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'Globesity'? The effects of globalization on obesity and caloric intake

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ABSTRACT

We examine the effect of globalization, in its economic and social dimensions, on obesity and caloric intake, namely the so –called 'globesity' hypothesis. Our results suggest a robust association between globalization and both obesity and caloric intake. A one standard deviation increase in globalization is associated with a 23.8 percent increase in obese population and a 4.3 percent rise in calorie intake. The effect remains statistically significant even after using an instrumental variable strategy to correct for some possible reverse causality and ommited variable bias, a lagged structure, and corrections for panel standard errors. However, we find that the primary driver (of the 'globesity' phenomenon) is the 'social' rather than the 'economic' dimension of globalization, and specifically the effect of changes in 'information flows' and 'social proximity' on obesity. A one standard deviation increase in social globalization increased the percentage of obese population by 13.7 percent.

1. Introduction

The upsurge in the prevalence of obese or overweight population between 1985 and 2005 is still largely unexplained (Finucane et al., 2011). However, it is noticeable that it coincides with an increasing economic and social interdependence which is conventionally regarded as the 'globalization period' (ILO, 2004).[1] The latter, that is the association between obesity and globalization, can be denoted as the "*globesity* hypothesis". Some have referred to 'globesity' as the outcome of the speeding of the "nutrition transition" (Frenk, 2012). However, to the best of our knowledge, the hypothesis has not been successfully tested. The only exception is Ljungvall (2013) who examines one of the dimensions of interest, namely economic globalization, and finds evidence of an association with obesity.

This paper is the first one to carefully take the 'globesity hypothesis' to the data. That is, firstly we examine whether the expansion of economic and social interdependence is associated with the epidemic of obesity,[2] and secondly, we identify some of the potential explanatory pathways.

In disentangling the effects of globalization, it is important to distinguish at least two relevant dimensions, namely an *economic dimension*, relative to the world's increasing economic interdependence, and an equally relevant *social dimension* that pertains to lifestyle changes influencing how people live and work (ILO, 2004). Physiologically, obesity and being overweight result from an energy imbalance (Jéquier and Tappy, 1999), which has both environmental and genetic determinants (Bell et al., 2005). However, the global nature of the phenomena suggests the need to analyze other underlying mechanisms such as the food price decline (Hummels, 2007)[3] which can have an independent effect. The same applies to the effect of idiosyncratic economic shocks and, social

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[1] To date, the size of the overweight population exceeds the size of the underweight population measured using body mass index (BMI), (Popkin, 2007).

[2] Obesity is regarded as an epidemic, its regarded as one of the most important risk factors contributing to morbidity in advanced economies (Rosebaum et al., 1997; WHO, 2002), and it accounts for a fairly large proportion of healthcare expenditures in many advanced economies (Cawley and Meyerhoefer, 2012; Knai et al., 2007; Thompson and Wolf, 2001; Ebbeling et al., 2002).

[3] The average revenue per ton-kilometre shipped dropped by 92 percent between 1955 and 2004 (Hummels, 2007).

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changes (Appadurai, 1996), which can lead to the expansion of income inequality (Bergh and Nilsson, 2010b; Karlsson et al., 2010; Milanovic, 2005; Williamson, 1997).

A visual examination the data suggests evidence of a smooth association between obesity and globalization as retrieved from Fig. 1.[4] Such association is reproduced when globalization and calorie intake is examined in Fig. 2 at an ever steeper slope. Hence, a pertaining question refers to whether these associations alone explain the effects of globalization, or perhaps, whether there are other confounders driving the relationship? If globalization does indeed exert an effect on obesity and overweight, what mechanisms are the most likely at play in driving a causal influence? Is there still an effect of globalization, or of some of its dimensions (and components), when other mechansims are accounted for?

This paper sets out to empirically study the hypothesized association between globalization (and its different dimensions) and both obesity and caloric intake drawing upon a balanced panel of countries over the period where the obesity epidemic materialized. We run a battery of specifications employing different controls, conducive of alternative explanations of such epidemic including changes in living standards, income inequality, women's labor market participation,[5] and food prices to identify the arithmetic of the 'globesity phenomenon' (Bleich et al., 2008a; Jéquier and Tappy, 1999; Popkin, 2001). Furthermore, given that potential endogeneity of globalization on health outcomes, we follow the literature and employ an instrumental variable (IV) strategy to account for potential bias in our estimates. Consistently with prior research on globalization (Potrafke and Ursprung, 2012), we avoid using single measures such as trade liberalization, and we have decided to follow instead an index measure that summarizes different components of what globalization entails. Specifically, we draw on a widely accepted measure of globalization, the KOF index (and an alternative index for robustness purposes). The advantage of using an index measure is that in addition to measuring globalization, it allows for a decomposition of its different dimensions, and distinct categories within each dimension (Dreher, 2006a). The latter is important when one needs to control for socio-economic constraints that cannot be measured individually (Offer et al., 2013). Globalization indexes have been widely employed in a number of previous studies,[6] although the impact on health and nutrition has been overlooked with the exception of the effect on life expectancy (Bergh and Nilsson, 2010a). However, life expectancy changes refer to wider welfare effects influencing the time span of an individual's life, rather than their quality of life.

We exploit cross-country and time-series variation in a panel of 26 countries over the years 1989–2005,[7] a period when globalization exhibited the most dramatic expansion. Our data set comprises aggregate data containing the maximum number of countries we could collect at the time of the analysis, for the longer homogeneous period, and different dimensions of globalization (see Tables A1 and A2 in the Appendix). The comprehensive nature of our data enables us to distinguish the impact of globalization on both country specific obesity rates and total caloric intake. We have employed official data published by the Organization for Economic Cooperation and Development (OECD) for our baseline estimates. In addition, we have used

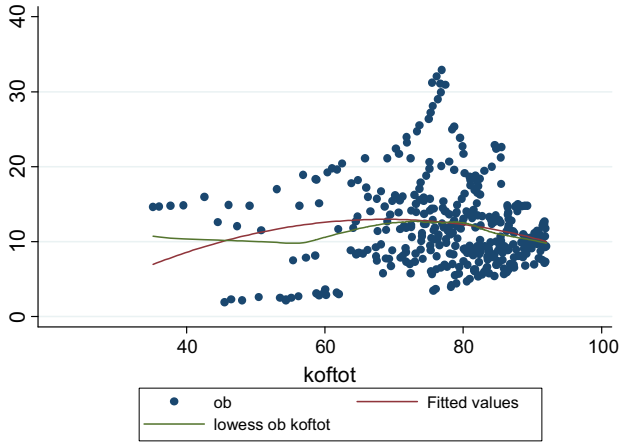

Fig. 1. Obesity rates (adult population) and globalization index. Note: Obesity rate refers to the prevalence (body mass index in excess of 30), plotted against the variation in the KOF index of globalization on a 0–100 scale. A linear trend indicates the fitted least square value and the lower confidence interval. *Source:* OECD, KOF index of globalization.

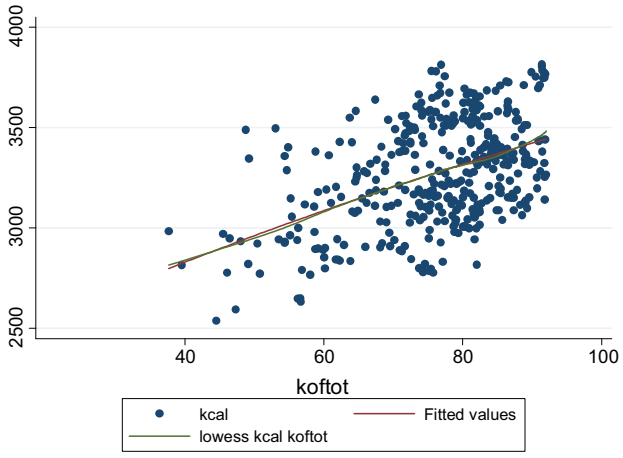

Fig. 2. Kilocalorie intake (adult population) and globalization index. Note: Kilocalorie intake rate refers to the population's daily per capita consumption of kilocalories, plotted against the variation in the KOF index of globalization on a 0–100 scale. A linear trend indicates the fitted least square value and the lower confidence interval. *Source:* OECD, KOF index of globalization.

a second dataset, provided in Finucane et al. (2011) for comparative purposes, which contains comprehensive data from a number of different sources but more limited time variation. Time- and country-fixed effects are used to avoid biased estimates (Achen, 2000; Carson et al., 2010; Lewis-Beck, 2006; Lewis-Beck et al., 2008).

In addition to the results of specifications containing a long list of controls, we report both estimates including lagged effects, and, especially those resulting from an instrumental variable (IV) strategy. The reason to include a number of controls is important to net out the influence of other confounding and compositional effects (e.g., increased urban and built environments, lower food prices due to lower tariffs,[8] employment opportunities for women). The latter inevitably capture some unobserved heterogeneity, which we wish to control for, and allow us to disentangle the 'residual' effect of globalization on obesity after a number of other alternative explanations have been accounted for.

[4] This index was developed by Dreher (2006a). The acronym KOF comes from Konjunkturforschungsstelle, the institute where the index is published.

[5] There is a literature on the effect of female labor market participation on obesity as it increases the opportunity cost of time, giving people incentives to consume more convenience foods (Finkelstein et al., 2005).

[6] Mostly showing that globalization has been beneficial for trade, growth, and gender equality and has not hampered welfare development (Potrafke, 2014)

[7] Data on percentages of the population that are obese include all 26 countries for 1994–2004. From 1989 to 1993, we have data on 12 countries: Austria, Finland, France, Iceland, Japan, the Netherlands, New Zealand, Spain, Sweden, Switzerland, United Kingdom, and United States.

[8] For example, the price of beef has dropped an astounding 80 percent, largely due to global trade liberalization (Duffey et al., 2010).

In the next section, we briefly summarize the most relevant research on the socio-economic determinants of obesity and overweight. Section three reports the data and empirical strategy. We then describe our results and robustness checks in a separate section and finally, section five concludes.

2. Obesity determinants and the effect of globalization

Gains in body weight in the last decades such as those reported in Fig. 1 are unlikely to be explained by genetics alone. Instead they point towards a wider modification of the environment individuals live in (Hill et al., 2000) which we hypothesize result from globalization.

Among different sources of environmental change, one can cite the effect of new technologies (Philipson and Posner, 2003; Lakdawalla and Philipson, 2009) which give rise to new forms of socialization and economic activity, and have transformed both the nature of workplace and leisure activities. Shifts in economic activity in both agriculture and manufacturing sectors furthering the services sector can give rise to a reduction in the demand for physical activity at the workplace (Prentice and Jebb, 1995). However, such physical actitivty reduction has not been homogenous across the world,[9] and it is arguably explained by a sluggish adaptation to energy-saving technological changes (Bleich et al., 2008b; Cutler et al., 2003).

The effects of globalization are concomitant to a reduction of transport costs, and the subsequent *food price* reductions which, might in turn have increased energy consumption, without adjusting energy expenditure. Such mismatch between the energy consumed and expended can be argued to underpein, at least in part, the obesity epidemic. However, the effect of globalization exceeds in magnitude that of food prices alone. The latter is the case insofar as globalization can be linked to more general dietary changes in accordance with the so-called "nutrition transition" (Hawkes, 2006; Kim et al., 2000; Monteiro et al., 1995). That is, diets change towards greater consumption of fat, added sugar, and animal food products, but reduced intake of fiber and cereals (Bray and Popkin, 1998; Duffey et al., 2010).

Another source of influence refers to changes in the exposure to global socio-*cultural environments* (Egger et al., 2012; McLaren, 2007; Monteiro et al., 2000; Costa-Font and Gil, 2004; Costa-Font et al., 2010; Ulijaszek and Schwekendiek, 2012; Ulijaszek, 2007). Such social environmental changes increasingly are recognized as responsible for an "obesogenic environment" (Lake and Townshend, 2006; Swinburn et al., 1999), which predispose people to becoming obese if they follow some prevailing environmental norms. The latter includes changes in the built environment (e.g., reducing the escalator use) and transportation systems saving energy to their passengers. Eating and physical activity patterns are likely to be culturally driven behaviors too, and Wansink (2004) finds that the eating environment (e.g., time taken to eat, standard portions, socialization) is closely associated with the quantity of food consumed.

Other socio- environmental influences result form *an increasing* female labor market participation. This is relevant because women have traditionally played a role in meal preparation and regular shopping for fresh foods (Welch et al., 2009), and they have not not been fully substituted by male partners. Similarly, worldwide urbanization has been linked to sedentary lifestyles (Popkin, 2004) and greater food variety (Raynor and Epstein, 2001), both of which can explain an expansion of obesity rates (Bleich et al., 2007; Hu et al., 2003; Robinson, 1999). Social lifestyle factors also can reduce neighborhood socialization while, at the same time, increase the use of information technologies promoting sedentary recreation activities through television, telephones, or computers (Frenk et al., 2003). However, the effect of urbanization also might vary with economic development, as we discuss subsequently. One can expect different socio-cultural environments to arise in developed urban areas compared with less developed sites. The empirical effect of urbanisation thus is ambiguous (Eid et al., 2008; Lopez, 2004; Zhao and Kaestner, 2010).

Socioeconomic inequality plays a role in explaining obesity and overweight. Sobal and Stunkard (1989) who review more than a hundred studies find clear evidence of an association between socio-economic status and obesity. More specifically, an inverse association between social class (Sobal, 1991), education (Sundquist and Johansson, 1998)[10], income (Costa-Font and Gil, 2008) and obesity is well established worldwide. At a macroeconomic level, Ruhm (2000) finds that both obesity increases and physical activity declines during business cycle expansions, consistently with a socio-economic gradient on obesity.

Finally, *time constraints* (related to globalization) engender stressful and sedentary lifestyles (Phillipson, 2001; Costa-Font and Gil, 2006) and explain the rise in the consumption of fast food which, in turn are found to increase the risk of obesity (Chou et al., 2008; Bowan and Gortmaker, 2004; Jeffery and French, 1998; Offer et al., 2010).

In light of the brief overview above next, we empirically test whether either economic (e.g., lower prices) or social (e.g., Westernization of diets, lifestyles) dimensions of globalization explain the obesity epidemic, considering the distinct implications that each factor poses for policy.

3. Data and empirical strategy

3.1. Data

We attempt to examine the association between obesity and caloric intake with globalization using the largest sample available at the time of this study. Accordingly, we gathered unique, country-level data from several sources, such that our analysis relies on a panel data set of 26 countries spanning from 1989 to 2005. Due to restrictions in data availability, we faced a trade-off between the number of countries to include in the study (a very large number of countries over a short time period versus a longer time period that includes lesser countries). We chose the sample that provided us with the largest possible number of observations, and as we explain below, we tested the robustness of our estimates by using an alternative sample with a larger number of countries for a short period from Finucane et al. (2011). We summarize the study data in Table 1. Specifically, we organise the variables in terms of the two dependent variables, a set of variables measuring globalization and a number of controls.

3.1.1. Obesity rate

As our main dependent variable, we measure the percentage of the population of a given country that is obese, using data from the OECD Health Data and the Data Global Database on Body Mass Index collected by the World Health Organization.[11] A person is considered obese if her BMI (kg/m^2) is over 30.[12] The average obesity

[9] An exception is Paeratakul et al. (1998) who find evidence of changes in physical activity and obesity in China even where some population is less exposed to globalization, (including social globalization).

[10] Recent studies argue that inequalities in obesity can be traced to gender, age, and ethnicity (Dreeben, 2001; Zhang and Wang, 2004). However, the interpretation of income inequality is not causal when using individual data.

[11] For detailed information on OECD country surveys, see http://www.oecd.org/eco/surveys/. Additional data can be found at http://apps.who.int/bmi/index.jsp.

[12] In a few cases, we inferred missing data by assuming a constant growth rate.

Table 1
Summary statistics.

	Mean	Std. Dev.
Dependent variables		
Obese (percentage of population with BMI > 30)	11.9937	5.683745
Daily kcal per capita	3273.473	262.4789
Globalization measures		
KOF Index of Globalization	76.38137	11.2139
KOF Economic Globalization	73.26112	13.1
KOF Actual Flows	64.01112	19.50979
KOF Restriction	82.97882	11.69536
KOF Social Globalization	74.45437	12.27322
KOF Personal Contact	71.65053	11.39363
KOF Information Flows	76.17981	12.18239
KOF Cultural Proximity	75.42042	23.77102
KOF Political Globalization	83.05968	15.78976
CSGR Globalization Index	51.84125	0.1967204
CSGR Economic Globalization	15.28149	0.0583496
CSGR Social Globalization	27.80759	0.1848005
CSGR Political Globalization	54.42806	0.1988458
Social, economic and geographic controls		
GDP per capita (in thousands)	21.69923	11.66909
GINI Inequality Index	29.32482	5.161923
Population of the country	31.64149	55.23773
Female labor market participation	43.76999	3.558793
Food price/consumer Price Index	1.051514	0.0785037
Population in urban areas (per cent)	73.78697	11.22828
Education (girls to boys ratio at school)	1.027249	0.0596855

Notes: KOF index: Index from the Swiss federal institute of technology. BMI refers to body mass index. CSGR Index: Index from the University of Warwick GDP: Gross Domestic product data from 1989 to 2004. Countries included: Austria, Finland, France, Iceland, Japan, Netherlands, New Zealand, Spain, Sweden, Switzerland, UK, USA, Belgium, Canada, Denmark, Italy, Norway, Poland, Portugal, Slovakia, Australia, Estonia, Hungary, Ireland, Lithuania, Malaysia.

rate for the sample of countries in our study is 12% but it has grown over time, consistently with the existence of an obesity epidemic (see Table 1 and Fig. 1).

3.1.2. Daily intake of calories

As an explanantory mechanism, we use calorie intake as a dependent variable too. Previous literature has found that the main driving force behind the rise of obesity is an increase in calorie intake, rather than a reduction in calories burned (Bleich et al., 2008a). Using data from Russia, Huffman and Rizov (2007) confirm the strong positive effect of caloric intake on obesity. Taking this into account we also measure the effect of globalization on caloric intake,[13] using data from FAOSTAT.[14]

3.1.3. Globalization measures

Globalization is a multi-dimensional concept that cannot be captured by one single variable, so we exploit a comprehensive index employed in a large number of studies that integrates three dimensions of globalization, which in turn comprise 24 subcomponents. The data reveals that globalization is a rapidly occurring phenomenon. The average index value of 37 in 1970 almost doubled to 62 in 2009. In order to disentangle the mechanisms by which the expansion of globalization could have led to a rise in obesity, we consider two dimensions of globalization: the economic and the social (see Tables A1–A3 in the Appendix), following Keohane and Nye's (2000) disaggregation. We use data from two alternative globalization indices (Bergh and Nilsson, 2010b; Dreher, 2006b; Potrafke, 2010): the *CSGR Globalization Index*, developed by the University of Warwick Globalization Project (see Lockwood and Redoano, 2005) and the *KOF Index* (Dreher, 2006a; Dreher and Gaston, 2008; Dreher et al., 2008). The description of their components and the correlation between these two indices suggests that their results should be very similar (see the Appendix). The CSGR and KOF economic indices exhibit a correlation of only 0.48, whereas correlations for the social and political indices are of magnitudes 0.70 and 0.82, respectively (see Table A3).

3.1.4. Other explanatory variables

GDP per capita at current prices (US dollars), was collected from the IMF's World Economic Outlook Database. To take into account the possibility that obesity rates are associated to GDP in a non-linear fashion, we control both for GDP per capita and its square. We include the *percentage of women in the economically active population of each country*, using data obtained from the World Bank's Health, Nutrition, and Population (HNP) statistics. To measure *urbanization*, we calculated the percentage of urban population in a country using data from the United Nations' 2011 World Urbanization prospects report. Given that the data refers to five-year spans, we interpolated the values corresponding to the four years in between each measure. We also include in our list of controls the index of food prices over the consumer prices index in each country. These data were collected from the OECD and Eurostat for all countries; except for Malaysia and Lithuania where we use data from FAO.[15]

We obtained the *Gini index* from the Standardized World Income Inequality Database, Version 3.1, released on December 2011. The Gini index is a common measure of within country income inequality, such that a value of 0 represents perfect equality (with all citizens earning the exactly same income), whereas a value of 1 indicates maximal inequality (such that only one person possesses all the country's income).

We include as an additional control the female to male net enrollment in secondary education (calculated by dividing the female value for the indicator by the male value). A gender parity index (GPI) equal to 1 indicates parity across genders; a value less than 1 generally indicates disparity in favor of men, whereas values greater than 1 would imply disparity in favor of women. We gathered these data from the UNESCO Institute for Statistics.[16] We include the country's population as a control which we measured in millions, and the data obtained from the World Bank Database.

In addition, we used two geographical variables (constant over time, and extracted from the CIA Factbook) to instrument for globalization: *coastline*, or the total length (kilometers) of the boundary between the land area (including islands) and the sea, and *land boundaries*, equal to the total length (kilometers) of all land between the country and its bordering country or countries.

3.2. Empirical strategy

To examine the relationship of interest, we use a specification that relates overall globalization, as well as its economic and social dimensions (and its components), to the variables of interest: obesity and daily calorie intake in different countries over time. The basic specification is:

$$O_{tj} = \alpha + G_{tjs}\ \beta + \Sigma X_{jt}\delta + \gamma_t + u_j + \varepsilon_{tj}, \quad (1)$$

where s denotes the sth dimension (or component) of globalization (when relevant), i refers to the country, t indicates the time dimension, O_{tj} reflects obesity rates (or daily intake of calories) in a year t and a country j, G is a measure of globalization, X includes all relevant country characteristics that have an impact on obesity, γ_t refers

[13] For robustness checks we also look at the relationship between Globalization and the grams of fat consumed (resulting regressions can be found in the Appendix)

[14] Food and Agricultural Organization of the United Nations (http://faostat.fao.org/site/354/default.aspx).

[15] http://stats.oecd.org/Index.aspx?DataSetCode=MEI_PRICES. http://faostat.fao.org/site/683/DesktopDefault.aspx?PageID=683#ancor.

[16] In a few cases, we lacked data for a few years, and we inferred them by assuming a constant growth rate.

to time effects, u_j encompasses country fixed effects, and ε_{tj} refers to the error term.

We begin by testing the effect of the overall index of globalization on obesity and calorie intake, with only standards of living and inequality controls as a baseline specification. Next, we include the different dimensions of economic and social globalization (political globalization never resulted in significant findings, so we do not discuss it further), as well as its distinct components. All of our ordinary least square (OLS) specifications use robust standard errors to correct for potential heteroscedasticity. Because globalization implies a greater integration between economies and societies, the errors could be correlated across countries. To allow for heterocedasticity and contemporaneously correlated errors across countries, we also use a panel-corrected standard error procedure (PCSE; following Beck and Katz, 1995). In addition, we also expand our controls to include a battery of potential confounders and other compositional variables affected by globalization, which might indirectly explain the development of an obesity epidemic.

Finally, to account for some potential endogeneity of globalization on obesity, we follow an instrumental variable (IV) strategy, which meets both theoretical relevance criteria, and simultaneously exhibits overall significant F-test in a first stage. Estimates reported are obtained employing generalized methods of moments (GMM), and we report the standard errors, which are robust to heteroscedastic and serially correlated residuals (see Tables 4 and 5). Specifically, our instruments refer to coastline and land boundaries which have been extensively employed in previous studies. Theoretically, coastline and land boundaries are barriers to trade and social communication, hence we expect the higher the barriers, the slower the exposure to globalization. We calculated an F-test for the exclusion of instrument(s) based on the first-stage regression; and consider our instrument(s) valid if the F-statistic exceed the value of 10 (Staiger and Stock test). We also applied the Cragg-Donald test of the null prediction that the model is underidentified, that is, that Z does not sufficiently identify X. Only if the instrument(s) satisfied both tests did we proceed.

Finally, we have estimated the above equation using time lags (t – p), acknowledging that the effect of globalization on obesity might not be contemporaneous. Similarly, we have examined a nonlinear (both quadratic and cubic) association between globalization and obesity and calorie intake but then the results did fail to show evidence of a nonlinear association.

Table 2
OLS and Panel Corrected Standard Error (PCSE) regressions. Dependent variable: OBESITY.

	OLS			PCSE	OLS			PCSE	OLS			PCSE
	1A	1B	1C	1D	2A	2B	2C	2D	3A	3B	3C	3D
Measures of globalization												
Overall globalization index	−0.087	0.231	0.255***	0.118***								
	[0.114]	[0.153]	[0.067]	[0.035]								
Economic globalization index					−0.126	0.075	0.110	0.065***				
					[0.119]	[0.070]	[0.068]	[0.023]				
Actual flows (economic glob. index)									−0.082	0.016	0.067	0.037**
									[0.096]	[0.058]	[0.047]	[0.017]
Restrictions (economic glob. index)									−0.143	−0.103	−0.064	−0.035
									[0.098]	[0.070]	[0.074]	[0.025]
Social globalization index					0.078	0.209**	0.134*	0.080***				
					[0.131]	[0.086]	[0.078]	[0.023]				
Personal contact (social glob. index)									−0.072	0.229**	0.117	0.144***
									[0.119]	[0.101]	[0.083]	[0.035]
Information flows (social glob. index)									0.234***	0.216***	0.128*	0.036
									[0.062]	[0.065]	[0.075]	[0.022]
Cultural proximity (social glob. index)									−0.018	−0.012	0.005	−0.011
									[0.038]	[0.037]	[0.034]	[0.008]
Social, economic and geographic controls												
GDP per capita (in thousands)		−0.577	−0.525**	−0.414***		−0.576**	−0.488**	−0.423***		−0.486**	−0.416**	−0.404***
		[0.296]	[0.197]	[0.076]		[0.229]	[0.196]	[0.074]		[0.200]	[0.201]	[0.091]
(GDP per capita (in thousands))^2		0.006	0.006*	0.005***		0.006	0.005	0.005***		0.004	0.004	0.005***
		[0.005]	[0.003]	[0.001]		[0.004]	[0.003]	[0.001]		[0.004]	[0.003]	[0.001]
Gini		0.026	0.614***	0.422***		0.023	0.540***	0.343***		−0.090	0.406**	0.268***
		[0.196]	[0.174]	[0.081]		[0.195]	[0.177]	[0.076]		[0.156]	[0.186]	[0.072]
Population of the country		0.063***	0.054***	0.046***		0.070***	0.061***	0.052***		0.087***	0.075***	0.066***
		[0.021]	[0.011]	[0.003]		[0.018]	[0.010]	[0.004]		[0.014]	[0.010]	[0.004]
% of Women in the active population			0.706***	0.624***			0.653***	0.595***			0.562***	0.533***
			[0.167]	[0.062]			[0.187]	[0.064]			[0.171]	[0.067]
Food price/CPI			29.971***	12.288***			25.452***	11.666***			21.579***	8.760***
			[6.591]	[3.661]			[6.598]	[3.454]			[6.763]	[3.226]
Urbanization			0.166***	0.102***			0.140**	0.093***			0.135**	0.083***
			[0.057]	[0.027]			[0.059]	[0.026]			[0.050]	[0.026]
Education (% of girls respect % of boys at school)			−0.577	0.165			0.893	0.399			1.962	1.192
			[7.209]	[2.561]			[7.721]	[2.674]			[6.809]	[2.473]
N	375	362	341	341	375	362	341	341	375	362	341	341
R-squared	0.087	0.491	0.731	0.631	0.112	0.554	0.738	0.644	0.195	0.656	0.766	0.666

Notes: Expressions A, B and C correspond to a pooled OLS, clustered by cfountry while expressions D correspond to Panel Corrected Standard Errors. Robust standard error values appear in brackets below the regression coefficient. All regressions include a time trend and they are clustered by country. GDP: Gross Domestic Product; CPI: Consumer Price Index; Globalization Index: KOF. Countries included: Austria, Finland, France, Iceland, Japan, Netherlands, New Zealand, Spain, Sweden, Switzerland, UK, USA, Belgium, Canada, Denmark, Italy, Norway, Poland, Portugal, Slovakia, Australia, Estonia, Hungary, Ireland, Lithuania, Malaysia.
Statistically significantly different from zero:
* At the 10% level.
** At the 5% level.
*** At the 1% level.

3.3. Robustness

To check for the robustness of our findings, we have used several alternative specifications in which we varied the number of control variables, the globalization index (KOF or CSGR), the econometric approach, and the different dimensions of the globalization index measures (and its components as reported see Tables A1 and A2 in the Appendix). Similarly, we have employed another more recent dataset to measure obesity obesity from Finucane et al. (2011), which employs estimates from published and unpublished health examination surveys and epidemiological studies.

4. Results

4.1. Baseline estimates

Table 2 reports the OLS and PCSE results, measuring the effect of overall globalization and its economic and social dimensions on obesity. In all cases, total globalization exhibited a significantly positive relationship with the three dependent variables.

According to Table 2, a naïve specification exhibited no significant association between globalization and obesity, but the inclusion of a number of reasonable controls which capture the

Table 3
OLS and Panel Corrected Standard Error (PCSE) regressions. Dependent variable: KCAL CONSUMED.

	OLS			PCSE	OLS			PCSE	OLS			PCSE
	1A	1B	1C	1D	2A	2B	2C	2D	3A	3B	3C	3D
Measures of globalization												
Overall globalization index	12.5667*** [3.470]	14.128*** [5.080]	12.583** [5.323]	10.008*** [1.797]								
Economic globalization index					0.673 [5.084]	4.720 [5.268]	4.122 [4.379]	3.467** [1.472]				
Actual flows (economic glob. index)									−4.876 [2.918]	−2.533 [3.060]	−5.066*** [1.759]	−2.498* [1.316]
Restrictions (economic glob. index)									5.490 [4.363]	1.305 [5.293]	5.805 [3.408]	1.799 [1.361]
Social globalization index					8.466* [4.726]	5.391 [4.874]	6.428 [3.927]	5.486*** [1.420]				
Personal contact (social glob. index)									10.618* [4.981]	15.084*** [5.274]	17.551*** [3.171]	14.691*** [2.034]
Information flows (social glob. index)									−1.362 [5.044]	−0.981 [5.238]	1.501 [4.003]	1.942 [1.462]
Cultural proximity (social glob. index)									1.482 [2.139]	−0.623 [1.940]	−0.814 [1.559]	−0.405 [0.491]
Social, economic and geographic controls												
GDP per capita (in thousands)		4.051 [11.969]	28.603** [11.825]	13.963*** [4.393]		10.386 [12.848]	33.22** [12.063]	16.333*** [4.555]		9.341 [14.581]	5.623 [11.510]	6.912* [4.180]
(GDP per capita (in thousands))^2		−0.064 [0.198]	−0.457** [0.199]	−0.171** [0.068]		−0.172 [0.214]	−0.538** [0.205]	−0.213*** [0.070]		−0.219 [0.250]	−0.160 [0.192]	−0.118* [0.061]
Gini		4.007 [11.491]	8.832 [8.538]	0.527 [4.452]		3.905 [11.389]	6.472 [8.738]	−0.740 [4.483]		−1.086 [9.517]	−13.517 [8.592]	−10.180** [4.587]
Population of the country		1.439** [0.556]	1.089** [0.431]	1.240*** [0.215]		1.486** [0.612]	1.242** [0.517]	1.399*** [0.270]		1.893** [0.697]	1.950*** [0.603]	2.058*** [0.300]
% of Women in the Active Population			8.094 [12.648]	−1.859 [5.722]			6.909 [13.034]	−3.362 [5.633]			−18.821 [11.479]	−15.119*** [5.682]
Food price/CPI			176.866 [349.734]	148.331 [162.280]			−1.792 [336.127]	78.349 [161.732]			−569.223** [262.779]	−164.451 [150.150]
Urbanization			−10.349** [4.161]	−6.866*** [2.166]			−12.065** [4.466]	−7.794*** [2.249]			−8.390** [4.011]	−7.027*** [1.724]
Education (% of girls respect % of boys at school)			−501.435 [441.671]	−211.603 [169.185]			−406.113 [469.321]	−188.021 [169.473]			−316.336 [339.533]	−113.14 [161.343]
N	395	384	353	353	395	384	353	353	395	384	353	353
R-squared	0.227	0.320	0.495	0.956	0.154	0.271	0.482	0.955	0.275	0.378	0.585	0.958

Notes: Expressions A, B and C correspond to a pooled OLS, clustered by country while expressions D correspond to Panel Corrected Standard Errors. Robust standard error values appear in brackets below the regression coefficient. All regressions include a time trend and they are clustered by country. GDP: Gross Domestic Product; CPI: Consumer Price Index; Globalization Index: KOF. Countries included: Austria, Finland, France, Iceland, Japan, Netherlands, New Zealand, Spain, Sweden, Switzerland, UK, USA, Belgium, Canada, Denmark, Italy, Norway, Poland, Portugal, Slovakia, Australia, Estonia, Hungary, Ireland, Lithuania, Malaysia.
Statistically significantly different from zero:
* At the 10% level.
** At the 5% level.
*** At the 1% level.

Table 4
Robustness checks (I). Dependent variable: Obesity.

	IV	CSGR			
	IV-1C	OLS-1C	PCSE-1D	OLS-2C	PCSE-2D
Measures of globalization					
Overall globalization index	0.255**	0.078**	0.037***		
	[0.103]	[0.037]	[0.011]		
Economic globalization index				0.031	0.039
				[0.088]	[0.029]
Social globalization index				0.114***	0.053***
				[0.035]	[0.013]
Social, economic and geographic controls					
Socioeconomic	YES	YES	YES	YES	YES
Demographic	YES	YES	YES	YES	YES
Food price/CPI	YES	YES	YES	YES	YES
N	341	315	315	315	315
R-squared	0.731	0.711	0.646	0.720	0.656

Notes: The first column reproduces expression 1C instrumenting for globalization using Coastline and Land boundaries as IVs. The next four columns replicate expressions 1C, 1D, 2C and 2D using an alternative globalization index from CSGR. Robust standard error values appear in brackets below the regression coefficient. All regressions include a time trend and they are clustered by country. Socioeconomic controls include: GDP, GDP squared, Gini index, % of women in active population, Education as defined in previous tables. Demographic controls include: Population, Urbanization. Countries included: Austria, Finland, France, Iceland, Japan, Netherlands, New Zealand, Spain, Sweden, Switzerland, UK, USA, Belgium, Canada, Denmark, Italy, Norway, Poland, Portugal, Slovakia, Australia, Estonia, Hungary, Ireland, Lithuania, Malaysia.
Statistically significantly different from zero:
* At the 10% level.
** At the 5% level.
*** At the 1% level.

Table 5
Robustness checks (I). Dependent variable: kcal consumed.

	IV	CSGR			
	IV-1C	OLS-1C	PCSE-1D	OLS-2C	PCSE-2D
Measures of globalization					
Overall globalization index	19.708***	5.286*	4.179***		
	[5.692]	[2.877]	[0.652]		
Economic globalization index				1.786	2.363
				[8.629]	[3.044]
Social Globalization Index				3.684	2.984***
				[2.331]	[0.751]
Social, economic and geographic controls					
Socioeconomic	YES	YES	YES	YES	YES
Demographic	YES	YES	YES	YES	YES
Food price/CPI	YES	YES	YES	YES	YES
N	316	294	294	294	294
R-squared	0.434	0.489	0.866	0.427	0.427

Notes: The first column reproduces expression 1C instrumenting for globalization using Coastline and Land boundaries as IVs. The next four columns replicate expressions 1C, 1D, 2C and 2D using an alternative globalization index from CSGR. Robust standard error values appear in brackets below the regression coefficient. All regressions include a time trend and they are clustered by country. Socioeconomic controls include: GDP, GDP squared, Gini index, % of women in active population, Education as defined in previous tables. Demographic controls include: Population, Urbanization. Countries included: Austria, Finland, France, Iceland, Japan, Netherlands, New Zealand, Spain, Sweden, Switzerland, UK, USA, Belgium, Canada, Denmark, Italy, Norway, Poland, Portugal, Slovakia, Australia, Estonia, Hungary, Ireland, Lithuania, Malaysia.
Statistically significantly different from zero:
** At the 5% level.
* At the 10% level.
*** At the 1% level.

presence of compositional effects, delivers a large significant and positive coefficient. Next, we seek to disentangle the specific effect of various dimensions of globalization and, subsequently, we examine their components to ascertain which dimensions have the most potential for engendering an obesity epidemic. We find that globalization increases the prevalence of obesity, especially after controlling for inequality and economic development. However, when we distinguish between its economic and social dimensions, we find that this effect is primarily driven by changes in social globalization alone. When we control for GDP per capita, inequality measures (Expression 2b), these effects overshadow the influence of economic globalization on obesity, and even report small non- robust coefficients. In contrast, social globalization displays a robust effect on both obesity and calorie intake, which, judging on the dimensions that appear as significant, suggests that wider social constraints on personal contact and information flows might explain the rise in the prevalence of obesity. We have further tested whether our results are driven by outliers (e.g., US), but the results still hold invariant to its exclusion.

Expressions 1c and 2c in Table 2 expand further the number of controls and they include also the relative variation of food prices, the share of women in the economically active population and education. The overall impact of globalization (expression 1c) suggests the following effect size: a one standard deviation increase in the KOF globalization index related to a rise of 23.8 percent in the prevalence of obesity.

We then specify the contribution of different components of economic and social globalization in 2a to 2d, and again we further disaggregate such components in personal contact and information flows (both of which appear as significant determinants of obesity

Table 6
Robustness checks (II). Lagged globalization effects.

	Dependent variable: obesity			Dependent variable: kcal		
	KOF OLS-1C	KOF OLS-2C	IV IV-1C	KOF OLS-1C	KOF OLS-2C	IV IV-1C
Measures of globalization						
Overall globalization index	0.246***		0.255***	11.981**		19.107***
	[0.063]		[0.097]	[5.255]		[5.602]
Economic globalization index		0.099			4.229	
		[0.068]			[4.411]	
Social globalization index		0.137*			5.738	
		[0.075]			[4.049]	
Social, economic and geographic controls						
Socioeconomic	YES	YES	YES	YES	YES	YES
Demographic	YES	YES	YES	YES	YES	YES
Food price/CPI	YES	YES	YES	YES	YES	YES
N	340	340	340	352	352	352
R-squared	0.734	0.739	0.733	0.488	0.472	0.734

Notes: The IV reproduces expression 1C instrumenting for globalization using Coastline and Land boundaries as IVs. Robust standard error values appear in brackets below the regression coefficient. All regressions include a time trend and they are clustered by country. Socioeconomic controls include: GDP, GDP squared, Gini index, % of women in active population, Education as defined in previous tables. Demographic controls include: Population, Urbanization. Countries included: Austria, Finland, France, Iceland, Japan, Netherlands, New Zealand, Spain, Sweden, Switzerland, UK, USA, Belgium, Canada, Denmark, Italy, Norway, Poland, Portugal, Slovakia, Australia, Estonia, Hungary, Ireland, Lithuania, Malaysia.
Statistically significantly different from zero:
* At the 10% level.
** At the 5% level.
*** At the 1% level.

Table 7
Robustness checks (III). Dependent variable: obesity from Finucane 2011.

	Mean Women			Mean Men		
	KOF OLS-1C	KOF OLS-2C	IV IV-1C	KOF OLS-1C	KOF OLS-2C	IV IV-1C
Measures of globalization						
Overall globalization index	0.070**		0.010***	0.069**		0.092***
	[0.031]		[0.024]	[0.028]		[0.025]
Economic globalization index		0.003			0.000	
		[0.015]			[0.019]	
Social globalization index		0.054**			0.055**	
		[0.023]			[0.022]	
Social, economic and geographic controls						
Socioeconomic	YES	YES	YES	YES	YES	YES
Demographic	YES	YES	YES	YES	YES	YES
Food price/CPI	YES	YES	YES	YES	YES	YES
N	46	46	46	46	46	46
R-squared	0.657	0.667	0.626	0.578	0.601	0.559

Notes: The IV reproduces expression 1C instrumenting for globalization using Coastline and Land boundaries as IVs. Robust standard error values appear in brackets below the regression coefficient. All regressions include a time trend and they are clustered by country. Socioeconomic controls include: GDP, GDP squared, Gini index, % of women in active population, Education as defined in previous tables. Demographic controls include: Population, Urbanization. Countries included: Austria, Finland, France, Iceland, Japan, Netherlands, New Zealand, Spain, Sweden, Switzerland, UK, USA, Belgium, Canada, Denmark, Italy, Norway, Poland, Portugal, Slovakia, Australia, Estonia, Hungary, Ireland, Lithuania, Malaysia.
Statistically significantly different from zero:
* At the 10 percent level.
** At the 5% level.
*** At the 1% level.

rates in columns 3a to 3d). However, the effect only becomes significant after we controlled for the reduction in food prices and the increasing percentage of active women in the labor force, which has a consistently positive and significant effect on obesity. When we decompose the globalization index on that of its components, economic components appear to be either not significant or exhibit negligible coefficients, while social globalization effects are robust. Similarly, when we in turn decompose the social globalization in its components, we find that the significant effect is driven by changes in personal contacts, and information flows. These provide some initial confirmation of the intuitive effects social globalization dimension exerts on obesity as described in previous sections. The effect size indicates that a one standard deviation change in social globalization is found to increase the obesity rate by 13.7 percent.

Table 3 reports the same empirical specification as in Table 2 but for calorie intake. That is, we measure the effect of overall globalization and its economic and social dimensions on calorie intake, and we find that results are consistent with Table 2. Results from Table 3 suggest that globalization increases caloric intake, and that while social globalization exerts a positive and significant association with calorie intake, economic globalization turns out to be non-significant or even revert sign. One standard deviation change in the KOF index of globalization leads to a 4.3 percent increase in calorie consumption. The significance of such effect only depends on the inclusion of urbanization controls.

As in with Table 2, when we distinguish in Table 3 the contributions of different components of economic and social globalization (expressions 3a, 3b 3c and 3d in Table 3), we consistently find that the social globalization effect is mainly driven by personal contact (and information flows in explaining obesity), confirming a general intuition of the westernization of lifestyles.

When we turn to the controls in Tables 2 and 3 to account for compositional effects. We find that the percentage of active women in the labor market exhibited the expected, positive association with obesity prevalence. The effect size indicates that one standard deviation increase in the active female labor force results in a rise of 2.4 percentage points in the share of obese population. Urbanisation appears to be significantly and positively associated obesity rate, but displays a counter effect on calorie intake.

Finally, we find that a rise in per capita income displays a negative effect on population obesity rates, though this impact grew less important among poorer countries. Inequality exerts the opposite effect, higher inequality increases the prevalence of obesity, consistent with the existence of a well-known social gradient of obesity (Costa-Font and Gil, 2008).

Similar results are obtained form regressions looking at the impact of globalization on the grams from fat consumed.[17]

4.2. Robustness checks

Tables 4 and 5 display the results of our robustness checks and sensitivity analysis. We focus on several features that could influence our results: the globalization index employed (KOF versus CSGR), the specification performed (IV or PCSE) and the consideration of lags. All of these estimates include the full set of control variables; the results confirm our previous findings.

When considering the type of specification, it could be the case that some unobserved characteristics are correlated with both globalization and obesity (or calorie intake), and hence drive the association. To address this concern, we draw from an instrumental variable (IV) strategy. As mentioned before, we used two alternative and widely used variables to instrument globalization exposure: *coastline*, or the total length (kilometers) of the boundary between the land area (including islands) and the sea, and *land boundaries*, equal to the total length (kilometers) of all land between the country and its bordering country or countries. Frankel and Romer (1999) pioneered the technique of using geography as an instrument for openness and since then several studies in the literature have adopted geographical measures as instruments for openness or globalization (Wei and Wu, 2001, for example). Results for obesity and calorie intake are presented in the first column of Tables 4 and 5, respectively. The overall effect of globalization remained significant with our IV specification.

The second robustness check we performed in the above tables consisted in using an alternative index of globalization. Specifically, we use the CSGR index as an alternative measure (see Table A2 in the Appendix). We display both OLS and the PCSE specification estimates and distinguish between total CSGR globalization and social and economic CSGR globalization. Once again, we find evidence consistent with robust effects.[18] The effects of social globalization exhibit comparable coefficient magnitudes as previous estimates.

We then address the question of a lagged effect of globalization on obesity and calorie intake (Table 6) by examining the effect of a lagged structure. When we follow this approach only the first lag is

[17] The results can be found in the Appendix (Table A4) and they are consistent with the ones describes here for obesity and calorie intake.

[18] We performed another analysis for a subsample of 23 countries that did not feature any missing information. The relationship of globalization with obesity, calories, and fat consumed persisted

Table A1
The KOF index of globalization.

	Mean (standard deviation) in data
Economic globalization	73.261 (13.100)
(i) Actual flows	64.011 (19.510)
Trade (%GDP)	
Foreign direct investment, stocks (% GDP)	
Portfolio investment (% GDP)	
Income payments to foreign nationals (% GDP)	
(ii) Restrictions	82.979 (11.696)
Hidden import barriers	
Mean Tariff Rate	
Taxes of international trade (% total population)	
Capital account restrictions	
Social globalization	74.454 (12.273)
(i) Personal contact	71.651 (11.394)
Telephone traffic	
Transfers (% GDP)	
International tourism	
Foreign population (% total population)	
International letters (per capita)	
(ii) Information flows	76.180 (12.182)
Internet users (per 1000 people)	
Television (per 1000 people)	
Trade in newspapers (% GDP)	
(iii) Cultural proximity	75.420 (23.771)
Number McDonald's restaurants (per capita)	
Number Ikea (per capita)	
Trade in books (% GDP)	
Political globalization	83.060 (15.790)
Embassies in country	
Membership in international organizations	
Participation in UN security missions	
International TREATIES	

Notes: GDP: Gross domestic product. Data from 1989 to 2004. Countries included: Austria, Finland, France, Iceland, Japan, Netherlands, New Zealand, Spain, Sweden, Switzerland, UK, USA, Belgium, Canada, Denmark, Italy, Norway, Poland, Portugal, Slovakia, Australia, Estonia, Hungary, Ireland, Lithuania, Malaysia.

Table A2
Alternative globalization measures: the CSGR globalization index.

	Mean and Standard deviation in data
Economic globalization	15.281 (5.835)
Trade (% GDP)	
Foreign direct investment (%GDP)	
Portfolio investment (%GDP)	
Income (% GDP)	
Social globalization	27.808 (18.480)
(i) People	
Foreign population stock (% total population)	
Foreign population flow (% total population)	
Worker remittances (% GDP)	
Tourists (% total population)	
(ii) Ideas	
Phone calls (per capita)	
Internet users (% population)	
Films	
Books and Newspapers (imported and exported)	
Mail (per capita)	
Political globalization	54.428 (19.885)
Embassies in country	
UN missions	
Membership in international organizations	

Notes: GDP: Gross domestic product. Data from 1989 to 2004. Countries included: Austria, Finland, France, Iceland, Japan, Netherlands, New Zealand, Spain, Sweden, Switzerland, UK, USA, Belgium, Canada, Denmark, Italy, Norway, Poland, Portugal, Slovakia, Australia, Estonia, Hungary, Ireland, Lithuania, Malaysia.

statistically significant. However, the results suggest that the lagged effects pick up the previous contemporaneous effects, which were not significant together with the effect of one-year lag. We found that the suggested further lags were non significant, and unit root tests suggest no evidence of unit roots. The instrumented and non-instrumented lagged effects of globalization on obesity thus are comparable in magnitude, though they appear to be significantly different when the effect is evaluated on calories consumed.

Finally, Table 7 reports the estimates of comparable regressions as above employing the obesity estimates from Finucane et al. (2011) as a dependent variable. For both men and women, we find a positive and significant effect of globalization. The estimates remain robust whether we instrument the variable globalization or not. Consistently, when we distinguish between economic and social globalization, only the effects of social globalization appear significant consistently with previous results.

An important picture comes out of our findings, namely that the relationship between globalization and obesity is robust and positive, consistently with visual evidence. However, when we disentangle the various mechanisms at play, we find that economic globalization per se does not exert a robust effect on obesity and calorie intake. In contrast, social globalization does indeed exhibit a consistently positive relationship, suggesting that globalization by impacting the social life of individuals, exerts deeper effect on individuals lifestyles and fitness.

5. Conclusions

This paper sets out to examine the association between globalization (including its social and economic dimensions) and obesity alongside calorie intake. We find some intriguing results. First, we identify an effect of globalization on obesity which is robust to different specifications and empirical strategies. Second, we find that such effect is mainly (though not exclusively) driven by the 'social globalization' dimension of the index which is rather robust and significant, irrespective of the measure employed. Third, upon disentangling the influence of different components of social globalization, we find they were driven by changes in either 'information flows' and 'social proximity'. In contrast, we find that our previously significant effects of economic globalization (in naïve specifications without controls) were primarily driven by compositional effects, and more specifically, they were sensitive to the inclusion of the reduction in relative food prices as a control.

Our results are found to be robust to different globalization indexes and measures of obesity, alongside alternative explanations of the globesity hypothesis such as the independent effect of increasing female labor market participation, income inequality and national income, alongside urbanization. Specifically, we confirm the influence of the expansion of female labor market participation on all dependent variables. In contrast, the effect of urbanization, is found to be more ambiguous. This might reflect

Table A3
Correlations between the two different globalization indices.

	KOF economic	KOF social	KOF political
CSGR economic	0.48		
CSGR social		0.70	
CSGR political			0.82

Table A4
OLS and Panel Corrected Standard Error (PCSE) regressions. Dependent variable: GRAMS FROM FAT CONSUMED.

	OLS			PCSE	OLS			PCSE	OLS			PCSE
	1A	1B	1C	1D	2A	2B	2C	2D	3A	3B	3C	3D
Measures of globalization												
Overall globalization index	1.538***	1.649***	1.772***	1.260***								
	[0.265]	[0.395]	[0.468]	[0.167]								
Economic globalization index					0.003	0.058	0.001	0.135				
					[0.260]	[0.281]	[0.257]	[0.097]				
Actual flows (economic glob. index)									−0.245	−0.092	−0.382*	−0.199**
									[0.208]	[0.259]	[0.2076]	[0.098]
Restrictions (economic glob. index)									0.315	−0.031	0.265	0.018
									[0.205]	[0.330]	[0.214]	[0.099]
Social globalization index					1.269***	1.157***	1.503***	0.993***				
					[0.316]	[0.328]	[0.339]	[0.141]				
Personal contact (social glob. index)									0.897**	1.003*	1.427***	1.305***
									[0.382]	[0.490]	[0.395]	[0.140]
Information flows (social glob. index)									−0.227	−0.349	−0.099	0.023
									[0.365]	[0.363]	[0.317]	[0.101]
Cultural proximity (social glob. index)									0.441***	0.404***	0.410***	0.223***
									[0.147]	[0.136]	[0.137]	[0.054]
Social, economic and geographic controls												
Socioeconomic	NO	YES+	YES	YES	NO	YES+	YES	YES	NO	YES+	YES	YES
Demographic	NO	YES++	YES	YES	NO	YES++	YES	YES	NO	YES++	YES	YES
Food price/CPI	NO	NO	YES	YES	NO	NO	YES	YES	NO	NO	YES	YES
N	395	384	353	353	395	384	353	353	395	384	353	353
R-squared	0.227	0.320	0.495	0.956	0.154	0.271	0.482	0.955	0.275	0.378	0.585	0.958

Notes: Expressions A, B and C correspond to a pooled OLS, clustered by country while expressions D correspond to Panel Corrected Standard Errors. Robust standard error values appear in brackets below the regression coefficient. All regressions include a time trend and they are clustered by country. Socioeconomic controls include: GDP, GDP squared, Gini index, % of women in active population, Education as defined in previous tables. Demographic controls include: Population, Urbanization. Countries included: Austria, Finland, France, Iceland, Japan, Netherlands, New Zealand, Spain, Sweden, Switzerland, UK, USA, Belgium, Canada, Denmark, Italy, Norway, Poland, Portugal, Slovakia, Australia, Estonia, Hungary, Ireland.
Statistically significantly different from zero:
* At the 10% level.
** At the 5% level.
*** At the 1% level.
+ We only include GDP, GDP squared, Gini index.
++ We only include Population.

the fact that, although urbanization might increase the availability diverse foods, its effect might be netted out by the expansion of sedentary habits associated to larger cities. We find that national income exerts a negative effect on population obesity rates, though the effect is non-linear as the impact grows less important among poorer countries. The latter might be partially explained by the effect of income inequality, which is found to correlate with an expanding prevalence of obesity.

In a nutshell, we find that social globalization—and more specifically changes in information flows and personal contact—stands out as a robust explanation for the expansion of the obese and overweight population and the rise of calorie consumption. Although not the result of an exogenous intervention to be interpreted causally, our findings are consistent with the original thesis. That is, we provide empirical support to the 'globosity hypothesis'. The obvious policy implication lies in the need for policy interventions to assist individuals in adjusting their life's to the social (less caloric) demands of global lifestyles (e.g., making use of defaults and nudges). The latter might help mitigating the otherwise expanding world obesity and overweight trend.

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Appendix A

See Tables A1–A4.

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