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The (Agri-)Cultural Origins of Obesity

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The (Agri-)Cultural Origins of Obesity

Abstract

Previous research has shown that societies that historically focused on agricultural production demonstrate higher levels of long-term orientation. This suggests that the deep-rooted cultural origins of time preference may have a scarring impact on modern obesity rates through intergenerational transmission. We hypothesize that a historically long-term oriented culture could result in the behavioural choices of better diet and more exercise today, via the reinforced ability of individuals to delay gratification. Using a sample of 132 countries, we employ regression analysis to first estimate the historical determinants of time preference, and then examine the impact of long-term orientation on obesity. Controlling for other factors, we find that, on average, historically long-term oriented countries exhibit significantly lower obesity rates today. Results are robust to different methodological approaches and sensitivity analyses. Policies targeting obesity should consider those deep-rooted behavioural factors that can determine the differential response of individuals to policy instruments.

Keywords: Obesity; time preference; long-term orientation; agricultural origins

1. Introduction

Obesity is a growing public health problem and, more importantly, among the biggest causes of *preventable* deaths associated with individual behaviour (see, e.g., Cutler et al., 2003; Sutin et al., 2011). According to the World Health Organization (WHO), obesity has almost tripled in the past four decades, with 13% of all adults being obese (2018). To explain this phenomenon, economic literature has mainly focused on microeconomic (e.g. price of foods, wages) and macroeconomic (e.g. agricultural productivity, urbanization rate) factors, while health literature has mainly focused on biological and medical problems. This paper investigates the effect of culture by studying how the deep-rooted cultural component of long-term orientation (LTO) influences countries' obesity rates.

An emerging body of research is investigating the intertemporal trade-offs in the human decisions associated with growing obesity. Patience (or LTO) is a key factor here, since greater patience is expected to lead to a healthier lifestyle today in an attempt to gain from lower body mass index (BMI) and better health in the future (Komlos et al., 2004; Sutin et al., 2011; Dodd, 2008; Ikeda, 2010). This strand of the literature shows that calorie intake, unhealthy diet, and lack of exercise can all lead directly to obesity. One can assume that healthy eating, i.e. resisting sweets and fatty foods, might involve a disutility associated with foregoing the pleasure of 'tasty' foods. Likewise, exercising requires effort, which might be considered a disutility by some individuals. However, there are medium- and long-term benefits of healthy eating and exercise, which are associated with better health and lower BMI and obesity rates. There is, therefore, a trade-off between utility today (relating to the pleasure of eating or the time and effort that exercise requires) and utility in the future (related to lower BMI or a lower likelihood of health problems).

Notably, Courtemanche et al. (2014) recently validated the effect of time preference on intertemporal trade-offs in healthy eating, as opposed to the critique of time-inconsistent decisions. A common critique of the above literature is that dieting can be considered an admission of past mistakes, possibly resulting from time inconsistency. Using data from the 1979 cohort of the National Longitudinal Survey of Youth, which includes questions on body weight and hypothetical intertemporal trade-offs, Courtemanche et al. (2014) conclude that dieting is a rational issue linked to patience, rather than self-control. Their falsification tests provide no evidence of a link between time preference and either height or health conditions that are less directly tied to eating and exercise, thus validating the results on BMI.

We contribute to this research stream by identifying a specific cultural component of time preference with historical origins. The aforementioned investigations of how time preference influences obesity often focus on individual characteristics and current socioeconomic and macroeconomic conditions. A frequent underlying problem when studying the effect of the relationship between time preference and obesity is that it is often hampered by unobserved heterogeneity, time-invariant characteristics, and reverse causality. For instance, obesity is linked to health problems that can lead to lower acquisition of human capital, in turn potentially affecting agents' tendency to discount the future (reverse causality). To this end, our research provides an explicit time-invariant characteristic that is, by definition, unaffected by contemporary obesity levels as it is rooted in ancestry. Our study, thus, addresses the problem of reverse causality and enhances knowledge of the pure role of time preferences on obesity rates.

In particular, we use two stepping-stones to study the relationship between a cultural dimension of time preferences originating in the distant past and obesity rates that we observe around the globe today. First, our research builds on the recent work of Galor and Özak (2016), who show that societies with pre-industrial agro-climatic characteristics that favoured engagement in agriculture (providing goods with higher nutritional value but with a delay) rather than hunting and gathering tend to have higher LTO. Their study also shows that this historically differential occupational choice is associated, through intergenerational transmission, with a culture of LTO that we observe across countries today.

Second, we combine the agricultural origins of time preference (Galor and Özak, 2016) with the aforementioned evidence that high time discounting in the contemporary era is often associated with lower obesity rates (see, e.g., Courtemanche et al., 2014). We hypothesize that the cultural origins of time preference have a scarring impact on modern obesity rates, and that societies with higher levels of deep-rooted LTO are likely to demonstrate lower obesity levels.

Despite being essential in explaining the differences in obesity rates, cultural differences are often not considered in existing studies. Indeed, obesity is regarded differently in various cultures (Brown, 1991; Sobal, 2001; Ulijaszek and Lofink, 2006); hence, socioeconomic variables may also have varying impacts through different channels across regions and cultures. Furthermore, some studies have shown that obesity can be partly transmitted by family or society (see, e.g., Llewellyn et al., 2013). Koeppen-Schomerus et al. (2001) show the role of the family environment on obesity. More recently, using data on adoptees, Costa-Font et al. (2016) provided empirical evidence of the cultural transmission of obesity from parents to children, thereby contradicting the findings of Sacerdote (2007). According to Anderson et al. (2007), increases in parents' BMI over recent decades can explain over one-third of the increase in children's BMI during the same period. We believe that our study expands this literature by focusing on a specific dimension of transmitted culture: LTO.

Finally, for completeness, our analysis considers contemporary economic characteristics such as income, urbanization, health expenditures, education, and geographical characteristics. Higher and increasing income is often positively associated with obesity rates (Popkin, 2003; Monteiro et al., 2004; Egger et al., 2012). This appears to hold especially for middle-income countries and is often linked to food prices (Cutler et al., 2003). However, in most developed countries, higher income groups are often less obese compared to lower income groups, possibly because they are more inclined to avoid sedentary lifestyles (Cutler et al., 2003; Lakdawalla and Philipson, 2009; Fernald, 2007). Other studies have found a mixed picture, where the association with income or GDP is somewhat unclear (Abdulai, 2010; Minos et al., 2016). The income threshold at which obesity becomes apparent among women seems to be decreasing, in line with the picture obtained in industrialized countries (Monteiro et al., 2004). Hruschka and Brewis (2013) also find evidence of weight gain among women with higher socioeconomic status and in countries with higher GDP, but they also note that the relationship varies largely across countries and regions. Finally, Goryakin et al. (2014) find that economic globalization seems to be negatively associated with higher weight, whereas social and political globalization are positively related to obesity.

In summary, over and above any other known individual-level and macro-level characteristics that might affect obesity, could historically determined cultural origins affect modern obesity levels? This paper advances the literature by: (a) examining whether, in addition to any other known factors, cultural origins of human behaviour can affect obesity levels; and (b) simultaneously exploring the within and between variation for a large number of countries, thus decomposing the time-invariant component and exploiting an exogenous source of variation. The existing literature often relies on cross-sectional analyses, which do not always consider cross-country unobserved heterogeneity, reverse causality, or time-invariant characteristics.

Our research has an important message for policy makers. While culture appears to be time invariant, taking it into account can have fruitful implications. In particular, the introduction of education programs targeting increased patience levels in the population (as a complement to productivity improvements through skill acquisition) can have an important effect on mitigating the obesity epidemic for both developing and developed countries that seem to suffer in our LTO cultural component.

The remainder of the paper is organized as follows: Section 2 describes the data and methods; Section 3 presents the results of the empirical analysis; and Section 4 concludes.

2. Data and Methods

2.1. Estimating Long-Term Orientation

Galor and Özak (2016) define time preference as LTO, which is one of the cultural dimensions that characterize societies, measured by an index ranging between 0 and 100 (Hofstede, 1991). In his seminal work, Hofstede (1991) defines six cultural dimensions based on the values of a society that ultimately dictate individual behaviour. His work allows for cross-country comparisons on each of these dimensions and has found many applications in economics, business, and management. In its narrowest definition, LTO is 'the ability to delay gratification' or, in other words, consideration of the long-term consequences of one's actions, or how societies collectively regard consumption now rather than in the future.

Galor and Özak (2016) show that the LTO of today's societies is rooted in the choice of agricultural production and crop yields before and after 1500AD. The intuition is that after people settled in regions depending on their agricultural suitability, they started cultivating crops. Individuals that chose agricultural production that provides higher but delayed returns (in terms of crop yields) relative to hunting and gathering had to become patient and, ultimately, transmitted this trait to their children. Importantly, this was diffused to society because of higher productivity and birth rates, compared to hunter-gatherers.

After 1500AD, with the discovery of the Americas and further exploration of other continents, a larger variety of crops became available. Galor and Özak (2016) argue that the crop yield and crop cycle length after the new crops' introduction as well formulated the time preference of societies. More long-term oriented societies (according to their aforementioned choice before 1500AD) opted for crops with higher yields, even if that meant longer growth cycles, thus uncovering the agricultural origins of time preference. This historically acquired cultural trait then persisted and shaped the LTO of modern societies.

Galor and Özak's (2016) original analysis includes 85 countries for which Hofstede has defined LTO and for which data were available. We perform our main analysis using the same sample. However, the data allow us to expand the sample and predict LTO for a larger number of countries using a linear imputation technique (Allison, 2001). Imputation techniques are quite common in the literature (see, e.g., Pampel et al., 2012; Ashraf and Galor, 2013; You and Khagram, 2005), and are also used by international organizations to deal with missing data (see, e.g., Pasteels, 2013).

We follow two steps: after first replicating the results of Galor and Özak (2016), we then use the coefficients obtained thereby (along with their data) to predict LTO for 132 countries in a simple linear imputation. The main specification, which we replicate with a simple ordinary least squares (OLS) approach, is as follows:

$$LTO_i = \beta_0 + \beta_1 Yield_i^{p1500} + \beta_2 \Delta Yield_i^{a1500} + \beta_3 Cycle_i^{p1500} + \beta_4 \Delta Cycle_i^{a1500} + \beta_5 GeoControls_i + \varepsilon_i \tag{1}$$

where LTO represents Hofstede's (1991) definition of LTO; $Yield_i^{p1500}$ is the average crop yield in a country before 1500AD; $\Delta Yield_i^{a1500}$ is the change in yield after new crops' introduction post 1500AD; $Cycle_i^{p1500}$ is the crop growth cycle before 1500AD; and $\Delta Cycle_i^{a1500}$ is the change in that cycle after 1500AD.

Geographical controls ($GeoControls_i$), aimed at controlling for agricultural conditions and land suitability, include absolute latitude, elevation above sea level, terrain roughness, distance to coast or river, a landlocked dummy, an island dummy, the share of land in tropics/sub-tropics/temperate zones, precipitation, temperature, agricultural suitability for ancestors, ancestors' time of transition to agriculture, and continental dummies. Regression results are presented in Table A.1, and the sample countries' rankings are reported in Table A.2 (both in the Online Appendix).

We subsequently use the coefficients obtained from the OLS to predict LTO for a larger sample of countries. For consistency purposes, and to restrict the predictions to positive numbers, we transform any negatives into zeros (which only affects the Gambia and the Dominican Republic; including negatives does not change our main results: see Table A.3 in the Online Appendix). As Fig. 1 shows, the linear prediction performs very well, with a correlation of ρ=0.8539 between Hofstede's (1991) actual LTO and Galor and Özak's (2016) predicted LTO. As a robustness check, we also perform the main analysis using the original LTO, as defined by Hofstede (1991). Our results remain the same (see Table A.5 in the Online Appendix.

[Insert Fig. 1 here]

Linear imputations are commonly used to deal with missing data (Allison, 2001). Following the standard literature, we run a logistic regression using all of our covariates to predict the 'missingness' of a variable. The results suggest that the data are missing at random as almost none of the coefficients are significant and do not influence the probability of a value missing for a specific country (see Table A.6 in the Online Appendix). This implies that there are no systematic differences between countries for which Hofstede defined

LTO and those with missing values; hence, the obtained coefficients for the linear imputation appear unbiased. However, expanding the sample via linear imputation and using the predicted values may downwardly bias the standard errors (Allison, 2001). For this reason, we also perform a single-chained imputation that stochastically generates a random error for each predicted value (Brownstone and Valetta, 2001). We then use these stochastically imputed values in a robustness check for our main results (see Table A.7 in the Online Appendix).

This procedure allows us to estimate our regressions for an extended sample of countries compared to simply using LTO as defined by Hofstede in the original sample of 85 countries.

2.2 Data and Empirical Strategy

Having obtained the estimates of predicted LTO with the econometric approach presented in Section 2.1, we proceed to specify our main model. The dependent variable is the share of adults considered obese in a country, defined by having a BMI higher than 30. BMI data are readily available from the WHO for a large number of countries and for long time series. We expand the original dataset using predicted LTO values and a number of controls taken from the World Bank Indicators. Our final sample for the main specifications is a panel of 132 countries for the years 2000-2015 (see Table A.8 in the Online Appendix for the full list of countries).

Our empirical strategy first relies on the following pooled OLS model, which pools all the data together to obtain the between estimator, thus allowing us to explain the differences in obesity rates across countries:

$$\text{Pooled OLS: } OBESITY_i = \beta_0 + \beta_1 \widehat{LTO}_i + \beta_2 X_i + \varepsilon_i \qquad (2)$$

To use as much information available from our panel dataset, our empirical strategy attempts to tackle the issue that a society's LTO (as defined by Hofstede, 1991 and Galor and Özak, 2016) is time invariant (or changes very slowly over many decades) and only differs across countries. Previous studies have argued that obesity is correlated with time-varying factors, such as increasing income levels (Lakdawalla and Philipson, 2009). A pooled OLS estimation would only capture differences between countries and ignore changes over time. However, because obesity tends to increase over time, it may bias the estimates of a pooled OLS. Therefore, one could exploit a panel dataset and perform a fixed effects analysis to account for time-invariant characteristics, so that the obtained coefficients indicate changes over time for each country. To both exploit the time-dimension of our dataset and explore within-country variation, we use the solution provided by Mundlak (1978). The argument is that one can simply add the within-group means of the regressors in an OLS framework to obtain both the within and between estimators (Wooldridge, 2002). In a sense, therefore, the Mundlak approach allows us to decompose the fixed effect by simultaneously accounting for the within variation. In other words, the Mundlak approach enables us to observe both differences between countries and changes over time. Moreover, the within variation can be interpreted as the short-term effect, and the between variation as the accumulated or long-term effect (Wooldridge, 2002).

$$\text{Mundlak Aproach: } OBESITY_{i,t} = \beta_1 \widehat{LTO}_i + \beta_2 X_{i,t} + \gamma u_i + \varepsilon_{i,t} \qquad (3)$$

Taking this argument one step further, Schunck and Perales (2017) developed a generalized linear model in STATA (*xthybrid*): based on the model developed by Allison (2009), it extends the Mundlak approach by adding random effects, thus allowing the time-invariant component to vary randomly across countries or groups of countries. This is important, as groups of countries tend to share similar cultural traits. Our estimations will, therefore, include three specifications: a pooled OLS to account for between variation, a simple Mundlak (1978) technique with the covariate means to account for within and between variation, and the hybrid estimation proposed by Schunck and Perales (2017) to also allow for random effects:

$$\text{Hybrid Model: } OBESITY_{i,t} = \beta_1 \widehat{LTO}_i + \beta_2 X_{i,t} + (\beta_3 - \beta_2)\bar{X}_i + \gamma u_i + \varepsilon_{i,t} \qquad (4)$$

The main variables of interest are *OBESITY* and predicted LTO. The vector of controls X includes GDP per capita, urbanization, employment in agriculture, food imports, health expenditure, and schooling, as some of the factors associated with obesity in the relevant literature (see, e.g., Popkin, 2003; Monteiro et al., 2004; Egger et al., 2012, Goryakin et al., 2014). We also include regional and time dummies in our specifications. The variables are fully described in Table A.9 in the Online Appendix.

3. Results

For both the reduced and the extended sample, we estimate a pooled OLS to simply capture differences between countries, then follow the Mundlak approach to simultaneously account for within-country changes over time, and, finally, perform a Hybrid estimation to also allow for random effects.

The results for the limited sample are reported in Table 1 (for the reduced form specifications, see Table A.11. in the Online Appendix).

[Insert Table 1 here]

The predicted LTO is highly significant across all regressions. The coefficient in the pooled OLS model suggests that countries with a 10-point higher score in LTO have a 1.7% lower proportion of obese adults, after controlling for a number of relevant characteristics and both regional and time dummies. This indicates that culture and societal aspects contribute to explaining differences in obesity rates across countries.

The significance and size of the coefficient remain largely the same after including a time dimension and within-country variation in the Mundlak Approach in (Column 2). Here we exploit both dimensions of our dataset to account for time-invariant (between) and time-varying (within) characteristics. Finally, in the hybrid model that also allows for random effects, the coefficient of predicted LTO increases somewhat and remains highly significant (Column 3). These results suggest that more long-term oriented societies have developed persistent cultural traits that lead, in turn, to lower obesity rates.

Next, we estimate our models using the extended sample of 132 countries based on the linear imputation (Table 2). The results remain largely the same as those for the limited sample. Our measure of predicted LTO is negative and highly significant in all our specifications, indicating that more long-term oriented societies exhibit lower obesity rates.

[Insert Table 2 here]

It is worth noting that, comparing the Mundlak and Hybrid models, changes over time seem less important than the levels (long-term or cumulative effect) of our explanatory variables. This further highlights the importance of deep-rooted cultural traits in explaining obesity rates around the world. Another plausible explanation is that some of these covariates exhibit rather low variation over time and change little from year to year. We address this concern in Tables A.12 and A.13. in the Online Appendix using three-year intervals and averages.

We also consistently find that countries with a better-educated population, a higher share of urban population, and higher health spending tend to have lower obesity rates. These results are rather intuitive and in line with the relevant literature. However, some of these covariates may be susceptible to reverse causality, which further highlights the importance of our contribution, as deep-rooted cultural traits formed a long time ago are unaffected by contemporary obesity rates.

Surprisingly, GDP does not seem to be correlated with obesity rates. This applies to both levels and the changes over time, as the coefficient is not significant in most specifications. Following Galor and Özak (2016), LTO is an important determinant of differences in income per capita across countries as it affects patience, savings rates, and, in turn, economic growth. Thus, this finding implies that the inconclusive evidence about the effect of income on obesity rates is attributable to the factors that affect income (such as education and patience), and not income per se.

Our main result is robust to different specifications, different samples (excluding OECD or low-income countries), and alternative definitions and imputation methods of our main explanatory variable. These are all presented in the Online Appendix.

4. Discussion

Our paper introduced yet another time-invariant factor as a macro-level determinant of obesity. Using a country-level analysis to examine whether cultural origins are a determinant of obesity, we found empirical evidence that countries with more deep-rooted long-term orientation exhibit significantly lower obesity rates. Furthermore, our results suggest that more urbanized countries have higher obesity rates, whereas countries with higher health expenditure and schooling enjoy lower obesity. GDP alone does not seem to affect obesity. Our results are robust to alternate specifications, time dimensions (three-year averages and three-year gaps), and samples (low- and lower-middle income countries). Predicted LTO is uncorrelated with our error term, providing further evidence that our variable of interest is likely to be exogenous. We exploited an exogenous source of variation to argue that inherited culture, as expressed by a society's LTO, is associated with obesity rates around the world. We also simultaneously explored within and between variations for a large number of countries and decomposed the time-invariant component.

This paper built on Galor and Özak's (2016) concept of the agricultural origins of time preference. We combined their findings with evidence that time preference is associated with obesity to test our hypothesis. We expanded the dataset to a larger number of countries by deriving the level of culturally embodied predicted LTO. Our findings are in line with Courtemanche et al. (2014), who suggest that time preferences are associated with obesity but we focused on the historical roots of patience.

It is important to note that there are several other important determinants of obesity. Obesity rates have been increasing since the 1970s (WHO, 2018), and the potential contribution of the food industry (Lakdawalla and Philipson, 2009) should not be disregarded. However, our results suggest that, given these other determinants, certain societies might be more prone to the influence of this trend, thus experiencing higher obesity rates. There is also another plausible explanation for our findings: agricultural societies' appreciation for a diet based on (healthy) agricultural products might have been passed down through generations, with positive effects on BMI.

From a policy perspective, the literature has identified policy interventions and behavioural nudges (Oliver and Ubel, 2014) to help people shift towards healthier dietary habits (including lower calorie intake) and a more active lifestyle to ultimately reduce obesity. The results of our analysis highlight the role of education in tackling obesity (Atella and Kopinska, 2012). Since culture is an important determinant of obesity, education can affect time preference and, therefore, health-related behaviours via self-selection of long-term oriented individuals, or by drawing attention to the future (Kemptner et al., 2011). Therefore, based on the endowment effect our study identified, education may be a key mechanism in shaping a patience culture.

While cultural origins appear to affect obesity levels, this is neither the sole nor most important determinant, and other important micro-level factors must not be ignored. Therefore, cultural origins of obesity should not be misinterpreted as making obesity inevitable. Rather, they are an additional underlying factor, as every society includes people at all levels of the obesity spectrum. Future research can explore whether particular policies or nudges may be more or less effective in different societies depending on cultural origins, and identify appropriate policies that might yield the greatest marginal returns depending on the type of cultural origins.

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Table 1
Regression results on the prevalence of adult obesity: limited sample.

	Prevalence of adult obesity (BMI>30)		
	Pooled OLS	Mundlak	xthybrid
Predicted Long-Term Orientation (Between+Random)	-1.7424***	-1.4984***	-2.3362***
	(-3.27)	(-2.90)	(-2.67)
GDP (Within)		-1.8021	-0.3906
		(-0.87)	(-0.62)
Urbanization (Within)		7.5988***	
		(2.77)	
Employment in Agriculture (Within)		-1.9696	-1.2750***
		(-1.59)	(-4.22)
Food Imports (Within)		-1.3800	-0.2605
		(-1.43)	(-0.46)
Health Expenditure (Within)		-3.6641	-3.8644***
		(-0.80)	(-2.72)
Secondary Schooling (Within)		0.2089	0.7123***
		(0.63)	(4.71)
GDP (Between)	-1.2894**	0.6902	-1.3880*
	(-2.60)	(0.34)	(-1.65)
Urbanization (Between+Random)	1.6877**	-5.6010*	1.0030
	(2.42)	(-1.95)	(1.02)
Employment in Agriculture (Between)	-0.7786	1.2717	-2.5442
	(-1.03)	(0.83)	(-1.08)
Food Imports (Between)	-1.4150	0.0208	-8.9439
	(-0.94)	(0.01)	(-1.55)
Health Expenditure (Between)	-6.4910**	-2.5881	-2.6765***
	(-2.38)	(-0.44)	(-3.53)
Secondary Schooling (Between)	-1.1991**	-1.9647***	-1.3880*
	(-2.17)	(-2.71)	(-1.65)
Region Dummies	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes
Observations	1,033	1,033	1,033
Number of groups	80	80	80
R-squared	0.6007	0.6363	
Wald chi2			1258.01

Notes: t-statistics in parentheses. Heteroskedasticity robust standard errors clustered at the country level.

Table 2
Regression results on the prevalence of adult obesity: extended sample.

	Prevalence of adult obesity (BMI>30)		
	Pooled OLS	Mundlak	xthybrid
Predicted Long-Term Orientation (Between+Random)	-1.5200***	-1.4984***	-2.0880***
	(-3.12)	(-2.90)	(-3.47)
GDP (Within)		-2.5133*	-0.0348
		(-1.71)	(-0.05)
Urbanization (Within)		-0.4665	
		(-0.31)	
Employment in Agriculture (Within)		-1.4885	-0.4906
		(-1.19)	(-1.25)
Food Imports (Within)		-0.7158	-0.2768
		(-0.52)	(-0.54)
Health Expenditure (Within)		1.1770	2.1099
		(0.24)	(1.14)
Secondary Schooling (Within)		-0.4285	0.8314***
		(-0.99)	(4.08)
GDP (Between)	-0.5742*	1.9021	-0.4398
	(-1.70)	(1.30)	(-0.83)
Urbanization (Between+Random)	2.2379***	3.2833**	2.3991***
	(3.95)	(2.04)	(4.78)
Employment in Agriculture (Between)	-0.1395	1.4072	-0.2745
	(-0.23)	(1.10)	(-0.45)
Food Imports (Between)	-0.0706	0.7142	-0.0105
	(-0.06)	(0.37)	(-0.01)
Health Expenditure (Between)	-8.1116***	-10.8024*	-7.0956**
	(-3.04)	(-1.81)	(-2.12)
Secondary Schooling (Between)	-1.0854**	-1.1323**	-1.5176***
	(-2.50)	(-2.11)	(-2.90)
Region Dummies	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes
Observations	1,512	1,512	1,512
Number of groups		132	132
R-squared	0.5543	0.5719	
Wald chi2			682.84

Notes: t-statistics in parentheses. Heteroskedasticity robust standard errors clustered at the country level.

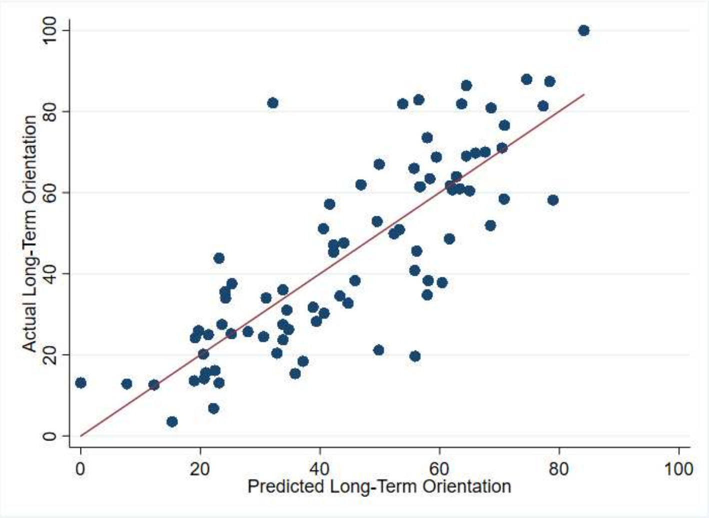

Fig. 1. Actual vs. Predicted Long-Term Orientation.

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Highlights

Can the cultural origins of time preference have an impact on modern obesity rates?

We test this hypothesis using a sample of 132 countries

We estimate the determinants of time preference and the impact of long-term orientation on obesity

Historically long-term oriented countries exhibit lower obesity rates today