Supplementary annex to the article "How much have we changed? Long-term determinants of attitudes towards homosexuality in Chile"

S1. Changes in the acceptance of homosexuality in Latin America

Table S1. Percentage of people who would not like to have homosexuals as neighbours in 17 Latin American countries (1998–2009)

	1998	2009	Change
Argentina	24.6	17.7	−6.9
Bolivia	54.3	37.9	−16.4
Brasil	32.8	14.3	−18.5
Chile	43.6	22.9	−20.7
Colombia	39.0	36.1	−2.9
Costa Rica	56.7	29.7	−27.0
Ecuador	69.6	37.4	−32.2
Guatemala	58.4	31.6	−26.8
Honduras	59.6	36.3	−23.4
Mexico	48.6	21.0	−27.6
Nicaragua	47.5	27.9	−19.5
Panama	58.7	30.6	−28.1
Peru	49.7	32.0	−17.7
Paraguay	72.7	36.1	−36.6
El Salvador	80.2	37.5	−42.8
Uruguay	26.1	13.1	−13.0
Venezuela	70.4	26.6	−43.7
Latin America	51.0	28.5	−22.5

Notes: Data in 1998 are not representative of the whole national population in some countries. The Latin American figure consists in a population-weighted average of the response.
Source: Authors' analysis from Latinobarometer (Corporación Latinobarómetro 1998, 2009).

S2. Technical details of the econometric decomposition of the difference in the average acceptance of homosexuality between 1998 and 2018

The approach we adopt in this study follows the spirit of the econometric exercise proposed by Kitagawa (1955), which become widely known as the Oaxaca-Blinder decomposition (Blinder 1973; Oaxaca 1973), intended for continuous variables and widely used in Labour Economics for addressing gender wage differentials. First, Gomulka and Stern (1990) adapted this methodology for binary variables and, later, several authors have proposed several improvements allowing distinguishing between the contributions of different covariates to the gap the research aims disentangling. In this respect, we follow the method devised by (Yun 2004, 2005, 2008). This methodology is not free of shortcomings. As discussed by Fortin, Lemieux and Firpo (2011), one of the problems of this approach is that, when we consider categorical variables among the regressors (which we introduce through dummies in the econometric specification of interest), the contribution of each covariate to the change due to returns depends on the omitted category of such covariates. The solution proposed by Yun (2004, 2005, 2008) involves a normalisation of coefficients such that the coefficient of the first category equals the unweighted average of the coefficients on the other categories. This approach makes the contribution of each set of categories independent of the choice of the omitted category, but the interpretation becomes harder and, as any sort of normalisation, it involves certain degree of arbitrariness. Nevertheless, it is the adjustment most widely used in this sort of econometric decomposition.[1] It is worth mentioning that none of the previous works aiming to disentangle how the predictors considered in their analyses account for the changes (Andersen and Fetner 2008; Lewis and Gossett 2008; Lee and Mutz 2019; Loftus 2001; Pampel 2016), which comprise categorical variables, takes this issue into account. This casts doubts on the robustness of such results to the choice of the omitted category. We carry out all our analyses using Stata 16 and we perform the decomposition employing the package `oaxaca` (Jann 2008).

[1] See, among many others, Gang, Sen and Yun (2008), Johnston and Lee (2011) and Schneebaum and Badgett (2019) or Vujicic and Nasseh (2014).

Given that our variable of interest is binary (approval or non-approval of same-sex relations), we make use of *logit* models in order to explore the main determinants of such attitudes. Formally, for each year, we estimate the following equation:

$$Y_i^j = F(X_i^j \beta^j) \qquad i = 1, ..., N^j; j = 1998, 2018 \tag{1}$$

where Y_i^j is a the attitude towards homosexual relations of individual i in group j (the year of interest), which takes the value 1 if the respondent considers that there is nothing wrong at all with homosexuality and 0 otherwise; $F(\cdot)$ represents the cumulative distribution function of the logistic distribution and X_i^j and β^j are a vector of control covariates and their associated coefficients. Although the results are basically identical, we prefer using a *logit* over a *probit* model because the average probability is equal to the average predicted probability using the former, whereas this equality only holds in asymptotic terms using the latter sort of model. We can express such a probability as

$$\bar{Y}^j = \frac{1}{N_j} \sum_{i=1}^{N^j} F(X_i^j \hat{\beta}^j) \qquad j = 1998, 2018 \tag{2}$$

One calculates the difference in average probability of having a positive attitude towards homosexuality (Δ) as follows:

$$\Delta = \bar{Y}^{2018} - \bar{Y}^{1998} = \frac{1}{N^{2018}} \sum_{i=1}^{N^{2018}} F(X_i^{2018} \hat{\beta}^{2018}) - \frac{1}{N^{1998}} \sum_{i=1}^{N^{1998}} F(X_i^{1998} \hat{\beta}^{1998}) \tag{3}$$

In order to split the change over time between the variation due to the differences in characteristics, we add and subtract to the equation 3 the predicted probability of agreeing with homosexuality if population in year 1998 determined their attitudes as individuals interviewed in year 2018. This allows separating the 20-year difference in a component due to the change in characteristics (Δ_X), which captures the differences existing if population in 1998 behaved as respondents in 2018, and the discrepancy associated to structural changes in the responses (Δ_X, i.e., the differences related to the changes in the coefficients, obtained applying

coefficients of both years to population in 2018). Formally,

$$\Delta = \hat{\Delta} = \hat{\Delta}_X + \hat{\Delta}_S$$

where

$$\hat{\Delta}_X = \frac{1}{N^{2018}} \sum_{i=1}^{N^{2018}} F(X_i^{2018} \hat{\beta}^{1998}) - \frac{1}{N^{1998}} \sum_{i=1}^{N^{1998}} F(X_i^{1998} \hat{\beta}^{1998}) \tag{4}$$

$$\hat{\Delta}_S = \frac{1}{N^{2018}} \sum_{i=1}^{N^{2018}} F(X_i^{2018} \hat{\beta}^{2018}) - \frac{1}{N^{2018}} \sum_{i=1}^{N^{2018}} F(X_i^{2018} \hat{\beta}^{1998})$$

In order to disentangle the relevance of categorical covariates in the decomposition, we make use of the method proposed by Yun (2004, 2005, 2008), we estimate "normalised" equations where we express the coefficients of dummy variables as deviations from the grand mean (the average of the coefficients of all the categories included in the econometric specification).

S3. Results estimating age effects instead of cohort effects

Table S2. Determinants of acceptance of homosexuality in Chile including age effects instead of cohort effects (odds ratios of *logit* models)

	Both years pooled (I)	Year 1998 (II)	Year 2018 (III)
Female	0.910	0.742	0.940
	(0.155)	(0.193)	(0.198)
Resident in urban area	0.795	1.082	0.671
	(0.236)	(0.480)	(0.250)
18–25 years old	2.334***	1.857*	2.619***
	(0.600)	(0.682)	(0.863)
26–40 years old	1.176	1.112	1.196
	(0.244)	(0.372)	(0.297)
61 or more years old	0.594	0.507	0.595
	(0.200)	(0.299)	(0.245)
Primary education	1.114	0.889	1.201
	(0.362)	(0.384)	(0.614)
Secondary education	1.476	1.471	1.451
	(0.522)	(0.566)	(0.816)
Higher education	3.293***	5.704***	2.759*
	(1.246)	(2.665)	(1.567)
Religious	0.424***	0.588*	0.374***
	(0.073)	(0.169)	(0.077)
Centre	0.668	1.245	0.390
	(0.228)	(0.554)	(0.254)
Right	0.596	1.488	0.438**
	(0.191)	(0.779)	(0.173)
None/other	0.686	1.240	0.548*
	(0.170)	(0.493)	(0.187)
Trust in people	1.676***	0.886	2.074***
	(0.314)	(0.290)	(0.493)
Trust in institutions (0–4)	0.969	0.780	1.089
	(0.093)	(0.130)	(0.142)
Year 2018	11.382***		
	(2.347)		
Intercept	0.075***	0.050***	1.141
	(0.032)	(0.032)	(0.763)
Mean of dependent variable	0.177	0.053	0.327
McFadden pseudo-R^2	0.244	0.072	0.115
Correctly predicted (%)	82.8	94.3	70.5
No. of observations	2,388	1,309	1,079

Notes: *** significantly different from 1 at 1% level; ** significant at 5% level; * significant at 10% level. Heteroskedasticity-robust standard errors between parentheses. The reference category is a male living a rural area, between 41 and 60 years old, no formal education, non-religious, with a left party affiliation and not trusting in people.
Source: Authors' analysis from ISSP.

Table S3. Decomposition of the change of acceptance of homosexuality in Chile between 1998 and 2018 including age effects instead of cohort effects

	Differences in characteristics (I)	Differences in returns (II)	Total difference (III)
Total	0.017**	0.308***	0.325***
	(0.008)	(0.024)	(0.023)
Sex	0.000	0.000	
	(0.001)	(0.001)	
Urban-rural residence	0.000	−0.027	
	(0.002)	(0.032)	
Age	−0.007	−0.005	
	(0.005)	(0.009)	
Education	0.013**	0.012	
	(0.006)	(0.020)	
Religiosity	0.002	0.007	
	(0.002)	(0.006)	
Political affiliation	0.001	−0.002	
	(0.006)	(0.029)	
Trust in people	0.000	−0.033***	
	(0.001)	(0.016)	
Trust in institutions	0.007	0.021	
	(0.004)	(0.013)	
Intercept		0.335***	
		(0.055)	

Notes: *** significant at 1% level; ** significant at 5% level; * significant at 10% level. Delta method standard errors between parentheses. The model includes age through three dummies (18–25, 26–40, and 61 years old and above).
Source: Authors' analysis from ISSP.

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