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Television and fertility: evidence from a natural experiment

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Abstract
In this paper, we study the effect of television exposure on fertility. We exploit a natural experiment that took place in Germany after WWII. For topographical reasons, Western TV programs, which promoted one/no child families, could not be received in certain parts of East Germany. We find robust evidence that access to West German TV results in lower fertility. This conclusion is robust to alternative model specifications and different data sets. Using individual level information on TV consumption, we employ IV techniques to estimate the direct effect of Western TV consumption on fertility. By using aggregate level fertility data, we furthermore show the robustness of our analysis in a difference-in-difference setting. Our results suggest that individual fertility decisions are affected by role models or information about other ways of life promoted by media.

Keywords Natural experiment · TV consumption · Fertility

JEL Classification C26 · D12 · J13

1 Introduction

Many developed countries—especially European countries—have experienced a sharp decline in fertility over the last few decades, leading to a fertility rate below the reproduction level. In addition, most of these countries are characterized by aging populations and will be or already are confronted with a demographic development challenging their labour markets, welfare systems, and political institutions in several respects.

In this paper, we contribute to the literature exploring determinants on individual fertility decisions beyond the classical opportunity cost framework. In particular, we

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focus on the role of watching TV on fertility behaviour. Thereby, we discuss the hypothesis that reference group effects resulting from the exposure to role models and lifestyles transmitted via television, shaping individuals' attitudes, preferences, and beliefs are at work. In a similar vein, Kearney and Levine (2015) analyse the impact of a MTV reality show on teen childbearing. They show that data from Google Trends and Twitter indicate that the show influenced attitudes and generated a substantial reduction in teen births.

We add to the existing literature in several ways. First, we provide additional evidence for the relationship between TV consumption and fertility on the district level. Second, we employ information on TV exposure at the individual level. That is, we rely on individual data on the actual frequency of watching TV while most seminal economic studies on this subject have had no information on individual TV consumption. Jensen and Oster (2009), for example, measure cable access in India at the village level. Similarly, La Ferrara et al. (2012) and Chong and La Ferrara (2009) use information on whether an area is covered by the signal of Rede Globo, the main soap opera producer in Brazil. Third, our empirical results suggest that fertility behaviour at all (relevant) age groups is affected by TV consumption, likely via lifestyles, preferences and images presented on TV programs. Thereby, we are the first showing a TV effect on overall fertility. Finally, we are the first showing a TV effect on fertility for a developed country, namely the German Democratic Republic (GDR).

The GDR was one of the world's biggest economies during the period under consideration, where—in comparison with industrializing or developing countries—the demographic transition was much more advanced.[1] Within the GDR, it is plausible to assume that variation in TV access is independent of several other determinants affecting fertility preferences. For example, infrastructure, female labour market participation, health care, income distribution, and the use of contraceptives had been well developed and homogeneous throughout the GDR. Therefore, our setting allows us to rule out other political, social, institutional, or economic changes that likely come along with the introduction of TV, and also impact on fertility preferences (see Potter et al. 2002).

For our undertaking, we take advantage of a unique natural experiment that took place in Germany after WWII. For topographical reasons, Western TV programs and their specific content regarding family role models and material aspirations could not be received in certain parts of East Germany. This quasi-experimental setup allows the identification of a causal relationship between TV exposure and fertility behaviour in a developed country. The identification strategy was developed in Bursztyn and Cantoni (2016) for analysing East German consumption behaviour. A similar design is applied by DellaVigna et al. (2014) examining the impact of cross-border media exposure on nationalistic behaviour in the aftermath of the Serbo-Croatian conflict in the 1991–95 Yugoslavian wars. We underpin the robustness of our results by applying two different data sets on different levels of aggregation, namely district level data from the Statistical yearbooks of the GDR and survey data collected by the Central Institute of Youth Research.

[1] According to Heston et al. (2009), based on GDP at current prices, the GDR was among the 20 largest countries in the world.

Our paper is divided into seven sections. In Sect. 2, we briefly review existing studies on the importance of TV for family role models and fertility behaviour. In Sect. 3, we provide some background on television in the divided Germany, describe the TV content broadcast on both sides of the Iron Curtain and discuss the natural experiment exploited in our paper as well as related identifying assumptions. Next, in Sect. 4, we provide empirical evidence at the aggregate district level supporting our hypothesis. And, in Sect. 5, we present additional empirical evidence at the individual level explicitly controlling for potential endogeneity issues of TV consumption. In Sect. 6, we discuss other channels that might affect fertility via watching television. Section 7 concludes.

2 Previous literature

Fertility is affected by many factors ranging from the costs of having children (e.g. Mörk et al. 2013; Brewer et al. 2011; Milligan 2005) to family friendly labour market policies (Kalwij 2010). Several scholars devote their research to the question of whether (higher) education influences fertility (e.g. Goldin and Katz 2000; Brand and Davis 2011). Jensen (2012) points to the role of labour market opportunities itself in affecting marriage and fertility decisions. Similarly, Del Bono et al. (2012) show that job displacement negatively affects the probability of having a child. Moreover, economic models explaining individual fertility decisions have recently been widened to account for factors beyond the classical investment and opportunity cost framework (see for example Becker and Lewis 1973) such as neighbourhood effects or income inequality (Kearney and Levine 2014). For example, Li and Zhang (2009) study the external effect of household childbearing on the demand for children. Their findings suggest that the probability of a household having a second child decreases if the proportion of neighbouring households with two children decreases. Likewise, Fernández and Fogli (2006) demonstrate that women's own personal experience and their culture—proxied by the total fertility rate in the parents' country of origin—play a role in influencing their fertility.

The importance of TV for family role models and fertility behaviour has largely been ignored in economic studies on the determinants of fertility although several papers in other fields show that television exposure affects attitudes and behaviour, which might be relevant to fertility decisions as well. For example, Morgan and Rothschild (1983) analyse the effect of watching TV on gender role stereotypes. Holbert et al. (2003) deal with opinions concerning women's rights stemming from prime time TV consumption; Becker (2004) analyses the effects of television on adolescent girls' identity and body image, and Chong and La Ferrara (2009) explore the effect of geographical television expansion on divorce rates in Brazil. Recently, the impact of television exposure on fertility has attracted economists' attention. La Ferrara et al. (2012) and Jensen and Oster (2009) suggest that television might play a central role in determining family structure, women's status, and fertility. As identification strategy La Ferrara et al. (2012) make use of the different timing of entry of the main soap opera producer in Brazil. Similarly, Jensen and Oster (2009) exploit the introduction of cable television in India.

Little evidence, however, exists on the impact of TV consumption on fertility in the developed world. In such an environment most development related policies affecting fertility, as universal access to health and childcare, electrification, and female labour market participation have been in place for a long time.

3 Empirical strategy

In this section, we start with the description of how television evolved in both parts of Germany after WWII and discuss the TV content broadcast on both sides of the Iron Curtain. Afterwards, we describe the natural experiment that we take advantage of in our analysis and provide support of the underlying identifying assumptions.

3.1 Television in the divided Germany

Following WWII, Germany was divided into two countries. TV broadcasting developed differently on the two sides of the Iron Curtain that divided this formerly homogenous country. In West Germany, the USA, the UK, and France were instrumental in founding a BBC-like public broadcasting system; East Germany established its own TV stations based on the Soviet model.

In the GDR, state-controlled TV was employed for the purpose of indoctrination.[2] In an economy of shortage, the communist regime promoted full employment of both men and women. To increase population size and, hence, the labour force, a two- to three-child policy was instituted.[3] The policy was supported by investment in childcare, financial support for families, housing subsidies, and promotion of the ideal family as consisting of many children and employed and married women.

3.2 Family role models in East and West

Several studies (Pfau et al. 2010; Trültzsch 2009) analyse how this family model was promoted on GDR television. For example, in an analysis of family series of the 1980s Trültzsch (2009) finds that all female characters were employed and bore the double burden of family and job. As in real life, employment was much valued by all. Leisure time was depicted as a scarce good. In addition to employment, family, including parenting, played an important role. TV families had a high number of children (about four) and this was depicted in a positive light. Showing problems with the work-life balance was taboo. In TV series aired prior to the 1980s, the ideal GDR family—characterized by a large number of children—was even more evident (Pfau et al. 2010).

West German TV aired different subject matters, information, and programs than those seen on East German TV. Western TV programs provided a view of a much wealthier and prettier world. In the matter of family and gender stereotypes, the contrast

[2] Actually, it was not the state, but the leading communist party SED that controlled the TV program.

[3] East Germany's constitution viewed marriage and family as the foundation of society. In 1966, an official family code became effective in which it was stated that the aim of marriage was to have children (§9 FGD).

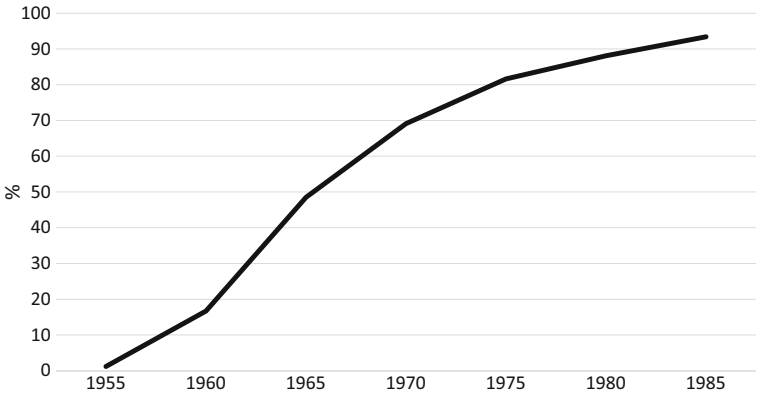

Fig. 1 Share of households owing a TV. *Source*: Statistical year books of the GDR

between the two types of TV programming was severe and diametrically opposed. For example, an analysis of West German TV programs showed that children played a small part in the West German television world; less than 8 percent of the female characters had children (Weiderer 1994).[4] Even in family series, more than half of all main characters had no children (Weiderer and Faltenbacher 1994). Similar results are found in Küchenhoff (1975) 15 years earlier.[5,6] During the 1970s, most families on TV were depicted in a negative light and seemed, especially prone to quarrelling. Several studies on Western TV shows aired during the period under consideration find that most women on TV were unmarried, young, appealing, and did not work; married women were depicted as maternalistic and as lacking sex appeal. The labour participation rate among female characters never exceeded 50 percent; among married women, employment was less than 20 percent. At the same time, housework did not seem relevant and only very few women were shown engaged in household activities (Küchenhoff 1975; Weiderer 1994; Weiderer and Faltenbacher 1994).

3.3 The natural experiment

From 1955 onwards, the ownership of television sets increased steadily in the GDR. The graph in Fig. 1 shows the development of the share of households owing at least one TV over time. In 1975, more than 80 percent of all households owned a TV and access to the state-controlled broadcasting service was ubiquitous. If possible, however, most GDR citizens watched Western TV.[7] West Germany broadcasted to the East with the aims of providing uncensored information, generating pro-Western

[4] Weiderer accounts for public TV, namely ARD and ZDF, and private TV, namely RTLplus, which was founded in 1984.

[5] Küchenhoff accounts for public TV, namely ARD, ZDF, and Dritten (regional versions of ARD).

[6] Since family role models were similar, the introduction of private TV unlikely interferes our identification approach.

[7] According to Wolle (1998, p. 71), each night East Germans "collectively emigrated" to West Germany in front of their TV sets.

sentiment, and undermining public support for communism. To maximize availability of West German TV in East Germany, several West German television broadcasting transmitters were placed next to the East German border.

What makes the situation described above a natural experiment for our undertaking is the fact that due to topographical variation, not all areas in the GDR were reached by Western broadcasting. Figure 2 shows the signal coverage of West German TV in the GDR and illustrates that distance from the broadcasting towers located near the inner

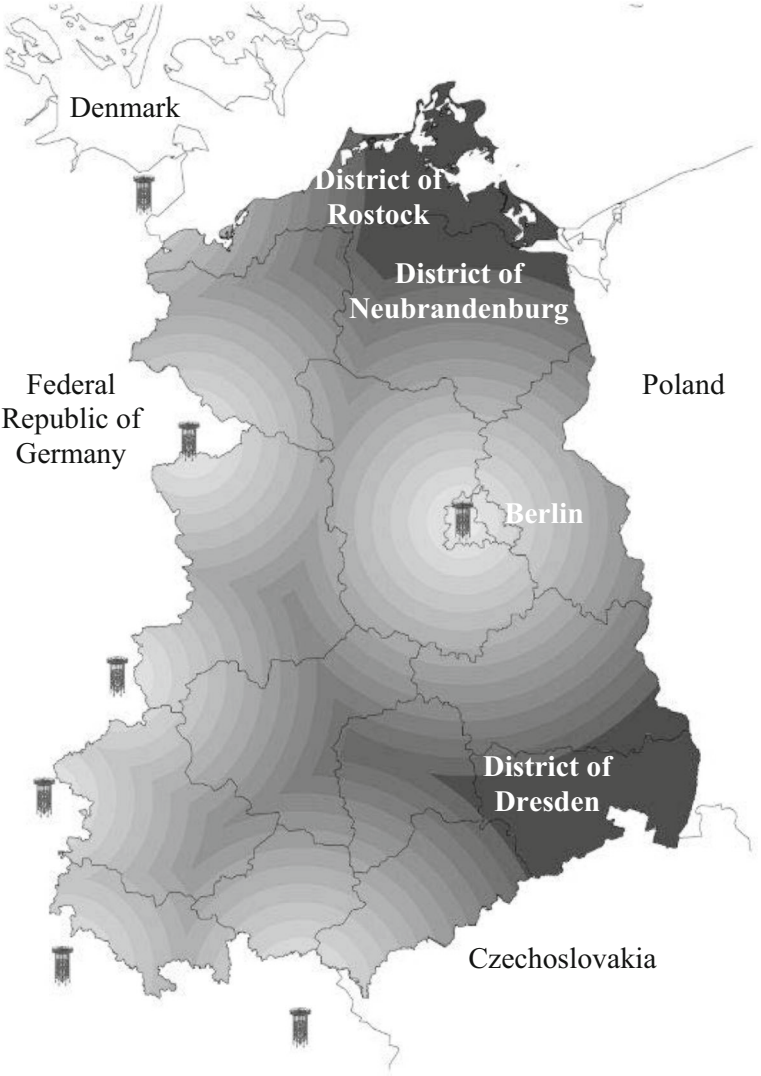

Fig. 2 Signal strength of Western TV stations in Eastern Germany (the German Democratic Republic, GDR). Note: Dark lines indicate administrative boundaries (Bezirksgrenzen) of the GDR. Black areas indicate dead spots for Western TV reception

German border and West Berlin determines signal strength. Note, specifically, that the region around Dresden in the southern part of the GDR was a dead spot for Western TV. A second area without access to West German TV was in the Northeast and, to some extent, overlapped with the administrative borders of the districts of Rostock and Neubrandenburg.

In this paper, we follow the analysis of signal strength by Bursztyn and Cantoni (2016) who employ a signal propagation model accounting for the Earth's curvature and the distance to the signal source to measure the availability of Western TV signals in the GDR. In line with anecdotal evidence, they conclude that the districts of Dresden, Neubrandenburg, and Rostock define a reliable control group lacking access to Western German TV.[8]

In summary, we argue that compared to East German TV, Western TV promoted role models in which having children is of little importance. Furthermore, West German television promoted images of consumption-orientated lifestyles, increased material aspirations (Hyll and Schneider 2013) and affected the composition of consumption (Bursztyn and Cantoni 2016). Altogether, this is likely to have had a depressing effect on fertility levels (Becker 1960). Given the widely accepted impact of TV exposure on preferences, attitudes, and beliefs (Gerbner et al. 2002 or Shrum et al. 2005), we assume that the "transportation" of values and ideas from West Germany altered priorities and fertility preferences in East Germany. Similarly, watching East German TV might had increased the propensity of having children. In our setting, for treated individuals and regions, the counterfactual is watching East German TV, not watching no TV at all. Thus, we hypothesize that consumption of Western TV affects fertility behaviour different than the consumption of Eastern TV. Thereby, we take advantage of the Cold War natural experiment described above to identify the effect of Western TV on fertility.Kern and Hainmueller (2009), Hyll and Schneider (2013), Hennighausen (2015), and Bursztyn and Cantoni (2016) use the same natural experiment to study the consequences of West German television on such varying topics as public support for the East German communist regime, material aspirations, individual beliefs, and private consumption, respectively. Although we have plausible arguments that the observed fertility effects most likely stem from different female role models promoted by West and East German TV, there might be other mechanisms from TV consumption in place, which are discussed in more detail in Sect. 6.

3.4 Identifying assumptions

Our empirical identification strategy relies on the assumption that simply living in a region without Western TV reception (the control regions defined by the districts of Dresden, Rostock, and Neubrandenburg) fails to explain fertility behaviour (beyond the mere effect of Western TV consumption).

[8] Even if in some parts of those districts access to Western TV was technically feasible, the quality was often so bad that people abstained from watching West German TV. To the best of our knowledge, anecdotal evidence about Western TV consumption in the GDR is unfortunately only available in German. For a detailed discussion, see, for example, Meyen (2010), Pfau et al. (2010), Wolle (1998), and Holzweißig (1996).

In what follows, we show that living conditions which might affect fertility in the control region were similar to the conditions in the other regions of East Germany during the period under observation. Table 1 displays several economic and social characteristics at the district level from the Statistical Yearbook of the GDR that could

Table 1 District level characteristics for 1962, 1972, and 1987 by treatment status

Variable description	Summary statistics				*t* test
	Districts WITHOUT Western TV		Districts WITH Western TV		
	Mean	SD	Mean	SD	*p* value
District Level Data 1962					
Female share	54.75	1.32	54.61	0.58	0.78
Female employment share	68.44	10.20	68.42	6.37	1.00
Population density (per km2)	194.59	118.07	197.28	100.35	0.97
Share of employed in agriculture (%)	21.82	16.17	19.22	7.85	0.69
Share of employed in industry (%)	30.61	17.52	36.58	10.54	0.46
New apartments built (per 1000 inhabitants)	3.33	0.70	2.92	1.28	0.61
Child care enrolment (enrolled children as % of all children between 3 and 6 years old)	42.00	6.62	52.29	5.90	0.02
Savings per capita (mark)	1219.90	185.32	1167.70	141.46	0.61
District Level Data 1972					
Female share	53.51	1.48	53.65	0.58	0.80
Female employment share	76.53	10.48	75.40	5.65	0.80
Population density (per km2)	195.65	113.71	192.51	95.33	0.97
Share of employed in agriculture (%)	15.05	10.80	12.77	5.24	0.60
Share of employed in industry (%)	33.84	15.62	39.45	9.21	0.43
New apartments built (per 1000 inhabitants)	6.82	1.94	6.82	1.50	1.00
Child care enrolment (%)	70.80	1.13	73.65	4.04	0.27
Savings per capita (mark)	3543.03	562.70	3543.57	402.17	1.00
District level data 1987					
Female share	52.14	0.98	52.40	0.58	0.55
Female employment share	80.87	3.78	80.45	3.59	0.86
Population density (per km2)	186.65	103.33	180.00	84.40	0.91
Share of employed in agriculture (%)	13.47	8.72	11.33	4.38	0.55
Share of employed in industry (%)	33.73	12.31	39.72	7.39	0.30
New apartments built (per 1000 inhabitants)	11.92	0.61	12.19	1.73	0.80
Child care enrolment (%)	93.35	0.99	93.33	1.52	0.99
Savings per capita (mark)	7981.18	1327.45	8008.13	844.66	0.97

The table displays population-weighted averages, excluding the district of East-Berlin. Districts that do not receive Western TV consist of the districts of Dresden, Rostock, and Neubrandenburg. Source: Statistical Yearbook of the GDR

have an impact on fertility. The years 1962 and 1972 mark different specific points in time in our empirical setting.

The year 1962 defines the beginning of our control period, one year after the Berlin Wall was built, the brain drain to the western part of Germany was ground to a halt, and the autocratic GDR regime gained full control over society. In the 1960s, the GDR government prohibited Western TV and enforced this, for example, by major campaigns to remove aerials pointing to the West. In 1971, political leadership changed, and Walter Ulbricht was replaced by Erich Honecker. In the subsequent year, the Basic Treaty (Grundlagenvertrag) was signed on 21 December 1972 in East Berlin, marking a turning point in the relationship of the two German States (GDR and FRG) and constituting a major success of the GDR foreign policy, which culminated in the admittance of both Germanies to the United Nations in 1973.

In the subsequent years, the relations between the GDR and West Germany were characterized by a policy of détente and the prohibition placed on watching Western TV was eased, implying that Western TV became unofficially tolerated.[9] We expect treatment to matter from 1973 on, when the restrictions of watching Western TV were removed. The year 1972, therefore, constitutes the end of the "pre-treatment" period. We gathered data till the year 1987 which describes the economic and social situation 15 years after 1972.

Apart from general settlement and industry structure indicators, such as population density and share of employment in agriculture or industry, Table 1 shows the female population share, female employment share, the number of new apartments built per 1000 inhabitants, savings per capita in Mark, and the rate of children enrolled for childcare per 100 children between the age of 3 and 6 years. As demonstrated in Table 1, except for the children's enrolment rate we find virtually no difference between regions with and without Western TV at any reasonable significance level. Even for the children's enrolment rate the difference between the regions becomes smaller and almost disappears in 1972. In 1987 there are no more differences, reflecting the increased societal conformity as a consequence of the consolidated autocratic GDR regime after the Berlin Wall was built in 1962. Regarding differences in childcare enrolment, which almost disappeared before the beginning of the treatment period, we have no indication that they are induced by different access to Western TV. A further discussion on childcare enrolment is provided at the end of chapter 5.

Another important feature of the empirical setting employed in our paper that we take advantage of is the extremely low mobility throughout the GDR. Due to central planning, there was no conventional labour market and, hence, no labour mobility. Also, a shortage of housing further eliminated spatial sorting. On average, only about 0.7 percent of the population moved across region borders per year. Even though we cannot entirely rule out that systematic migration from or to the regions with Western TV occurred, we control for the most important changes in the regional demography.

In line with the findings of Kern and Hainmueller (2009), Hyll and Schneider (2013), Hennighausen (2015), and Bursztyn and Cantoni (2016), the historical and statistical

[9] In a speech given at the 9th meeting of the Central Committee of the Communist Party of the GDR in May 1973 Erich Honecker even officially stated that everybody in the GDR was allowed to watch West German TV (if technically possible as discussed in this section) at his leisure, thereby accepting the consumption of West German TV as an everyday reality in the GDR (see Dittmar 2010, S. 297).

evidence presented in this section reflects the doctrine of democratic centralism aiming for a conformist society that for the purpose of our analysis creates an almost ideal empirical setting.

4 Aggregate-level evidence

In this section, we analyse if fertility rates are higher in regions that had no access to West-German TV than in regions that could receive Western TV. We therefore employ aggregate district level data from the Statistical Yearbook of the GDR and estimate a difference-in-difference reduced form model. Repeated observations of fertility outcomes on the district level permit difference-in-difference estimation and the taking of unobserved time aspects and district fixed effects into account. However, since we do not directly observe TV consumption on the district level, the results presented within this empirical framework can only be interpreted as reduced form estimates of the two-equation model defined in Sect. 5.1.

The underlying equation of our difference-in-difference approach can be specified as follows:

$$y_{it} = \beta_0 + \beta_1 T_k + \beta_2 T_k \mathrm{TV}_j + \beta_3 X_{it} + \beta_4 \mathrm{year}_t + \beta_5 d_i + \varepsilon_{it}, \tag{1}$$

where y_{it} is our outcome variable, i is an index for districts, t refers to different years. TV_j is a dummy equal to 1 for districts that receive Western TV and T_k is a dummy equal to 1 for the period after 1972—the treatment period. β_2 captures the overall effect of access to Western TV since the start of treatment over the 15 years afterwards. Covariates are depicted by X. year are year dummies to control for time fixed effects and d_i stands for district fixed effects to control for unobservable district characteristics that are fixed over time. Standard errors are clustered on the district level to take into account the correlation among the observations of the same district and control for heteroskedasticity.

4.1 Data

At the aggregate level, we explain the annual district fertility rate defined as the number of newborn children per 1000 women using control variables such as female labour market participation, female population share, population density, the number of new apartments built, child care enrolment, industry structure indicators, and savings per capita. As discussed in Sect. 3.3 and following Bursztyn and Cantoni (2016), the districts of Dresden, Neubrandenburg, and Rostock represent the regions lacking Western TV reception.

As described in Sect. 3.4, the year 1962 defines the beginning of the control period. The time period from 1973 onwards then constitutes the treatment period which is defined by access to West-German TV almost everywhere in the GDR except for areas located in the districts of Dresden, Neubrandenburg, and Rostock. Variable definitions

and descriptive statistics for both the districts with and without Western TV are given in Table 2.[10]

As shown in Table 2, we include population density and two industry structure indicators (share employed in agriculture and share employed in industry) in our model in order to capture long term regional developments driven by economic growth, structural economic change, and internal migration. We further control for the female population share, the labour force participation of women, new apartments built and childcare enrolment to approximate the impact of pronatalist socialist social policies. Finally, savings per capita account for potential income differences and repressed inflation typical in centrally planned economies such as the one under study.[11]

Altogether, we observe district specific general fertility rates and control variables for all 14 GDR districts excluding the district of East Berlin from 1962 until 1987. Since East Berlin was the capital of the GDR and commonly perceived as the counterpart of the western sector of Berlin, the so-called window to the west, East Berlin was particular in many aspects and cannot be considered representative for other parts of the GDR. That is, in our basic specification we have 364 observations comprising 15 years of treatment and 11 years of pre-treatment.

4.2 Results at the aggregate level

Table 3 presents the parameter estimates of the reduced form difference-in-difference estimator at the district level as previously discussed in this section.[12] The endogenous variable is the natural logarithm of the fertility rate defined in Table 2. From model 1 on the left to model 5 on the right part of Table 3, we add additional control variables. All model specifications result in a strongly negative treatment effect.

Model 1 and model 2 present simple pooled OLS difference-in-difference estimates accounting for the control variables discussed above where the interaction between the treatment group dummy and the treatment period dummy is interpreted as the reduced form estimate of the TV effect in the treated regions within the GDR. In both models, we find a statistically significant negative reduced form TV effects. In model 3 to model 5, we add time constant fixed effects reflecting year or district specific time invariant characteristics. In line with our hypothesis that Western TV exposure reduces fertility, all TV effect estimates remain negative and statistically significant different from zero. Our preferred specification is given in model 5, where we include all control variables and their squared counterparts as well as year fixed effects and district fixed

[10] It is worth noting that even if there was a positive bias in official statistical publications of the GDR regime, for example, regarding the achievements of social policies such as the number new apartments built, this does not affect our results as long as this measurement error or bias was systematic for the entire country, which is very plausible in such a centralized state. And even if the level of this bias has varied over time, the two-way panel difference-in-difference specification presented below should not be affected if changes regarding the political climate can be modelled as a common trend among all districts.

[11] For a discussion on the phenomena of shortage and inflation, see Kornai (1992).

[12] We provide evidence for the definition of the treatment period in Table 11 in "Appendix". Therefore, we interact the treatment dummy with the calendar years, conditional on controls, where the baseline year is 1972. We infer that before 1973 there were no statistically significant differences between treatment and control regions regarding fertility, which already rules out pretrends. From 1973 onwards, fertility was lower in the treatment region supporting our definition of the treatment period.

Table 2 Variable definitions and descriptive statistics at the district level

Variable description		Summary statistics									
		Districts WITHOUT Western TV					Districts WITH Western TV				
		Mean	Sd	Min	Max	Obs	Mean	Sd	Min	Max	Obs
Endogenous variable											
Fertility (children born to mothers between 15 and 44 years of age per 1000 women)	Overall	74.8	14.2	54.2	111.8	78	68.8	12.3	48.3	104.1	286
	Between		5.8	68.4	79.9	3		4.2	61.5	76.2	11
	Within		13.4	52.6	106.8	26		11.6	48.6	99.1	26
Exogenous variables											
Female share (share of women in total population)	Overall	52.8	1.3	50.9	55.7	78	53.3	0.8	51.4	55.3	286
	Between		1.3	51.8	54.3	3		0.5	52.7	54.3	11
	Within		0.7	51.4	55.0	26		0.6	52.0	54.8	26
Female employment share (women employed as share of women aged 15 to 60)	Overall	73.1	8.0	58.0	84.5	78	74.9	6.5	56.2	85.9	286
	Between		7.2	68.5	81.4	3		5.1	65.2	82.0	11
	Within		5.3	61.7	82.5	26		4.4	63.5	83.0	26
Population density (per km2)	Overall	151.3	90.6	57.0	280.0	78	163.6	82.1	42.0	349.0	286
	Between		110.1	58.2	272.8	3		85.5	68.7	330.5	11
	Within		4.2	138.4	158.4	26		8.1	67.0	182.1	26

Table 2 (continued)

Variable description		Summary statistics									
		Districts WITHOUT Western TV					Districts WITH Western TV				
		Mean	Sd	Min	Max	Obs	Mean	Sd	Min	Max	Obs
New apartments built (per 1000 inhabitants)	Overall	8.0	3.0	2.2	12.3	78	7.7	3.3	1.6	14.3	286
	Between		0.9	7.0	8.7	3		0.8	6.5	9.0	11
	Within		2.9	1.8	13.3	26		3.2	0.9	14.7	26
Child care enrolment (enrolled children as % of all children betw. 3 and 6 years)	Overall	71.8	21.5	30.7	96.1	78	75.0	17.9	36.2	96.2	286
	Between		1.9	69.6	72.9	3		2.9	69.7	79.7	11
	Within		21.5	32.9	94.9	26		17.7	39.2	96.5	26
Share of employed in agriculture (%)	Overall	19.6	10.7	7.8	46.1	78	14.5	6.2	5.8	36.3	286
	Between		11.7	9.0	32.2	3		5.6	6.5	26.0	11
	Within		4.5	13.5	33.4	26		3.1	9.9	24.7	26
Share of employed in industry (%)	Overall	27.8	12.0	9.4	45.0	78	37.3	9.1	15.0	51.2	286
	Between		14.2	16.4	43.7	3		9.2	20.5	49.8	11
	Within		2.6	20.7	31.9	26		2.4	31.0	41.1	26
Savings per capita (mark)	Overall	4040	1977	1049	8990	78	4285	2067	1019	9362	286
	Between		650	3664	4790	3		458	3722	5019	11
	Within		1904	604	8240	26		2020	632	8628	26
Total number of observations						364					

Our data define a balanced panel of annual observations for 14 districts from 1962 until 1987. The district of East Berlin is excluded from the regression. Districts that do not receive Western TV consist of the districts of Dresden, Neubrandenburg, and Rostock

Table 3 Reduced form difference-in-difference estimates at the aggregate district level

	(1)		(2)		(3)		(4)		(5)	
	Pooled OLS		Pooled OLS		One-way FE		Two-way FE		Two-way FE	
	Log (Fertility)									
	Coefficient	Std. Err	Coefficient	Std. Err	Coefficient	Std. Err	Coefficient	Std. Err	Coefficient	Std. Err
TV effect	− 0.103***	0.030	− 0.076***	0.019	− 0.045*	0.024	− 0.064**	0.029	− 0.056***	0.014
Treatment group	− 0.030	0.033	0.025	0.016	0.000	0.020	0.000		0.000	
Treatment period	− 0.038	0.042	− 0.174***	0.018	− 0.290*	0.136	− 0.280	0.206	− 0.560*	0.270
Female emp. share	− 0.011***	0.003	− 0.033	0.023	− 0.054**	0.019	0.003	0.003	− 0.052***	0.015
Female share	0.019	0.032	− 0.921	0.710	0.434	0.394	− 0.023**	0.009	− 0.756*	0.405
Apartments built	0.003	0.007	− 0.020	0.018	0.009	0.006	0.000	0.004	0.000	0.006
Child care enrol:	− 0.004**	0.002	− 0.037***	0.004	− 0.009*	0.005	− 0.003	0.002	− 0.010***	0.003
Population density	− 0.000	0.000	0.000	0.001	0.000	0.000	− 0.001	0.001	0.000	0.001
Savings	0.000***	0.000	− 0.000***	0.000	− 0.000	0.000	0.000	0.000	0.000	0.000
Share industry	0.010***	0.003	0.019	0.014	0.013	0.008	0.003	0.003	0.042***	0.009
share agriculture	0.014***	0.004	0.011	0.010	0.005	0.006	0.011**	0.004	0.008	0.007
Female emp. share2			0.000	0.000	0.000***	0.000			0.000***	0.000
Female share2			0.008	0.007	− 0.005	0.004			0.007*	0.004
Flats built2			0.001	0.001	− 0.000	0.000			0.000	0.000

Table 3 (continued)

	(1)		(2)		(3)		(4)		(5)	
	Pooled OLS		Pooled OLS		One-way FE		Two-way FE		Two-way FE	
	Log (Fertility)									
	Coefficient	Std. Err	Coefficient	Std. Err	Coefficient	Std. Err	Coefficient	Std. Err	Coefficient	Std. Err
Child care enrol.2			0.000***	0.000	0.000	0.000			0.000**	0.000
Population density2			− 0.000	0.000	− 0.000	0.000			− 0.000	0.000
Savings2			0.000***	0.000	0.000	0.000			− 0.000	0.000
Share industry2			− 0.000	0.000	− 0.000**	0.000			− 0.001***	0.000
Share agriculture2			− 0.000	0.000	0.000	0.000			0.000	0.000
Time fix effects					Yes		Yes		Yes	
District fix effects							Yes		Yes	
Constant	3.742**	1.633	31.526	19.382	− 3.953	10.969	5.534***	0.640	26.369**	10.997
R-squared	0.692		0.840		0.971		0.970		0.979	
R-squared overall							0.909		0.905	
R-squared between							0.813		0.589	
Number of Obs	364		364		364		364		364	

Significance levels: *$p < 0.10$; **$p < 0.05$; ***$p < 0.01$. Standard errors are clustered at the district level. The suffix 2 indicates squared variables. The district of East Berlin is excluded from the regression. The districts without Western TV consist of the districts of Dresden, Neubrandenburg, and Rostock

effects to control for time invariant unobserved heterogeneity. In this specification, the negative effect of Western TV on fertility amounts to 5.6. That is, during the 15 years after start of treatment, fertility develops on average by 5.6%-points less for districts with Western TV than in districts that do not receive Western TV.

4.3 Robustness checks at the aggregate level

In this section, we show the robustness of our results across a variety of alternative model specifications. First, we restrict the districts without Western TV to the Dresden district only and exclude the districts of Neubrandenburg and Rostock from our sample. Second, we form a north-eastern region where Neubrandenburg and Rostock constitute districts without Western TV and Potsdam and Frankfurt districts with Western TV. Third, we analyse the effect for a south-eastern region, where Cottbus, Karl-Marx-Stadt and Leipzig constitute districts with Western TV and Dresden the district without Western TV. Fourth, we show regional-level results for the same regional subsample observed in the individual-level data applied in Sect. 5. Thereby, the districts without Western TV consist of respondents living in the district of Dresden. Districts with Western TV consist of the districts Schwerin, Magdeburg, Leipzig, Karl-Marx-Stadt, and Erfurt. Finally, we re-estimate the models presented in Table 3 where we include the formerly omitted district East Berlin. In all cases, we find negative and significant TV effect estimates between -0.027 and -0.083, that is, fertility develops on average between 2.7%-points and 8.3%-points less for districts with Western TV than in districts that do not receive Western TV. The results are given in Table 4. The smaller point estimate for the north-eastern regions is in line with the lower overlap of administrative borders and areas without access to Western TV.

Our reduced form difference-in-difference strategy, presented in this section, crucially relies on the assumption that districts exposed to Western TV and districts without Western TV did not follow different trends over time. First evidence for ruling out pretrends is provided in Table 11 in "Appendix". We further challenge the crucial common trend assumption by estimating a number of so-called placebo regressions. For that purpose, we only use the pre-treatment period from 1962 to 1972 and analyse whether districts with Western TV experienced a fertility decline already before 1973. Therefore, we assume that a hypothetical treatment sets in before 1973. The results are given in Table 5. From model 1 in the left to model 5 in the right column in Table 5 we vary the placebo treatment period within the timeframe 1962 to 1972. We begin with a six-year placebo-treatment period (from 1967 to 1972) splitting the actual pre-treatment period almost in the middle. In this case, we generate a dummy equal to 1 for the period from 1967 to 1972 (the placebo treatment period) and equal to 0 for the period from 1962 to 1966. We then shorten our placebo treatment period gradually to a 2 year period (from 1971 to 1972). None of the coefficients is significantly different from zero. Hence, we find no evidence for a violation of the common trend assumption in our empirical setting.

Finally, we conduct placebo regressions on all control variables. The results are given in Table 12 in "Appendix". We find slightly significant ($p < 0.1$) differences regarding female employment share and the industry structure indicators. The positive

Table 4 Robustness checks on subsamples at the aggregate district level

	(1)		(2)		(3)		(4)		(5)	
	Two-way FE		Two-way FE		Two-way FE		Two-way FE		Two-way FE	
	Only Dresden is without Western TV		Only north-eastern regions		Only south-eastern regions		Only regions as in individual data		Berlin included with Western TV	
	Log (fertility)									
	Coefficient	Std. Err	Coefficient	Std. Err	Coefficient	Std. Err	Coefficient	Std. Err	Coefficient	Std. Err
TV effect	− 0.068***	0.018	− 0.027*	0.011	− 0.043*	0.015	− 0.083***	0.013	− 0.064***	0.014
Treatment period	− 0.639**	0.289	0.723	0.636	− 1.022*	0.355	− 0.378	0.580	− 0.792***	0.257
Female emp. share	− 0.055**	0.020	0.058	0.037	− 0.071*	0.030	− 0.019	0.018	− 0.018	0.022
Female share	− 1.830**	0.649	− 0.871	0.392	0.261	0.405	− 1.794*	0.866	− 1.215***	0.366
Apartments built	0.000	0.008	− 0.002	0.007	− 0.025**	0.004	0.002	0.009	0.005	0.005
Child care enrol:	− 0.013**	0.006	− 0.003	0.005	0.003	0.003	0.008	0.006	− 0.010***	0.003
Population density	0.001	0.001	− 0.028	0.021	0.007	0.003	0.006	0.005	− 0.001	0.000
Savings	0.000	0.000	− 0.000*	0.000	0.000	0.000	− 0.000	0.000	0.000**	0.000
Share industry	0.037**	0.013	0.025	0.018	− 0.045**	0.014	0.026	0.028	0.045***	0.012
Share agriculture	0.021	0.013	0.015	0.020	− 0.036	0.040	− 0.016	0.012	0.015*	0.007
Female emp. share2	0.000***	0.000	− 0.000	0.000	0.000*	0.000	0.000	0.000	0.000	0.000
Female share2	0.017**	0.006	0.008	0.004	− 0.002	0.004	0.017*	0.008	0.011***	0.003
Flats built2	0.000	0.000	0.001	0.001	0.001***	0.000	− 0.000	0.000	− 0.000	0.000
Child care enrol.2	0.000*	0.000	− 0.000	0.000	− 0.000	0.000	− 0.000	0.000	0.000*	0.000

Table 4 (continued)

	(1)		(2)		(3)		(4)		(5)	
	Two-way FE		Two-way FE		Two-way FE		Two-way FE		Two-way FE	
	Only Dresden is without Western TV		Only north-eastern regions		Only south-eastern regions		Only regions as in individual data		Berlin included with Western TV	
	Log (fertility)									
	Coefficient	Std. Err	Coefficient	Std. Err	Coefficient	Std. Err	Coefficient	Std. Err	Coefficient	Std. Err
Population density2	− 0.000	0.000	0.000	0.000	− 0.000	0.000	− 0.000*	0.000	0.000**	0.000
Savings2	− 0.000	0.000	0.000*	0.000	− 0.000	0.000	− 0.000	0.000	− 0.000**	0.000
Share industry2	− 0.000**	0.000	− 0.000	0.000	0.001*	0.000	− 0.000	0.000	− 0.001***	0.000
Share agriculture2	− 0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000
Time fix effects	Yes		Yes		Yes		Yes		Yes	
District fix effects	Yes		Yes		Yes		Yes		Yes	
Constant	55.446***	17.834	27.152*	9.973	0.057	10.292	51.706*	24.124	36.651***	10.028
R-squared	0.980		0.996		0.996		0.989		0.976	
R-squared overall	0.824		0.505		0.025		0.269		0.581	
R-squared between	0.746		0.439		0.719		0.154		0.263	
Number of Obs	312		104		104		156		390	

Significance levels: *$p < 0.10$; **$p < 0.05$; ***$p < 0.01$. Standard errors are clustered at the district level. The suffix 2 indicates squared variables

Table 5 Reduced form difference-in-difference placebo treatments during the pre-treatment time period (1962–1972)

Placebo treatment period	(1)		(2)		(3)	
	Two-way FE		Two-way FE		Two-way FE	
	from 1967 to 1972 (6 years)		From 1969 to 1972 (4 years)		From 1971 to 1972 (2 years)	
	Log (fertility)					
	Coefficient	Std. Err	Coefficient	Std. Err	Coefficient	Std. Err
Placebo effect	− 0.017	0.018	− 0.003	0.012	0.016	0.016
Placebo T. period	− 0.377*	0.175	− 0.368*	0.182	− 0.369*	0.181
Controls	Yes		Yes		Yes	
Time fix effects	Yes		Yes		Yes	
District fix effects	Yes		Yes		Yes	
Constant	33.832	20.071	33.556	20.454	37.091*	20.694
R-squared	0.986		0.986		0.986	
R-squared overall	0.570		0.599		0.651	
R-squared between	0.820		0.807		0.773	
Number of obs	154		154		154	

Significance levels: *$p < 0.10$; **$p < 0.05$; ***$p < 0.01$. Standard errors are clustered at the district level. The suffix 2 indicates squared variables. The district of East Berlin is excluded from the regression. The districts without Western TV consist of the districts of Dresden, Neubrandenburg, and Rostock

TV effect coefficients in the economic sectors regressions imply that the industry sector grew faster, and the agricultural sector declined less in the treatment regions. These findings seem partly to be related to regional convergence.

The statistically significant effect of having access to Western TV on childcare enrolment also suggests a possible violation of our assumption that there are no systematic differences between the districts with and without Western TV, apart from access to Western TV. We interpret childcare enrolment as a derived variable driven by the supply and the demand for childcare. Demand for childcare in turn is mainly determined by female labour force participation. On the one hand, conditional on controls, table 112 reveals a negative relation between watching Western TV and female labour force participation, which would be in line with a declining demand for childcare. On the other hand, childcare supply is determined by the state, which in our case defined its purpose by providing identical living conditions in all regions of the country. Even if differences in childcare supply existed in the early pre-treatment period,

they quickly disappeared and should not have played the role of a limiting factor for fertility—as indicated by the identical female labour force participation across groups—in the beginning of the natural experiment described in Sect. 3. In 1980, the share of enrolled children was 92 percent in both regions, with and without Western TV.[13]

Altogether, table 112 does neither provide strong support nor major objections to our identification strategy. The regional level setup cannot completely rule out that the treatment coefficient is affected by underlying differences in regional development over time, but this was to be expected. In a sense, table 112 points to limitations of the regional-level analysis, suggesting moving from the regional level to the individual level, what we do in the next chapter.

5 Individual-level evidence

One major contribution of our paper to the existing literature is that we have contemporaneous individual-level data from the GDR. Therefore, we also provide empirical evidence at the individual level on the impact of watching West-German TV on fertility behaviour, thereby addressing potential endogeneity issues and identifying the direct causal effect of watching West-German TV.

This part of the paper is organized in four subsections. We first describe the econometric techniques employed in our baseline model using individual level data and, second, introduce the survey data used to estimate the effect of Western TV exposure on fertility. Third, we present the results. Finally, we address potential weaknesses of our analysis and demonstrate the robustness of our results.

5.1 Econometrical specification

Our goal is to assess how lifestyles promoted by Western TV influence fertility behaviour. Hence, the regression equation of interest for individual i, $i = 1, \ldots, N$, is

$$y_i = \gamma TV_i^* + \beta X_i + u_i \,, \tag{2}$$

where y_i is the observed number of children explained by Western TV consumption, TV_i^*, and other individual and household characteristics X_i. γ and β denote parameters. Standard errors are again clustered on the district level. According to our hypothesis, we expect γ to have a negative sign.

Unobservable variables, however, might influence both TV and fertility behaviour. For example, a preference for materialistic consumption goods could affect the observed number of children as well as the tendency to watch Western TV. Furthermore, individuals with a preference for a small number of children might be more inclined to watch Western TV. In these cases, an endogeneity problem arises.

[13] The differences in childcare enrolment between the treatment and the control group were 8.6 percentage points (p: 0.006) in 1965, 4 percentage points (p: 0.208) in 1970, 1.4 percentage points (p: 0.434) in 1975, and − 0.02 percentage points (p: 0.985) in 1987.

We overcome this problem by employing an IV approach that exploits the natural variation in West German TV exposure in East Germany.

In a first step, we estimate

$$TV_i^* = \eta D + \tau X_i + \varepsilon_i, \tag{3}$$

where D is a dummy variable indicating that an individual resides in a region lacking West German TV reception. X_i is a set of exogenous control variables, η and τ denote the associated parameters, and ε_i is the error term.

In the second step, we insert the reduced-form prediction of Western TV consumption from Eq. (3) into Eq. (2). Now, the parameter of interest γ in Eq. (2) is identified by the region dummy indicating no access to Western TV.

Our empirical analysis faces two challenges. First, we have count data on the left-hand side in (2), because Western TV consumption, TV_i, is measured in ordinal units, ranging from never watching Western TV to daily consumption. Second, our endogenous regressor is measured on an ordinal scale. To address these concerns, we linearize the endogenous regressor and the outcome variables and estimate 2SLS models. We employ three different measures of fertility. First, we assume that fertility—the number of children—can be considered as a metric variable. Second, we generate a binary variable for having children at all, and third, we generate a binary variable for having two or more children. Regarding TV consumption, the descriptive statistics suggest that a binary indicator for the intensity of TV consumption should capture the relevant information. Thereby, we generate a TV dummy which equals 0 if the frequency of watching Western TV equals "never" or "rarely" and 1 otherwise. As robustness tests we generate two alternative binary variables: First, the TV dummy is 0 if the frequency of watching Western TV equals "never" and 1 otherwise, and, second, the TV dummy is 0 if the frequency of watching Western TV equals "never", "rarely" or "once a week", that is, the TV dummy is 1 if the frequency equals "several times a week" or "daily" and 0 otherwise.

5.2 Data

Our (individual) data set was conducted between the end of 1988 and the beginning of 1989. At that time, the GDR was a stable communist country and no one expected its termination. We use formerly classified data collected by the Central Institute for Youth Research (the *Zentralinstitut für Jugendforschung*).[14] The Central Institute produced many critical studies that were never allowed to be published. To ensure respondents' anonymity, questionnaires were conducted in group settings, were unmarked, and were collected in sealed urns.[15] We use a written survey conducted in eight GDR regions. Participants had been selected via cluster-sampling. According to Etzkom and Stiehler

[14] Zentralinstitut für Jugendforschung, Leipzig (n.d.): Political Climate and Social Conditions in the GDR 1988/1989. GESIS Data Archive, Cologne. ZA6008 Data file Version 1.0.0, https://doi.org/10.4232/1.6008

[15] Such a procedure makes the data set credible even for the politically sensitive questions analyzed by Kern and Hainmueller (2009). For a detailed description of the data-gathering process and the Central Institute, see Kern and Hainmueller (2009).

(1998), the sample can be considered as representative for the younger cohort of the corresponding regions of the GDR.

Our data set consists of approximately 1500 women, aged 15 to 50. The mean age in our sample is about 23.2 years and covers exactly the age cohorts relevant for our undertaking.[16] We measure fertility behaviour with the observed number of children (and children dummies (see Sect. 5.1.)).

In contrast to previous studies, we use actual TV consumption to explain fertility behaviour instead of mere access to TV signals and, hence, are able to instrument individual consumption behaviour with exogenous topographical signal reception conditions. We assume that reported individual TV consumption is a suitable proxy for long-term individual TV consumption behaviour. Given the very low geographical mobility in East Germany and the ubiquitous availability of TV sets (see Fig. 1), this is a reasonable assumption.

Individual consumption of Western TV is captured by answers to the question: "How often do you watch Western TV?" The possible responses were: "daily, several times a week, once a week, less often, never." As mentioned in Sect. 5.1., in the analysis we apply a Western TV dummy, which is equal to 0 if the frequency of watching Western TV equals "never" or "rarely" and 1 otherwise.

In our data set respondents reside in one of seven regions one of which, the region around Dresden, was not exposed to West German TV (see Fig. 2) and, hence, constitutes the control group of our natural experiment. We observe about 373 women from this control region where only a very weak signal could be received, and only in fringe areas bordering other regions.

Table 6 gives the summary statistics for the number of children and the frequency of watching Western TV for both the control and the treatment group. As expected, we find the share of respondents having less than two children to be higher in the treatment group while the opposite holds for the control group. The lower part of Table 6 shows that, due to topographical reasons, the frequency of watching TV is much smaller within the control group than in the treatment group. In the control region, about 5.09 percent of respondents watched West German TV daily, compared to 61.79 percent of respondents living in a treated region. Consequently, watching Western TV (dummy) and a dummy variable indicating residence in the control region are strongly and negatively correlated at –0.77, significant with a p-value of 0.0000.

Table 7 provides the summary statistics for the set of control variables used in our empirical analysis. We account for age, income, partnership and marital status, religion, living in a rural or urban area, number of school years, and educational status.

5.3 Results

The parameter estimates of Eq. (2) are presented in the upper part of Table 8. As mentioned above, we identify TV consumption using the Dresden district dummy. The estimated parameters for this dummy in the first-stage reduced-form estimation,

[16] According to the statistical yearbook of the GDR 1990, more than 99% of all children were born to mothers aged 15 to 50. The average age of women who gave birth to a child in 1989 was about 24, which is approximately the average age in our sample.

Table 6 Variable definition and summary statistics of endogenous variables

Variable Definition			Summary statistics					
Variable	Description/Item		Control group:			Treatment group:		
			Individuals in districts WITHOUT Western TV			Individuals in districts WITH Western TV		
			Total	Freq	Share	Total	Freq	Share
Children	number of children	0	396	233	58.8%	1104	712	64.5%
		1		85	21.4%		239	21.6%
		2		67	16.9%		138	12.5%
		3		9	2.2%2		13	1.2%
		4		2	0.5%		2	0.2%
TV	frequency of watching Western TV	Never	373	260	69.7%	1107	30	2.7%
		Rarely		51	13.6%		39	3.5%
		Once a week		7	1.8%		26	2.4%
		Several times a week		36	9.6%		328	29.6%
		Daily		19	5.1%		684	61.8%

Districts without Western TV consist of respondents living in the district of Dresden. Districts that receive Western TV are given by respondents living in the districts of Schwerin, Magdeburg, Leipzig, Karl-Marx-Stadt, and Erfurt. Respondents from East Berlin are excluded

Eq. (3), are given in the lower part of Table 8. The Dresden district dummy is highly significant with a negative sign, providing support for the relevance of our instrument. Living in the control area substantially reduces Western TV consumption.

The first column of Table 8 sets out the results for fertility measured by the number of children. In line with our hypothesis, we find a negative and statistically significant effect of watching West German TV on fertility. Watching Western TV reduces the number of children by 0.13. In model 2, we estimate the probability of having children at all, and in model 3, the probability of having two or more children.

The resulting parameter estimates for both models are negative and significant at the 1 percent level, with p-values of 0.000 and 0.000, respectively. Hence, the negative effect of TV consumption is robust with respect to the different specifications of our depended variable displayed Table 8. In concrete, we find that watching Western TV reduces the probability of having children at all by 4.6%-points and the probability for having two or more children by 6.2%-points.[17]

Furthermore, our results show that age and being married are statistically significant and have the expected effects in all model specifications. Living together with a partner is only significant in model 1 and 2 and seems to be less important for the probability of having more children. Individuals living in urban regions are less likely to have

[17] All results remain robust if we apply different binary indicators for TV consumption, as suggested in Sect. 5.1.

Table 7 Variable definition and descriptive statistics of control variables

Variable definition		Summary Statistic				*t* test
Variable	Description	Control group: Individuals in districts WITHOUT Western TV		Treatment group: Individuals in districts WITH Western TV		
		Mean	Sd	Mean	Sd	*p* value
Age	Age in years	23.40	6.63	23.06	6.16	0.3669
Income	Monthly net income	501.52	327.86	517.06	330.02	0.4214
Partner	1 if respondent lives together with her partner	0.26	0.44	0.18	0.40	0.0015
Married	1 if respondent is married	0.33	0.47	0.32	0.47	0.7282
Religious	1 if respondent believes in god	0.16	0.37	0.14	0.35	0.3624
Suburban	1 if living in a city with less than 100,000 inhabitants	0.53	0.50	0.49	0.50	0.1585
Urban	1 if living in a city of more than 100,000 inhabitants	0.19	0.39	0.09	0.28	0.0000
Region d.k	No information on inhabitants	0.13	0.33	0.13	0.33	0.9200
Education	Number of years in school	10.00	0.94	10.06	0.85	0.1849
Training	1 if in vocational training or university	0.24	0.43	0.23	0.42	0.6307

Districts without Western TV are constituted of respondents living in the district of Dresden, a dead spot of Western TV reception. Reference group of SUBURBAN, URBAN and REGION d.k.: RURAL regions with up to 2000 inhabitants. Respondents from East Berlin are excluded

more children than individuals living in rural regions. The negligible effect of income on fertility might reflect the socialist environment in which the experiment took place.

5.4 Robustness tests

Although the natural experiment described above supports a causal interpretation of our results, in this subsection we address several concerns that might potentially affect our results.

5.4.1 Matching

First, we discuss potential sample selection effects. Individuals watching Western TV might be different in their characteristics compared to individuals who do not watch Western TV. As a validity check of the individual level results, we provide results from regressions on a matched sample (based on observables used as control variables in our main regression (see Table 8)). Therefore, we do a propensity score matching where we retain individuals, who do not watch Western TV, and only keep the single

Table 8 IV Estimation results

Endogenous variable	(1)		(2)		(3)	
	2SLS		2SLS		2SLS	
	Number of CHILDREN		One or more CHILDREN		Two or more CHILDREN	
	Coefficient	Std. Err	Coefficient	Std. Err	Coefficient	Std. Err
Second-stage regression						
TV	− 0.132***	0.012	− 0.046***	0.010	− 0.062***	0.007
Age	0.208***	0.039	0.151***	0.019	0.045**	0.018
Age2	− 0.002***	0.001	− 0.002***	0.000	− 0.000	0.000
Income	− 0.000***	0.000	− 0.000***	0.000	− 0.000	0.000
Income2	0.000	0.000	0.000	0.000	0.000	0.000
Partner	0.129***	0.030	0.103***	0.024	0.018	0.014
Married	0.512***	0.054	0.353***	0.032	0.168***	0.024
Religious	− 0.001	0.036	− 0.006	0.010	− 0.006	0.018
Suburban	0.030	0.035	0.037*	0.022	− 0.006	0.012
Urban	− 0.079***	0.024	− 0.022	0.028	− 0.047***	0.017
Region d.k	0.041	0.042	0.056	0.041	− 0.010	0.007
Education	− 0.039**	0.019	− 0.021***	0.006	− 0.007	0.013
Training	0.125***	0.035	0.056**	0.026	0.051**	0.022
Constant	− 2.478***	0.492	− 1.819***	0.286	− 0.603**	0.251
First-stage regression						
Endogenous variable			TV			
Dresden region			− 0.772***	0.018		
Controls			Yes			
Kleibergen-Paap F stat			1806.4			
Number of Obs			1432			

Significance levels: *$p < 0.10$; **$p < 0.05$; ***$p < 0.01$. The exogenous controls in the first-stage reduced-form estimation are the same as in the second stage. The control group consists of respondents living in the district of Dresden. Respondents from East Berlin are excluded. Standard errors are clustered at the district level

nearest neighbour from the group of individuals, who watch Western TV.[18] Balancing properties are displayed in Table 13 within "Appendix".

In Table 9, model 1, we display the matching results (ATT). Based on the matched sample, we provide OLS regression results in model 2 and 2SLS regressions in model 3. In all three models we focus on having one or more children.[19] Results suggest that

[18] Consumption of Western TV is based on the Western TV dummy applied in the main regressions.

[19] Results remain robust when the endogenous variable depicts the number of children or having two or more children.

Table 9 Matching results and regressions on matched sample

Endogenous variable	(1)		(2)		(3)	
	MATCHING		OLS		2SLS	
	One or more CHILDREN					
	Diff. in means	Std. Err	Coefficient	Std. Err	Coefficient	Std. Err
Second-stage regression						
TV	− 0.062*	0.036	− 0.056**	0.018	− 0.066***	0.014
Age			0.149***	0.021	0.149***	0.019
Age2			− 0.002***	0.000	− 0.002***	0.000
Income			− 0.000	0.000	− 0.000	0.000
Income2			− 0.000	0.000	− 0.000	0.000
Partner			0.126**	0.036	0.126***	0.033
Married			0.370***	0.018	0.370***	0.016
Religious			− 0.006	0.013	− 0.005	0.011
Suburban			0.085***	0.020	0.085***	0.018
Urban			0.009	0.031	0.009	0.028
Region d.k			0.060	0.052	0.060	0.046
Education			− 0.024	0.013	− 0.024**	0.012
Training			0.071*	0.028	0.071***	0.025
Constant			− 1.804***	0.368	− 1.799***	0.334
First-stage regression						
Endogenous variable					TV	
Dresden region					− 0.788***	0.037
Controls					Yes	
Kleibergen-Paap F stat					456.6	
Number of Obs	738		738		738	

Significance levels: *$p < 0.10$; **$p < 0.05$; ***$p < 0.01$. Regression models (2) and (3) are based on the matched sample, whereby standard errors are clustered at the district level

watching Western TV decreases the probability of having children between 5.6%-points and 6.6%-points.

5.4.2 Urbanization

We further check the robustness of our results due to varying urbanization levels and unobserved differences regarding the impact of pronatalist social policies in rural and urban areas. Population density and the level of urbanization were important determinants of fertility levels in developed societies in the twentieth century. The

urbanization rate and population density of Dresden was above the GDR average. That is, respondents of the control group (living in the Dresden region) were less likely to live in rural regions as can be seen in Table 7.

When restricting our analysis to suburban and urban regions, we find that for all three specifications of fertility, the parameter capturing the impact of watching West-German TV remains negative and statistically significant (see Table 14 in "Appendix").

5.4.3 Age effects

We also investigate effect heterogeneities by age group. The results presented by Kearney and Levine (2015) suggest that TV programs such as "16 and Pregnant" affect teen childbearing. In what follows we analyse whether the observed treatment in parts of the GDR only affected teen childbearing or older (than adolescent) women too. Therefore, we split our sample into two different age cohorts. First, we re-estimate all models using the restricted sample of women aged 15–21. The results for the restricted sample are given in Table 15 in "Appendix". The effect of Western TV consumption on fertility remains significant in all model specifications indicating a substantial effect even if we restrict our analysis to the very beginning of the reproductive years.

In addition, we re-estimate all models using the restricted sample of women aged 22 or more. The results for this restricted sample are displayed in Table 16 in "Appendix". For this age cohort, we find that women less likely have more children, which is also displayed in a significant negative TV effect regarding the number of children. However, we do not observe a statistically significant TV effect on having children at all.

5.4.4 Individuals not watching Western TV

Based on individual information data, we find strong hints that watching (Western) TV affected fertility behaviour. We next address the question whether individuals not watching Western TV in the treatment regions were more similar to the individuals observed in the control region than those watching Western TV. In Table 10, we focus on individuals who did not watch Western TV at all. Model 1 indicates that women in the control region (Dresden) and women not watching Western TV in the treatment region did not differ in their fertility behaviour. In model 2, we add watching Eastern TV to the model. Along the lines of our main regressions in Sect. 5.3., we generate an Eastern TV dummy which equals 0 if the frequency of watching East German TV equals "never" or "rarely" and 1 otherwise. We find a positive but insignificant coefficient for Eastern TV consumption suggesting that conditionally on living in Dresden, which remains insignificant, women watching Eastern TV were similar likely of having one or more children. Finally, in model 3, we check whether women in the control region watching Eastern TV had a similar fertility behaviour than women in the treatment region watching Eastern (but not Western) TV: The statistically insignificant interaction coefficient suggests that there were no differences.

Table 10 Women not watching Western TV

Endogenous variable	(1)		(2)		(3)	
	OLS		OLS		OLS	
	One or more CHILDREN					
	Coefficient	Std. Err	Coefficient	Std. Err	Coefficient	Std. Err
Dresden	− 0.029	0.048	− 0.048	0.045	0.019	0.097
TV GDR			0.074	0.040	0.134	0.097
Dresden * TV GDR					− 0.087	0.094
Age	0.122***	0.009	0.120***	0.009	0.120***	0.008
Age2	− 0.001***	0.000	− 0.001***	0.000	− 0.001***	0.000
Income	0.000	0.000	0.000	0.000	0.000	0.000
Income2	− 0.000	0.000	− 0.000*	0.000	− 0.000*	0.000
Partner	0.147**	0.038	0.142**	0.036	0.140**	0.035
Married	0.330***	0.015	0.333***	0.016	0.332***	0.016
Religious	− 0.027**	0.008	− 0.015	0.011	− 0.016	0.011
Suburban	0.055	0.028	0.059	0.030	0.063	0.032
Urban	0.006	0.027	0.011	0.026	0.013	0.025
Region d.k	0.063	0.042	0.057	0.039	0.062	0.040
Education	− 0.021	0.013	− 0.020	0.014	− 0.019	0.015
Training	0.024	0.035	0.021	0.028	0.016	0.021
Constant	− 1.511***	0.111	− 1.539***	0.127	− 1.584***	0.133
Number of Obs	285		284		284	

Significance levels: *$p < 0.10$; **$p < 0.05$; ***$p < 0.01$. The control group consists of respondents living in the district of Dresden. Respondents from East Berlin are excluded. Standard errors are clustered at the district level

5.4.5 Placebo tests

Finally, we test if individual-level characteristics unaffected by TV differ between treatment and control group. Table 17 in "Appendix" depicts the effect of watching Western TV on individual-level characteristics. Except for religion and living together with a partner, we find no differences between the treatment and control group. Since our main regressions condition on all the control variables, we are confident in the validity of our TV effect. Furthermore, as shown before, regressions addressing sample selection effects (see matching results) support our empirical findings.

6 Discussion on mechanism

A shortcoming of the data is that we do not observe the TV content consumed by East Germans directly. It could be that in the control region, individuals consume less TV in general, and use their free time on sexual intercourse instead. Overall TV

consumption is indeed lower in the control region, yet there is no information how free time is used (see model 1 in Table 18 in "Appendix"). Regarding the consumption of East German TV, we find that individuals in the treatment region consume less East German TV (see model 2 in Table 18 in "Appendix"). Watching Western TV (dummy) and watching Eastern TV (dummy) are not correlated (− 0.12).[20] Differentiated by region, the corresponding correlation for women living in the treatment region is 0.06 and for women living in the control region − 0.29. In sum, we cannot rule out that West German TV could have a zero-effect, but East German TV could have a positive effect on fertility, which, however, would still be in line with role models affecting fertility behaviour. Moreover, the fertility-effect could be an indirect effect stemming from other TV-effects. It could also be that consumers of West German TV are just better informed about family planning. In similar vein, Kalwij (2016) suggests that the availability of television and radio might had played an important role for passing family planning services in Thailand.

The assumption that TV images affect behaviour is in line with studies provided by Hornuf et al. (2020) and Slavtchev and Wyrwich (2021). Hornuf et al. (2020) provide evidence that West German television had a mitigating effect on xenophobia. They assume that individuals who received West German television were exposed more frequently to foreigners and thus have developed less xenophobia. Slavtchev and Wyrwich (2021, p.1) suggest that "TV can shape career choices by conveying information and pointing to business opportunities and/or by showing that entrepreneurship can be an alternative to dependent employment. Moreover, TV can influence career decisions by transmitting images that affect both, viewers' preferences and the esteem of occupations." The results of their analysis suggest that individuals' decision to start an own business can be influenced via TV.

Similarly, the findings in Table 10, namely that individuals not watching Western TV in the treatment regions are similar to the individuals observed in the control region, indirectly suggest that the different TV content could be the effect channel. In sum, while we find plausible arguments that fertility is affected by role models presented on TV, we cannot exclude that other mechanisms emanating from TV consumption are at work.

7 Conclusion

This paper explores the effect of Western TV consumption on fertility behaviour in the former GDR. In the developed world, isolating the impact of watching TV on behaviour is usually complicated due to the fact that a suitable control group hardly exists. We are able, however, to identify a causal relationship between Western TV consumption and fertility by exploiting a natural experiment that took place within the separated Germany of the cold war era.

Contrary to the values and family role models promoted by the communist regime established in the eastern part of Germany, Western TV portrayed lifestyles in which children played only a small part; female characters had much fewer children or no

[20] We observe a similar correlation (− 0.21) if we treat TV consumption as metric variables.

children at all. Due to geographical reasons, we can identify regions of the GDR that could not receive Western TV programs aired from the Western part of Germany (FRG). Therefore, a natural variation of West German television exposure occurred and enables us to instrument the consumption of Western TV programs in our empirical analysis. Our results prove to be robust to a number of robustness checks and the use of different data sets at the individual and the district level.

We find robust empirical evidence that women with access to Western TV programs had less children than women without access to Western TV. Depending on the data set in our main regressions we estimate negative effects of Western TV consumption on fertility between 4.6% and 5.6%, which is in line with existing studies. Kearney and Levine (2015), for example, provide robust empirical evidence that exposure to a MTV reality show on teen childbearing generated a 4.3% reduction in teen births in a very short treatment period of only about 2 years. Jensen and Oster (2009) have shown a similar effect associated with the introduction of cable television in rural India estimating a 3.7% reduced likelihood of pregnancy in a treatment period of about 3 years.

We provide plausible arguments, somehow ironically, that although Western TV consumption did not destabilize the East German regime, as shown by Kern and Hainmueller (2009), it could have exerted a strong impact on the East German population via the promotion of western family role models. From a more general perspective, our analysis suggests that, in addition to economic determinants, fertility decisions might also be affected by role models or information about other ways of life promoted by the media, factors that are usually ignored in economics. Hence, the classical investment and opportunity cost framework, which is still dominant in the economic profession, might only partly represent how fertility decisions are made.

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Declarations

Conflict of interest The authors declare that they have no conflict of interest.

Human and animals rights This article does not contain any studies with human participants or animals performed by any of the authors.

Appendix

See Tables 11, 12, 13, 14, 15, 16, 17 and 18.

Table 11 Year interaction and common trend

	(1)	
	Two-way FE	
	Log (Fertility)	
	Coefficient	Std. Err
TV*1962	− 0.023	0.027
TV*1963	− 0.015	0.027
TV*1964	− 0.016	0.030
TV*1965	− 0.017	0.028
TV*1966	− 0.017	0.028
TV*1967	− 0.033	0.034
TV*1968	− 0.027	0.029
TV*1969	− 0.028	0.017
TV*1970	− 0.010	0.012
TV*1971	− 0.009	0.015
1972 = base		
TV*1973	− 0.057***	0.011
TV*1974	− 0.054***	0.013
TV*1975	− 0.097***	0.020
TV*1976	− 0.103***	0.025
TV*1977	− 0.124***	0.029
TV*1978	− 0.109***	0.023
TV*1979	− 0.085***	0.020
TV*1980	− 0.075***	0.021
TV*1981	− 0.064***	0.021
TV*1982	− 0.057**	0.022
TV*1983	− 0.033	0.023
TV*1984	− 0.028	0.028
TV*1985	− 0.049*	0.025
TV*1986	− 0.045*	0.025
TV*1987	− 0.057**	0.023
Controls	Yes	
Time fix effects	Yes	
District fix effects	Yes	
R-squared	0.982	

pt

Table 11 (continued)

	(1)	
	Two-way FE	
	Log (Fertility)	
	Coefficient	Std. Err
R-squared overall	0.891	
R-squared between	0.565	
Number of Obs	364	

Significance levels: *$p < 0.10$; **$p < 0.05$; ***$p < 0.01$. Standard errors are clustered at the district level. The district of East Berlin is excluded from the regression. The districts without Western TV consist of the districts of Dresden, Neubrandenburg and Rostock. The baseline year is 1972. Control variables are the same used in the main specification in Table 3, model 5

Table 12 Placebo regression on control variables at the aggregate district level

	(1)		(2)		(3)		(4)	
	Two-way FE		Two-way FE		Two-way FE		Two-way FE	
	Female share		Female employment share		Apartments built		Child care enrol	
	Coefficient	Std. Err	Coefficient	Std. Err	Coefficient	Std. Err	Coefficient	Std. Err
TV effect	0.056	0.048	− 1.179*	0.631	0.650	0.371	− 5.462**	1.877
Controls	Yes		Yes		Yes		Yes	
Time fix effects	Yes		Yes		Yes		Yes	
District fix effects	Yes		Yes		Yes		Yes	
R-squared	0.938		0.962		0.949		0.989	
R-squared overall	0.162		0.789		0.418		0.823	
R-squared between	0.114		0.680		0.076		0.068	
Number of Obs	364		364		364		364	
	(5)		(6)		(7)		(8)	
	Two-way FE		Two-way FE		Two-way FE		Two-way FE	
	Population density		Savings		Share industry		Share agriculutre	
	Coefficient	Std. Err	Coefficient	Std. Err	Coefficient	Std. Err	Coefficient	Std. Err
TV effect	− 2.604	2.265	− 55.086	74.253	1.072*	0.508	0.496*	0.277
Controls	Yes		Yes		Yes		Yes	
Time fix effects	Yes		Yes		Yes		Yes	

Table 12 (continued)

	(5)		(6)		(7)		(8)	
	Two-way FE		Two-way FE		Two-way FE		Two-way FE	
	Population density		Savings		Share industry		Share agriculutre	
	Coefficient	Std. Err	Coefficient	Std. Err	Coefficient	Std. Err	Coefficient	Std. Err
District fix effects	Yes		Yes		Yes		Yes	
R-squared	0.448		0.996		0.930		0.984	
R-squared overall	0.676		0.920		0.921		0.904	
R-squared between	0.753		0.135		0.921		0.885	
Number of Obs	364		364		364		364	

Significance levels: $*p < 0.10$; $**p < 0.05$; $***p < 0.01$. Standard errors are clustered at the district level. The district of East Berlin is excluded from the regression. The districts without Western TV consist of the districts of Dresden, Neubrandenburg, and Rostock

Table 13 Balancing properties

	TV: no	TV: yes	*t* test		
	Mean	Mean	%bias	*t*	$p>\|t\|$
Age	23.39	23.16	3.6	0.50	0.620
Income	518.83	519.92	− 0.3	− 0.05	0.962
Partner	0.26	0.27	− 2.6	− 0.33	0.739
Married	0.33	0.32	3.5	0.47	0.638
Religious	0.15	0.16	− 3.1	− 0.41	0.682
Suburban	0.52	0.51	1.6	0.22	0.825
Urban	0.20	0.19	1.6	0.19	0.852
Region d.k	0.11	0.12	− 4.2	− 0.58	0.561
Education	10.04	10.00	3.7	0.50	0.621
Training	0.21	0.20	3.2	0.46	0.647
Number of Obs	369	369			

Results refer to a one-nearest neighbours propensity score matching with a restriction on the common support and no replacement

Table 14 Restricted sample IV estimation results—women living in suburban and urban areas

Endogenous variable	(1)		(2)		(3)	
	2SLS		2SLS		2SLS	
	Number of CHILDREN	One or more CHILDREN	Two or more CHILDREN			
	Coefficient	Std. Err	Coefficient	Std. Err	Coefficient	Std. Err
Second-stage regression						
TV	− 0.134***	0.015	− 0.033***	0.006	− 0.072***	0.011
Age	0.209***	0.040	0.151***	0.018	0.047**	0.023
Age2	− 0.002***	0.001	− 0.002***	0.000	− 0.000	0.000
Income	− 0.000**	0.000	− 0.000	0.000	− 0.000**	0.000
Income2	0.000	0.000	0.000	0.000	0.000*	0.000
Partner	0.164***	0.045	0.119***	0.036	0.039**	0.017
Married	0.477***	0.046	0.326***	0.033	0.162***	0.030
Religious	− 0.032	0.028	− 0.006	0.014	− 0.025*	0.013
Education	− 0.017	0.026	− 0.020**	0.008	0.012	0.012
Training	0.134***	0.043	0.086***	0.028	0.031	0.033
Constant	− 2.726***	0.487	− 1.854***	0.275	− 0.806***	0.299
First-stage regression						
Endogenous variable			TV			
Dresden region			− 0.784***	0.018		
Controls			Yes			
Kleibergen-Paap F stat			1870.7			
Number of Obs			886			

Significance levels: *$p < 0.10$; **$p < 0.05$; ***$p < 0.01$. The exogenous controls in the first-stage reduced-form estimation are the same as in the second stage. The control group consists of respondents living in the district of Dresden. Respondents from East Berlin are excluded. Standard errors are clustered at the district level

Table 15 Restricted sample IV estimation results—age cohort 15–21

Endogenous variable	(1)		(2)		(3)	
	2SLS		2SLS		2SLS	
	Number of CHILDREN		One or more CHILDREN		Two or more CHILDREN	
	Coefficient	Std. Err	Coefficient	Std. Err	Coefficient	Std. Err
Second-stage regression						
TV	− 0.118***	0.008	− 0.074***	0.006	− 0.028***	0.002
Age	0.084	0.145	0.022	0.127	− 0.000	0.038
Age2	− 0.002	0.004	− 0.000	0.004	0.000	0.001
Income	0.000	0.000	0.000	0.000	0.000	0.000
Income2	− 0.000	0.000	− 0.000	0.000	− 0.000	0.000
Partner	0.095***	0.022	0.087***	0.025	0.010	0.010
Married	0.369***	0.105	0.289***	0.077	0.081**	0.035
Religious	− 0.014	0.015	− 0.006	0.017	− 0.006*	0.003
Suburban	0.032	0.029	0.018	0.021	0.008**	0.004
Urban	− 0.071***	0.009	− 0.058***	0.006	− 0.008***	0.003
Region d.k	− 0.045**	0.020	− 0.047***	0.018	0.001	0.007
Education	− 0.049***	0.016	− 0.037***	0.008	− 0.012	0.010
Training	0.068***	0.021	0.039***	0.009	0.018*	0.010
Constant	− 0.457	1.288	0.043	1.123	0.086	0.369
First-stage regression						
Endogenous variable			TV			
Dresden region			− 0.740***	0.021		
Controls			Yes			
Kleibergen-Paap F stat			1196.6			
Number of Obs			703			

Significance levels: *$p < 0.10$; **$p < 0.05$; ***$p < 0.01$. The exogenous controls in the first-stage reduced-form estimation are the same as in the second stage. The sample is restricted to the age cohort 15–21. Standard errors are clustered at the district level

Table 16 Restricted sample IV estimation results – age cohort 22 +

Endogenous variable	(1)		(2)		(3)	
	2SLS		2SLS		2SLS	
	Number of CHILDREN		One or more CHILDREN		Two or more CHILDREN	
	Coefficient	Std. Err	Coefficient	Std. Err	Coefficient	Std. Err
Second-stage regression						
TV	− 0.152***	0.016	− 0.016	0.016	− 0.101***	0.012
Age	0.351***	0.056	0.179***	0.021	0.144***	0.026
Age2	− 0.005***	0.001	− 0.002***	0.000	− 0.002***	0.000
Income	− 0.001***	0.000	− 0.000**	0.000	− 0.000	0.000
Income2	0.000***	0.000	0.000	0.000	0.000	0.000
Partner	0.173***	0.038	0.120***	0.028	0.038	0.024
Married	0.513***	0.044	0.345***	0.030	0.177***	0.023
Religious	0.011	0.082	− 0.007	0.024	− 0.008	0.040
Suburban	0.077	0.064	0.089*	0.048	− 0.005	0.014
Urban	− 0.029	0.044	0.047	0.055	− 0.062*	0.037
Region d.k	0.168**	0.078	0.201***	0.063	− 0.021	0.029
Education	− 0.021	0.028	− 0.003	0.011	− 0.003	0.020
Training	− 0.272**	0.126	− 0.156	0.125	− 0.120*	0.067
Constant	− 4.778***	0.733	− 2.381***	0.348	− 2.143***	0.430
First-stage regression						
Endogenous variable			TV			
Dresden region			− 0.802***	0.019		
Controls			Yes			
Kleibergen-Paap F stat			1863.4			
Number of Obs			729			

Significance levels: *$p < 0.10$; **$p < 0.05$; ***$p < 0.01$. The exogenous controls in the first-stage reduced-form estimation are the same as in the second stage. The sample is restricted to the age cohort above 21 years of age. Standard errors are clustered at the district level

Table 17 Placebo regressions—IV estimation results

Endo. V	(1)		(2)		(3)		(4)		(5)		(6)		(7)	
	2SLS		2SLS		2SLS		2SLS		2SLS		2SLS		2SLS	
	AGE		INCOME		PARTNER		MARRIED		RELIGIOUS		EDUC		TRAINING	
	Coefficient	Std. Err.	Coefficient	Std. Err.	Coefficient	Std. Err.	Coefficient	Std. Err.	Coefficient	Std. Err.	Coefficient	Std. Err.	Coefficient	Std. Err.
Second-stage regression														
TV	0.077	0.153	8.521	9.320	− 0.090***	0.007	− 0.006	0.034	− 0.064**	0.028	0.040	0.030	0.004	0.012
Contr	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
First-stage regression														
Endo. V	TV		TV		TV		TV		TV		TV		TV	
Dres	− 0.773***	0.019	− 0.772***	0.019	− 0.773***	0.018	− 0.772***	0.018	− 0.771***	0.019	− 0.772***	0.018	− 0.772***	0.018
Contr	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
K-P.F.-st	1714		1727		1916		1822		1580		1834		1783	
N. Obs							1432							

Significance levels: *$p < 0.10$; **$p < 0.05$; ***$p < 0.01$. The control group consists of respondents living in the district of Dresden. Respondents from East Berlin are excluded. Standard errors are clustered at the district level. Each regression conditions on all the control variables used in the main specification, except the one variable used as an outcome

Table 18 Overall TV consumption (Western and Eastern TV) and only East German TV

Endogenous variable	(1)		(2)	
	OLS		OLS	
	Overall TV consumption		East German TV	
	Coefficient	Std. Err	Coefficient	Std. Err
Dresden region	− 2.140***	0.078	0.627***	0.053
Age	0.093**	0.027	0.100**	0.026
Age2	− 0.001*	0.000	− 0.001**	0.000
Income	− 0.001	0.001	− 0.000	0.000
Income2	0.000	0.000	0.000	0.000
Partner	0.037	0.069	0.030	0.071
Married	0.131	0.128	0.105	0.105
Religious	− 0.379*	0.169	− 0.477***	0.053
Suburban	− 0.118	0.115	− 0.085	0.087
Urban	− 0.427	0.230	− 0.170	0.157
Region d.k	− 0.097	0.146	− 0.192	0.129
Education	0.019	0.046	0.023	0.048
Training	− 0.153	0.199	− 0.195**	0.076
Constant	6.875***	0.621	2.243**	0.731
Number of Obs	1427		1427	

Significance levels: *$p < 0.10$; **$p < 0.05$; ***$p < 0.01$. OLS estimation results. Standard errors are clustered at the district level. Respondents from East Berlin are excluded. East German TV is measured on a five point scale, where one equates never and five equates daily watching TV. Overall TV consumption combines frequencies of watching Western and Eastern TV. The indicator maps never watching Western or Eastern TV up to daily watching Western and Eastern TV on a nine-point scale

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