0.6281 ***	0.6356 ***	0.6304 ***	0.6305 ***	0.6299 ***	0.6186 ***	0.6024 ***	0.6076 ***	0.6258 ***	0.6308 ***	0.6576 ***	0.6129 ***
Column C		(0.0189)	(0.0192)	(0.0190)	(0.0190)	(0.0190)	(0.0191)	(0.0199)	(0.0192)	(0.0197)	(0.0190)	(0.0232)	(0.0191)	(0.0126)	(0.0128)	(0.0126)	(0.0126)	(0.0126)	(0.0128)	(0.0132)	(0.0128)	(0.0131)	(0.0127)	(0.0146)	(0.0127)
Property of the content of the con	C009nt	-0.1558***	-0.1572***	-0.1534***	-0.1562***	-0.1562 ***	°-0.1524 ***	+-0.1546 ***	-0.1505 ***	-0.1454 ***	-0.1547 ***	-0.1388 ***	-0.1493***	-0.1075 ***	-0.1083 ***	*-0.1056 ***	+-0.1076 ***	-0.1076 ***	-0.1050 ***	-0.1056 ***	·-0.1033 ***	·-0.0994 ***	-0.1059 ***	-0.0944 ***	-0.1011 ***
Properties Pro		` /	, ,	` /	,	,	,	, ,	,	,	,	` /	(0.0114)	(0.0093)	(0.0093)	(0.0093)	(0.0093)	(0.0093)	(0.0095)	(0.0095)	(0.0093)	(0.0097)	(0.0093)	(0.0106)	(0.0093)
Part	C038nt																								
Fig. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.		` /	, ,	` /		. ,	. ,		. ,	. ,	. ,	. ,	,	` /	, ,	` /	,	,	,	,	` /	, ,	` /	` /	` /
Part	D054nt												000												
Coloration Part		. ,		` /	,	,	,	, ,	,	,	,	` /	(` /	, ,	` /	,	,	,	,	` /	, ,	()	` /	` /
Second Part	E143nt																								
Mathematical Control of the contro	C00F 0 (P)	,	,	, ,									. ,												
1	G007_36_Bnt																								
Miles Mile	3/0021	` /	(/	` /	,	,	. ,		. ,	. ,	,	` /	()	` /	, ,	` /	,	,	,	,	` /	. ,	(` /	` /
Mary	1002nt																								
Part	V001nt	(0.0207)	, ,	` /	(0.0207)	(0.0207)	(0.0210)	(0.0213)	(0.0209)	(0.0210)	(0.0200)	(0.0239)	(0.0200)	(0.0103)	, ,	` /	(0.0103)	(0.0103)	(0.0109)	(0.0171)	(0.0107)	(0.0172)	(0.0100)	(0.0109)	(0.0103)
March Marc	Audilit																								
Part	X003nt		(0.0230)	-0.0016											(0.0200)	-0.0013*									
March Marc	Account																								
March Marc	X007nt			(0.0000)	-0.0061											(0.0000)	-0.0060								
March Marc																									
Part	X007bin				(0.0000)	-0.0086											(010021)	-0.0160							
Miles																									
Control Cont	X011nt					,	0.0374 ***											, ,	0.0395 ***						
Part																			(0.0061)						
Modesh M	X025nt							-0.0217 ***	+											-0.0226 ***	+				
A								(0.0061)												(0.0049)					
A	X028nt								-0.0510 ***												-0.0421 ***	+			
A									(0.0059)												(0.0047)				
NAMSWYSH	X047nt									-0.0563 ***	,											-0.0654 ***			
Colorabia Colo										(0.0060)												(0.0048)			
Authors 1	X048WVSnt																								
Column C											(0.0000)												(0.0000)		
Signature Sign	X049nt																								
Composition												(0.0061)												(0.0048)	
1.9563 ** 1.7297 ** 2.0320 ** 1.9899 ** 1.9609 ** 1.96	S020																								
Coloration Col		1.05/2.***	1 7307 ***	2 0220 ***	1 0000 ***	1.07.00 ***	1 0500 ***	2.0//1.***	2 2077 ***	0.1747 ***	1 0010 ***	0.1105 ***	,	*											(0.0110)
N 46,794 46,765 46,672 46,738 46,738 45,694 42,847 45,155 43,697 46,022 35,072 46,794 52,847 52,816 52,707 52,778 52,778 51,342 48,532 51,109 49,322 51,994 39,817 52,847 chi^2 5,685,7433 5,688,5318 5,672,4690 5,683,4406 5,683,3736 5,611,6102 5230,4993 5466,7913 5423,3517 5646,8939 4503,3261 5724,3055 7305,0966 7299,7311 7289,6653 7302,4365 7302	_cons																								
chi^2 5,685.743 5,685.518 5,672.469 5,683.476 5,683.476 5,683.476 5,616.102 523.499 5,466.791 523.499 5,466.791 523.499 5,466.791 523.499 5,466.893 5,466.791 523.499 5,466.893 5,466.791 523.499 5,466.893 5,	NI NI	/	(,		(,			(/	(/	(,	((/		E2 047	E2 016	E2 707	E2 770	E2 770	E1 242	40 522	E1 100	40.222	E1 004	20.917	E2 947
P 0.000 0.00		,			,		,	,	,			,				,								,	- ,-
Pseudo R^2 (McFadden) 0.179 0.1806 0.1803 0.1801 0.		.,	.,	.,.	.,	.,	.,.																		
AIC 38,428.2481 38,373.9837 38,312.8451 38,371.4277 38,372.4109 37,379.4689 36,046.0042 37,637.9773 35,541.8175 37,919.9773 29,162.5254 38,382.4031 75,509.950 75,446.2792 75,286.9253 75,381.7813 75,382.8895 72,856.9017 70,647.1644 73,988.3821 69,950.4322 74,471.0248 58,024.8556 75,423.888 BIC 38,498.2762 38,452.7597 38,391.6032 38,450.1985 38,451.1817 37,458.0187 36,123.9927 37,716.4380 35,619.9828 37,998.6092 29,238.7119 38,461.1847 75,589.8354 75,535.0249 75,375.6504 75,470.5198 75,471.6280 72,945.3644 70,735.0642 74,076.7993 70,038.4934 74,559.6137 58,110.7761 75,512.63 AUCROC 0.7852 0.7857 0.7855 0.7854 0.7853 0.7856 0.7827 0.7827 0.7880 0.7859 0.7856 0.7859 0.7946 0.7858	-																								
BIC 38,498.2762 38,452.7597 38,391.6032 38,450.1985 38,451.1817 37,458.0187 36,123.9927 37,716.4380 35,619.9828 37,998.6092 29,238.7119 38,461.1847 75,589.8354 75,535.0249 75,375.6504 75,470.5198 75,471.6280 72,945.3644 70,735.0642 74,076.7993 70,038.4934 74,559.6137 58,110.7761 75,512.63 AUCROC 0.7852 0.7857 0.7855 0.7854 0.7853 0.7856 0.7827 0.7827 0.7880 0.7859 0.7946 0.7859	,	,																							
AUCROC 0.7852 0.7857 0.7855 0.7854 0.7853 0.7856 0.7827 0.7827 0.7880 0.7859 0.7946 0.7858							,				,		,								,				
							,				,		,	. 3,007.0004				, . ,	,,, 10.0011	5,, 55.0012	,	5,000.1701	,007.0107	,-10.,701	,012.0000
	chi^2 GOF	7.381.92	10.953.57	38.671.11									15.449.12												
p GOF 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000		,	-,	,-	-,-	,	,	.,	.,	,	,	,	-,												
			0.2160	0.2159		0.2157	0.2158	0.2120	0.2111		0.2164			0.2159	0.2160	0.2159	0.2157	0.2157	0.2158	0.2120	0.2111	0.2177	0.2164	0.2288	0.2160

Source and notes: same as in Table A3 (Stata scripts at https://tinyurl.com/puw7nd3n, and https://tinyurl.com/wcnwtvra, both accessed on 30 January 2023).

Mathematics 2023, 11, 786 23 of 28

T	Table A7. The average marginal effects identified after controlling using the most relevant seven
p	predictors (hepta-core) and each of the other seven most significant socio-demographic control
v	rariables in logit models.

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
C001_01nt (H2)	0.1132 ***	0.1145 ***	0.1113 ***	0.1131 ***	0.1124 ***	0.1122 ***	0.1264 ***	0.1112 ***
	(0.0024)	(0.0024)	(0.0024)	(0.0026)	(0.0024)	(0.0024)	(0.0029)	(0.0024)
C009nt (H2)	-0.0204 ***	-0.0206 ***	-0.0199 ***	-0.0208 ***	-0.0200 ***	-0.0188 ***	-0.0185 ***	-0.0195 ***
	(0.0015)	(0.0015)	(0.0015)	(0.0016)	(0.0015)	(0.0015)	(0.0017)	(0.0015)
C038nt (H4)	0.0252 ***	0.0254 ***	0.0250 ***	0.0266 ***	0.0257 ***	0.0244 ***	0.0237 ***	0.0248 ***
	(0.0015)	(0.0015)	(0.0015)	(0.0015)	(0.0015)	(0.0015)	(0.0017)	(0.0015)
D054nt (H3)	0.0344 ***	0.0343 ***	0.0347 ***	0.0351 ***	0.0328 ***	0.0343 ***	0.0379 ***	0.0328 ***
	(0.0021)	(0.0021)	(0.0021)	(0.0022)	(0.0021)	(0.0021)	(0.0024)	(0.0021)
E143nt (H1)	-0.0570 ***	-0.0567 ***	-0.0553 ***	-0.0605 ***	-0.0577 ***	-0.0554 ***	-0.0589 ***	-0.0569 ***
	(0.0021)	(0.0021)	(0.0021)	(0.0023)	(0.0022)	(0.0022)	(0.0025)	(0.0021)
G007_36_Bnt (H2)	-0.0511 ***	-0.0508***	-0.0515 ***	-0.0541 ***	-0.0518 ***	-0.0497 ***	-0.0569 ***	-0.0516 ***
	(0.0021)	(0.0021)	(0.0021)	(0.0023)	(0.0021)	(0.0022)	(0.0024)	(0.0021)
Y002nt (H2, H4)	-0.0396 ***	-0.0389 ***	-0.0393 ***	-0.0389 ***	-0.0399 ***	-0.0382 ***	-0.0397 ***	-0.0386 ***
	(0.0027)	(0.0027)	(0.0027)	(0.0029)	(0.0028)	(0.0028)	(0.0032)	(0.0027)
X001nt (H5)		0.0175 ***						
		(0.0034)						
X011nt (H5)			0.0049 ***					
			(0.0010)					
X025nt (H5)				-0.0029 ***				
				(0.0008)				
X028nt (H5)					-0.0068 ***			
					(0.0008)			
X047nt (H5)						-0.0073 ***		
						(0.0008)		
X049nt (H5)							-0.0053 ***	
							(0.0008)	
S020 (H5)								0.0133 ***
, ,								(0.0018)
N	46,794	46,765	45,604	42,847	45,155	43,697	35,072	46,794

Source: own calculation in Stata (Stata script at https://tinyurl.com/yvc3py3u, accessed on 30 January 2023) Notes: robust standard errors are between round parentheses. Coefficients computed as average marginal effects and emphasized using *** are significant at 1‰. The H codes on the left indicate the hypotheses to which the variables next to them belong.

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Mathematics 2023, 11, 786 28 of 28

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