

# Soap Operas and Fertility: Evidence from Brazil\*

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## Abstract

What are the effects of television, and of role models portrayed in TV programs, on individual behavior? We focus on fertility choices in Brazil, a country where soap operas (*novelas*) portray families that are much smaller than in reality. We exploit differences in the timing of entry into different markets of Rede Globo, the network that has an effective monopoly on *novelas* production in this country. Using Census data for the period 1970-1991, we find that women living in areas covered by the Globo signal have significantly lower fertility. The effect is strongest for women of lower socioeconomic status and for women in the central and late phases of their fertility cycle, consistent with stopping behavior. The result is robust to placebo treatments and does not appear to be driven by selection in Globo entry. Finally, we provide suggestive evidence that *novelas*, and not just television, affected individual choices. First, people living in areas covered by the signal were more likely to name their children after *novela* characters. Second, entry of a network that relied on imported shows did not have a significant impact on fertility. Third, the impact of Globo presence was strongest for women close in age to the main *novela* characters.

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# 1 Introduction

In the early 1990s, after more than thirty years of expansion of basic schooling, over 50% of 15 year olds in Brazil scored at the lowest levels of the literacy portion of the Programme for International Student Assessment (PISA), indicating that they could not perform simple task such as locating basic information within a text. People with four or fewer years of schooling accounted for 39 percent of the adult population in the urban areas, and nearly 73 percent in rural areas as measured by the 2000 Census. On the other hand, the share of households owning a television set had grown from 8 percent in 1970 to 81 percent in 1991, and remained approximately the same ten years later. The spectacular growth in television viewership in the face of slow increases in education levels characterizes Brazil as well as many other developing countries. Most importantly, it suggests that a wide range of messages and values, including important ones for development policy, have the potential to reach households through the screen as well as through the classroom.

This paper examines the effect of three decades of expansion of commercial television on fertility patterns in Brazil. Fertility is an interesting dimension of development policy to explore in the context of Brazil. In fact this country experienced a dramatic drop in fertility in the past forty years. The total fertility rate was 6.3 in 1960, 5.8 in 1970, 4.4 in 1980, 2.9 in 1991, and 2.3 in 2000 (Lam and Marteleto, 2003). The only other developing country comparable in size to have experienced such a sharp and generalized decline is China, where the decline was the result of deliberate government policy. In Brazil no population control policy was ever enacted by the government, and for a period of time advertising of contraceptive methods was even illegal. The change therefore originated from a combination of supply factors related to the availability of contraception and lower desired fertility. In this paper we focus on the latter and investigate one of the channels that may have led Brazilians to desire smaller family sizes. While there are certainly important changes to the structure of the Brazilian economy that may be associated with fertility decline, in this paper we focus on television as a vehicle for shaping individual preferences towards fewer births.

In particular, we examine the effect of exposure to one of the most pervasive forms of cultural communication in Brazilian society: soap operas, or *novelas*. To this date, the vast majority of the Brazilian population, across all social classes, watches regularly the 8 pm novela. One group has a virtual monopoly over the production of Brazilian novelas, Rede Globo. A content analysis of 115 novelas aired by Globo in the two time slots with highest audience between 1965 and 1999 reveals that 72 percent of the main female characters (aged 50 or below) had no children at all, and 21 percent had only one child. This is in marked contrast with the prevalent fertility rates in Brazilian society over the same period.

To identify the effects on fertility of exposure to this kind of family values, we exploit information on the timing of Globo entry into different areas. Our key independent variable is a dummy that captures whether an area receives

the Globo signal in a given year, and is constructed from information on the location and radial reach of Globo broadcasting and retransmitting stations in every year.

In a first set of results we examine the relationship at the aggregate level, i.e. over time and across 3,475 Minimally Comparable Areas (AMCs) in Brazil. Using Census data for the period 1970-1991 we find that, after controlling for time varying covariates and for time-invariant area characteristics, AMCs reached by the Globo signal had significantly lower fertility, measured as the number of children born alive for women aged 15-49. The magnitude of the effect is about  $1/4$  of the effect of being married, and is comparable to that associated with an increase of 1 doctor or nurse per 1,000 people.

In a second set of results we use individual level data and estimate the likelihood that a woman gives birth in any given year between 1980 and 1991, as a function of individual and household characteristics and of the availability of Globo signal in the area where the woman lives. *Ceteris paribus*, Globo coverage is associated with a decrease in the probability of giving birth of .6 percentage points, which is 6 percent of the mean. The magnitude of this effect is comparable to that associated with an increase of 2 years in women's education. The (negative) effect of Globo exposure is stronger for households with lower education and wealth, as one would expect given that these households are relatively less likely to get information from written sources or to interact with peers that have small family sizes. There is also considerable heterogeneity along the age dimension. Interestingly, the effect of Globo coverage is insignificant for women aged 15-24, and is quantitatively larger and significant for women aged 25-34 (a decrease of 8 percent of the mean probability of giving birth for this age group) and for women aged 35-44 (a decrease of 11 percent of the mean). This is consistent with the demographic literature on Brazil, which has highlighted how the decline in fertility was mostly due to stopping and not to delayed first births.

In the last part of the paper we discuss the extent to which these results may be interpreted as related to television viewing per se, or also to the type of programs (*novelas*) broadcast by Globo. We find evidence consistent with the idea that *novelas* did play a role in family decisions, including possibly those on fertility. Our first piece of evidence comes from naming patterns among school aged children. Using administrative data on a random sample of AMCs, we find that the parents living in areas that are reached by Globo are significantly more likely to name their children after the name of the main characters of *novelas* aired in the year in which the children were born. Our second piece of evidence comes from the entry of the second largest commercial network, Sistema Brasileiro de Televisao (SBT). Running similar regressions to those that we run for Globo, we find that exposure to SBT does not significantly affect fertility patterns. Interestingly, SBT broadcasts programs that are imported from Mexico and the US and are generally not perceived as realistic portraits of Brazilian society. Our third piece of evidence exploits variation in *novela* content across years, as well as variation in the potential extent of identification between viewers and *novelas*' main characters. We find that decreases in fertility

were stronger in years immediately following novelas that portrayed messages of upward social mobility, and for women whose age was closer to that of the main female characters in those years.

A key challenge for our identification strategy is the possibility that Globo presence may be correlated with unobserved determinants of fertility. Because we employ area fixed effects in all regressions, the relevant concern is whether Globo entry may be correlated with pre-existing fertility trends. We address this issue in several ways. First, using aggregate data for three Census waves we show that changes in Globo coverage across waves are not correlated with changes in the average number of children that women have. Second, we exploit yearly data on the flow of new births for the period 1958-2000 and we regress fertility on a set of dummies going from 10 years before Globo entry to 10 years after. Importantly, we find that there is no decline in fertility before the year in which Globo enters, but only afterwards (this result is displayed in figure 5 and discussed in section 5.3). Third, we conduct a series of placebo regressions and find that (i) future Globo entry in an area does not predict current fertility, and (ii) Globo presence in neighboring areas does not predict local fertility. Finally, as we discuss below, our results on content exploit variation within area-year or across years in a way that is intrinsically non-monotonic, and it would be difficult to explain those results as originating from trends.

Our paper is related to two strands of literature. The first is the literature on the determinants of fertility, with particular reference to the role of television in Latin America. We shall not review this literature here, as we discuss it in section 2 below in the context of Brazilian *novelas*. It should be observed that with respect to these contributions, that are mostly sociological and based on case studies, our work is the first attempt to identify a causal link with econometric techniques using a country-wide dataset.

The second strand of literature related to our paper is that on the effects of the media on social and political outcomes. Contributions in this field focussed on the role of newspapers and radio as mechanisms of accountability for politicians (Besley and Burgess, 2002; Stromberg, 2004), and on the effects of the media on voters' behavior (Gentzkow, 2006; DellaVigna and Kaplan, 2007). Other studies investigate the effects of television on *social*, as opposed to political, behavior, in particular on children's school performance (Gentzkow and Shapiro, 2006) and on adults' participation in social activities and trust (Olken, 2006).

In a recent contribution, Jensen and Oster (2007) estimate the impact that the entry of cable TV had on subjective measures of female autonomy, school enrollment and fertility. They use survey data on a sample of 180 rural villages in India for the years 2001-2003. Of these villages, 21 introduced cable TV during the survey period. One difference between our work and Jensen and Oster's lies in the breadth of the area covered (using Census data we cover the universe of Brazilian municipal areas) and time horizon (we explore the effects of Globo since its entry in the mid-1960s and until the early 1990s). This allows us to have a considerable degree of variation across areas over time and to look

at the long run impact of TV viewing on fertility. At the same time, the Census does not contain information on attitudes.

Another difference with respect to Jensen and Oster (2007) –and to most of the above cited literature– is that they do not exploit information on the *content* of media programs. In our analysis we provide suggestive evidence that what matters is not only television viewing, but also viewing a set of programs – novelas– containing certain messages and framed in a way that makes it easy for the viewers to directly relate to the situations portrayed. Two recent papers have explored the role of media content. One is the paper by Dahl and DellaVigna (2008), who focus on the short run effects of movie violence on crime. The second is the paper by Paluck (2008) who estimates the effects on beliefs and norms of a radio soap opera featuring messages of intergroup tolerance in Rwanda. Our work shares a similar motivation as Paluck’s, in that we are also interested in the possibility that media programs may become vehicles of development policy.

The remainder of the paper is organized as follows. In section 2 we provide some information on Brazilian novelas and on their main producer, Rede Globo. Sections 3 and 4 illustrate, respectively, our empirical strategy and the data. Section 5 contains our econometric results. Section 6 discusses the interpretation of our results in terms of TV exposure and media content. Finally, section 7 concludes.

## 2 Background on Brazilian *novelas*

Television has played a central role for the functioning and reproduction of contemporary Brazilian society and has played a strategic role in the process of articulating, diffusing, and institutionalizing new behavioral and attitudinal patterns in the country (Faria and Potter, 1999). In the span of three decades, exposure to television messages rose from zero to become universal in urban areas and to almost half in rural households. One of the crucial reasons for television’s influence in the country is the strength of its oral tradition.<sup>1</sup> In the early 1990s, after more than thirty years of expansion of basic schooling, adult literacy had reached only 80 percent. Ten years later, people with four or fewer years of schooling accounted for 39 percent of the adult population in the urban areas, and 73 percent in rural areas (Census 2000). Another characteristic of the country that contributes to the impact of television is the high rate of geographical, occupational, and social mobility: in this context, television helps give a sense of belonging (Faria and Potter, 1999). As noted by anthropologists, in Brazil the effect of television on values and attitudes is by no means confined to urban areas, but also reaches remote communities in the Amazons, inducing among other things a reorientation of beliefs on the role of women in society towards greater autonomy (Kottak, 1990).

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<sup>1</sup>In 2006, 39% of 15 year students in Brazil reported that they lived in homes with fewer than 10 books according to the PISA survey. In comparison, fewer than 10% of students from the OECD countries lived in homes with such few books (OECD, PISA 2006). The OECD average excludes Mexico. The sample excludes 15 year olds who have left school.

### **Rede Globo**

Television became a mass medium in Brazil earlier than in most developing countries. The military government in power in 1964 saw the potential of television as a tool for integrating the country, creating a national identity, developing markets, and controlling political information. The military pushed television deeper into the population by subsidizing credit for set sales and, in particular, by promoting the growth of one specific network to encourage national production. Rede Globo, selected as the privileged partner, began functioning in 1965 and quickly became the leading national network. Today, Rede Globo is the fourth biggest commercial network in the world, after ABC, CBS, and NBC, with a coverage of about 98 percent of the total number of municipalities in Brazil, which represents about 17.6 millions of households.

For the purpose of our identification strategy, it is important to understand how the expansion of Rede Globo occurred. During the military regime of general Joao Baptista Figueredo (1978-1985), the concessions of television networks followed clientelistic, political, and ideological criteria. The dictator had the absolute power to give the licenses for radio and television stations. Although this law was changed to put the congress in charge of approving the licenses, the clientelistic criterion was not abandoned at all (Lima, 2001). The relevance of the role of the media for the military regime was central. As several authors have stated, the military regime had an “obsession” with national integration, and the media was in charge of the cultural, political and economic integration. During that period the association between the government and Rede Globo was clear (Miguel, 2001).

The government of president Jose Sarney (1985-1990), the first elected government after the fall of the military dictatorship, provides a good example on how the clientelistic provision of licenses kept going. On 1989, there was a constitutional amendment to enlarge the government term from four to five years. During the two years before, the government gave a large number of TV and radio licenses to companies associated with congressmen who later voted in favor of the constitutional amendment (Costa and Brener, 1997). About the same situation happened again during the first mandate of president Fernando Henrique Cardoso (1995-1998), when the congress was about to vote another constitutional amendment which intended to approve reelection. Again a large number of licenses for retransmission stations were given to firms associated with congressmen (Lima and Capparelli, 2004). Indeed, to date there is a highly concentrated ownership of the media in Brazil: TV concessions, in particular, are controlled by eight families or groups.

An important reason why Rede Globo was the chosen partner of the government has to do with the fact that the network had a long standing cooperation agreement with Time-Life during the sixties. This included assistance with marketing strategies which at the time were unheard of in Brazil. The military government apparently assessed that Rede Globo matched best with their integration objectives especially given the fact that by the early seventies the marketing know-how had already been assimilated (dos Santos and Capparelli, 2005).

The instrumental use of licenses for clientelistic and political goals helps our identification strategy in that it mitigates concerns that Globo entry in different municipal areas may be driven by pre-existing (declining) fertility trends. Indeed, we empirically test for this possibility below and find that it is not supported in the data.

Obviously, political clientelism and a solid marketing strategy had to be complemented with a viable, quality product. Such product was the *novelas*. In fact, to this day a typical novela is watched by anything between 60 to 80 million viewers. The reason for the enormous success of this television format from Rede Globo during the last three decades can be traced to three aspects. First, they are all set up in easily recognizable locations so that viewers can better relate with the story. The context and the issues novelas deal with always relate to the daily life of the Brazilian population. Second, the network reaches viewers by making sure that its novelas use a colloquial language, a typical middle class setup, as most of the viewers identify, regardless of their own socioeconomic background, most telenovelas have an element of social mobility, and the novelas mix each other with real, everyday life, as its characters celebrate the same festivities, and national occurrences in “real time”. Third, the network spare no expenses in order to produce novelas of the highest technical and artistic quality. In fact, to this day, each episode of an average novela costs around 125,000 dollars, which is about fifteen times more than the production costs of the other Latin American novela powerhouse, the Mexican Televisa (Marques de Melo, 1988).

### **Fertility decline in Brazil**

As mentioned in the Introduction, in a few decades fertility fell rapidly in Brazil, with the total fertility rate (TFR) declining by over 50% from 1970 to 1990. With the military government far more interested in populating remote areas to protect borders than in organizing and promoting family planning programs, Brazil has often been described as an ideal environment for exploring specific determinants of fertility decline.

A large demographic literature has examined the proximate determinants of fertility. High rates of female sterilization have played a role as a main proximate determinant, along with increased use of the birth control pill (Merrick and Berquó 1983, Rutenberg et. al 1987). The rank of sterilization as a preferred method of contraception is related to institutional policies encouraging the delivery of births by cesarean section as well as government propaganda in the late 1960s which warned of the dangers of the birth control pill. The role of abortion, illegal in Brazil, is less clear.

The timing of births over the life cycle has also been explored in detail. Changes in the starting age of fertility have been negligible, related both to relatively stable marital patterns as well as persistently high rates of adolescent fertility. An increased spacing of births has contributed to the overall decline, although the stopping of childbirth at younger ages has been found to be more important (Martine (1996), Flores and Nuñez (2003)). While the increase in education explored by Lam and Duryea (1999) can explain a large share of the

overall decline, none of the aforementioned factors replicate the intertemporal and interspatial pace of the decline satisfactorily. Additionally, these studies typically do not address the underlying forces driving the higher demand for contraceptives or education.

### **Novelas and fertility**

One of the ideas advanced in sociological and communication studies is that there may be a link between the diffusion of television, and specifically of novelas, and fertility decline (e.g., Vink, 1988).

Brazilian novelas are rather different from Mexican ones, and in general from stereotypical Latin American telenovelas, because of the high quality of their plots and of their making. Since military-imposed censorship was in effect during most of the developmental period of the novela, a number of important writers started to write screen plots for Rede Globo. Several of them were having political problems with the military government.<sup>2</sup> These authors saw the opportunity of employment in the cultural industry as a way to fight dictatorship through the reinforcement of new values and ideas in their plots. In addition to freedom, recurrent themes include: criticism to religious and traditional values, consumption of luxurious goods, the portrayal of wealthy families, the display of new lifestyles, the circulation of modern ideas such as female emancipation in the work sphere, the female pursuit of pleasure and love even if through adultery, display of homosexuality, criticisms to machismo, and emphasis on individualism (Rios-Neto, 2001; Fadul, 1999). In section 4.2 below, we try to quantify the extent to which some of these values (specifically, on fertility, marriage and divorce) are contained in the novelas produced by Rede Globo.

Interestingly, family planning and population control were not *explicitly* addressed by Brazilian television or by novelas. Moreover, until the late seventies the government was reluctant to adopt population control policies: even advertising of contraception methods was considered illegal (McDonough and Souza, 1994). Still, novelas in Brazil were, and still are, loaded with material directly or indirectly relevant to family size preferences. Television reiterates the disclosure of a very specific model of family: small, beautiful, white, healthy, urban, middle and upper middle class consumerist family. Novelas have been a powerful medium through which the small family has been idealized. On the one hand, in many instances, the content of the story is related to the urban middle class of Rio de Janeiro and Sao Paulo, and the novela material, a fortiori, deals with the family type, spreading its values, attitudes and behavioral patterns. On the other hand, the small family may result from the constraints imposed by the plot. In Brazilian novelas the drama typically revolves around four or five families. In order to keep the number of characters manageable, no family

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<sup>2</sup>The extreme example is the case of Roque Santeiro, the most popular Brazilian novela ever, which was initially censored by the military government and later, when it was broadcast once democracy was brought back, it was viewed by nearly 100 million people, achieving a rating that fluctuated between 90 and one hundred percent. The reason for the censorship of the novela had little to do with the topic itself, but rather with the fact that the author was a communist.



can be very large. Sometimes this constraint leads to highly unrealistic family profiles.

The findings of an experimental focus group discussion illustrate this point. Herzog (1994) asked the group subjects, adult women of middle and lower-class backgrounds, to portray the families that are more frequently displayed on television by using available photographs, drawings, and printed material. They asked the same subjects to portray the family of common people using the same material. The results were clear: television families are small, rich and happy; the families portrayed as common people are poor, contain more children and the faces reveal unhappiness.

To sum up, constant exposure to smaller, less burdened television families, may have created a preference for fewer children and greater sensitivity to the opportunity costs of raising children (Faria and Potter, 1999).

### 3 Empirical strategy

In this paper we try to provide empirical evidence for the above conjecture, as advanced by the sociological literature. We shall do so by combining information on fertility with information on the timing of Rede Globo penetration in different areas of Brazil. We shall conduct our analysis at different levels of aggregation.

The first set of results uses aggregate data at the Minimal Comparable Area (AMC) level -defined below- over three time periods covering Census years 1970, 1980 and 1991. We estimate:

$$y_{jt} = X_{jt}\beta + \gamma G_{jt} + \mu_j + \lambda_t + \varepsilon_{jt} \quad (1)$$

where  $y_{jt}$  is the outcome of interest (average fertility in area  $j$  at time  $t$ , as defined below),  $G_{jt}$  is a dummy equal to 1 if area  $j$  received the signal of Rede Globo in year  $t$ ,  $X_{jt}$  is a set of time-varying controls at the area level,  $\mu_j$  and  $\lambda_t$  are, respectively, area and year fixed effects, and  $\varepsilon_j$  is the error term. Time-varying controls  $X_{jt}$  include the share of married women in the area, the share of catholic households, the average years of education of the household head, an index of household wealth, and the number of doctors and nurses per 1,000 people in the area. Note that by adding area fixed effects ( $\mu_j$ ) we control for time-invariant unobserved characteristics that affect fertility and may also be correlated with the timing of Globo entry. The time dummies capture instead the secular (declining) trend in fertility that is common to all areas. Our identifying assumption is that, conditional on area and time fixed effects and on the time-varying controls  $X_{jt}$ , the year of Globo entry is orthogonal to the error term. We shall test the plausibility of this assumption in section 4.2 below. In all regressions our standard errors are clustered by AMC.

There are two potential sources of endogeneity in the timing of Globo entry to different locations. The first is that the Ministry of Telecommunications may have used selective criteria in awarding licenses. As we explained in section 2, the considerations underlying the Ministry's choices were mostly linked to patronage vis-a-vis influential Brazilian families, and with no obvious link to local fertility

patterns. A second concern is that, because Globo is a commercial television, it may have chosen to enter wealthier locations first, as the latter would yield higher profits from advertising. For these reasons, we control for area fixed effects and for time-varying characteristics including a proxy for wealth in our regressions. We also explicitly assess the potential selection on our variables of interest.

In a second set of results we exploit individual level data to estimate the probability that a woman gives birth in a given year as a function of individual controls and Globo presence. As we explain below, in these regression we employ the 1991 Census wave and build a retrospective history of a woman’s fertility for the previous 12 years. We thus have 13 observations (years) for each woman in childbearing age. We estimate the following linear probability model:

$$y_{ijt} = X_{ijt}\beta + \gamma G_{jt} + \mu_j + \lambda_t + \varepsilon_{ijt} \quad (2)$$

where  $y_{ijt}$  is equal to 1 if a woman  $i$  living in area  $j$  gives birth to a child in year  $t$ ;  $G_{jt}$  is a dummy equal to 1 if area  $j$  received the signal of Rede Globo at least 9 months prior to year  $t$ ;  $\mu_j$  are AMC fixed effects and  $\lambda_t$  are year fixed effects. The variables in  $X_{ijt}$  include the woman’s age, the stock of children she had up to year  $t$ , and a dummy for whether she gave birth in  $t - 1$ , plus her marital status, religion, the education of the household head and an index of household wealth. We shall estimate (2) both for the full sample of women aged 15-49, and for different age brackets, to assess what are the age categories on which Globo viewing has a relatively larger impact. We cluster our standard errors by AMC in all regressions.

We shall also consider if exposure to television during different periods of a woman’s life leads different outcomes in terms of fertility behavior. For this purpose, we shall modify our estimating equation as follows:

$$y_{ijt} = X_{ijt}\beta + \gamma_1 N_{ijt}^{10-19} + \dots + \gamma_4 N_{ijt}^{40-49} + \mu_j + \lambda_t + \varepsilon_{ijt}, \quad (3)$$

where  $N_{ijt}^{10-19}$  is the number of years woman  $i$  living in area  $j$  at time  $t$  has been exposed to Globo programs during age 10-19, 20-29, and so on in 10-year brackets until  $N_{ijt}^{40-49}$ , which is the number of years of exposure to Globo during age 40-49.

Using individual level data we shall also test for the presence of heterogeneous effects in the impact of Globo according to socioeconomic status, and estimate the interacted specification:

$$y_{ijt} = X_{ijt}\beta + \gamma G_{jt} + \delta(G_{jt} * x_{ijt}) + \mu_j + \lambda_t + \varepsilon_{ijt}, \quad (4)$$

where  $x_{ijt}$  will be, alternatively, education and wealth.

Finally, in a last set of results we shall explore the extent to which our results can be linked to novela viewing rather than simply television viewing, and rely on ancillary regressions as well as on estimates of (1) and (2) where instead of a dummy for the presence of the Globo signal, we introduce a dummy for the presence of another TV network with different programming characteristics.

## 4 Data

### 4.1 Fertility

For the first set of regressions (1), our dependent variable is constructed aggregating individual level data from three rounds of the Brazilian Census: 1970, 1980 and 1991. We restrict the sample to women aged 15 to 49. Each woman has a geographic identifier that allows us to attribute her to the municipio where she lives. We do not actually use municipios but rather Minimally Comparable Areas (AMCs) as our spatial unit of analysis because this is the smallest consistently defined geographic area provided by the Brazilian Statistical Institute. The geographic borders of Brazil’s approximately 5000 municipalities changed over time, while there are 3,659 consistently defined AMCs for each round of the Census.

We define fertility as the number of live births that a woman declares to have had. This variable, which we denote as ‘LIVEBIRTHS’, is recorded directly as a specific question in each round of the Census and includes children born alive to a woman, regardless of whether the child is currently living in the household or not. Our dependent variable  $y_{jt}$  is the average value of ‘LIVEBIRTHS’ for all women aged 15-49 in AMC  $j$  and Census year  $t$ . Note that this variable moves rather slowly over time: in our sample the average number of live births across AMCs decreases from 3.0 in 1970 to 2.4 in 1991.

From the Census we also construct the following independent variables at the AMC level: average age of women aged 15-49; average years of education of the household head<sup>3</sup>; a proxy for average wealth that is constructed through principal component analysis from durables ownership and access to basic services (electricity, sanitation, etc.)<sup>4</sup>; share of women aged 15-49 who are married; share of catholic households; and the number of doctors and nurses with a diploma per 1000 people. The latter variable is meant to control for supply side factors that may have driven the reduction in fertility contemporaneously with the entry of Globo into different areas, notably health facilities and medical staff.

For the individual level regressions (2) we shall employ as dependent variable a “flow” variable, that is, a dummy  $BIRTH_{ijt}$  equal to 1 if woman  $i$  living in area  $j$  gave birth in year  $t$ . This variable is not explicitly incorporated in the Census questionnaire. We therefore impute it using the following procedure. For

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<sup>3</sup>We chose the education of the household head, rather than that of the woman, to mitigate potential endogeneity problems. For younger women, the decision to acquire more education may be a *response* to novela viewing; also, for these women the causality may run from fertility to education as they may stop studying once they have a child. If we include among the controls the number of years of education of the woman (as opposed to those of the head), our estimates of the Globo effect remain virtually unchanged. We show this for the individual level regressions in table 5.

<sup>4</sup>The variable denoted as "wealth" in the regressions is the first principal component extracted from the following set of variables: share of households with access to piped water from the public system, share of households with sanitation, share of households with electricity, share of households owning a radio, share of households owning a refrigerator, share of households owning a car. We do not consider ownership of a TV set, as this is likely endogenous to the availability of the Globo signal.

each woman in the age range 15-49, we know from the household roster which children of hers are living in the household. We retain only children younger than 12, as this increases our confidence that we measure all the births occurred in that time period. In fact in the Brazilian context it is extremely unlikely that a child leaves the household before the age of 12. Given that the Census reports the age of all household members, we compute the year of birth of a child as the difference between the year of the Census interview and the age of the child. We thus recover every year in which a woman gave birth over the 12-year period before the Census. Consider for example a woman interviewed in 1991 who has two children living with her. One is 2 years old and the other is 7 years old. Then we know that this woman gave birth in 1984 and 1989 and, according to our procedure, in no other year during the period 1979-91. We thus construct a dummy taking value 1 in years 1984 and 1989, and 0 in the remaining years during the period 1979-1991.

Due to the size of the original data, for the individual level regressions we extract a 5% random sample from the 1991 Census. We chose this Census wave because the 12 years before are the period where the bulk of Globo expansion occurred, as we document in the next section (figure 1).

The construction of the variable  $BIRTH_{ijt}$  rests on the assumption that a woman's children do not leave the household before the age of 12. While we cannot rule out that this may occur in a small number of cases -which would lead us to underestimate fertility- we have checked the consistency of our method by comparing our imputed figures with the answer to the Census question about the number of children currently alive for women *younger than 25*. In fact, given their age, these are women whose children should *all* be in the household if our conjecture is correct. Our results indicate that our method is quite reliable: in 96 percent of the cases our imputed number of children exactly coincides with the number of births these women declare; in a remaining 3.5 percent of the cases we underestimate the number of children born by 1 unit.

From the Census we also take the following independent variables: age of the woman; years of education of the household head; a proxy for wealth constructed from durable goods ownership and access to basic services<sup>5</sup>; a dummy equal to one if the woman is married, a dummy for catholic religion, and the number of doctors and nurses with a diploma per 1000 people.

Summary statistics of all variables are reported in Appendix Table A1.

## 4.2 Rede Globo and *novelas*

Our second data source is information provided by Rede Globo on the year in which different areas got access to their programs. For each broadcasting or retransmitting station, we know the year and the location where it was installed (latitude and longitude), as well as its radial reach in kilometers. This allows us

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<sup>5</sup>The variable denoted as "wealth" in the regressions is the first principal component extracted from the following set of dummies for each household: access to piped water from the public system; sanitation; electricity in the house; ownership of a radio; ownership of a refrigerator; ownership of a car.

to know which municipios were reached by the signal of any particular antenna and in which year they first started receiving the signal. We then match this information with the AMC corresponding to each municipio, and construct a variable  $Globo\ coverage_{j,t}$  equal to 1 if AMC  $j$  is within the signal radius of a Globo broadcasting or retransmitting station in year  $t$ , and 0 otherwise.<sup>6</sup>

[Insert Figures 1, 2]

Figure 1 shows the increase over time in the number of AMCs reached by the Globo signal. In 1970, only 4 AMCs out of 3,659 were receiving the Globo signal; in 1980 the number had increased to 1,300 and in 1991 to 3,147. Figure 2 shows the geographic expansion of the network between 1970 and 2000. Lighter colors correspond to an earlier exposure to the signal (with the exception of white, which stands for ‘no signal’). This figure suggests that the entry of Globo into different areas may not have been random. Globo reached the most developed parts of Brazil first, which is potentially a concern for our identification strategy because these areas are also those with lower fertility. However, we show below that after controlling for our time-varying controls and for AMC fixed effects there seems to be no evidence of selection on unobservables correlated with fertility trends.

To motivate our analysis and help us interpret the results, we have collected a large amount of data on the content of individual novelas broadcast by Rede Globo since the start of its operations. Rede Globo traditionally airs three sets of novelas:

- *novela das seis*, at 6 pm, which are typically historical stories about slavery and colonial time and have romantic content. These are the novelas with the lowest audience.
- *novela das sete*, at 7 pm, which are mostly contemporary comedies and often include elements of envy and conspiracy;
- *novela das oito*, at 8 pm (or 9 pm), which are heavily focussed on social issues and have by far the highest audience throughout the country.

We have coded a number of variables for all the 7 pm and 8 pm novelas from 1965 to 1999. Appendix Table A2 reports the full list of titles with beginning and ending date. For the purpose of the present analysis, the most relevant variables coded are: age of first female character; number of children of first female character; marital status of first female character; and whether the first female character is unfaithful to her partner (in the case of a married woman, whether she has an extra-marital relationship). The distribution of these variables is shown in table 1.

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<sup>6</sup>In order to minimize the error due to the fact that we attribute coverage to the entire municipal area, we exclude from the sample the top 5% AMCs in size, and use for our regressions 3,485 AMCs. The results are very similar when using the full sample.

[Insert Table 1]

Over the full sample of 7 and 8 pm novelas aired between 1965 and 1999, in 62.2 percent of the novelas the main female character does not have any children, in 20.7 percent she has one child, 9 percent two children, 4.5 percent three children, and in the remaining cases has four or more children. It is interesting to also consider a restricted sample of novelas where the main female character is below 50 years of age (which anyway comprises 97 out of 115 novelas), as these may be the characters with whom women in childbearing age most easily identify. In this smaller sample, the percentage of childless women increases to 71.6, 21.1 percent of the women have one child, and only 7.4 percent have two or three children (no woman has four or more). Finally, if we look at married women only, 41.2 percent of them has no children, 33.3 percent has one child and 20.1 has two. These figures are quite astonishing if we compare them to *actual* fertility patterns in the Brazilian population over this period. Furthermore, the low fertility among novela heroines is not driven by the more recent novelas: if anything, quite the opposite.

[Insert Figure 3]

Figure 3 shows the average number of children of the main female character of all 7 pm and 8 pm novelas aired in a given year. The numbers corresponding to each observation represent the sample size (number of novelas) from which the average is computed. As a general observation, with the exception of year 1996, the average female main character has no more than one child in each and every year between 1965 and 1999. Most strikingly, in the first decade of operation of Rede Globo, every 7 pm and 8 pm novela with the exception of two were about a woman who had no children at all. Similar observations apply to variables like marriage, divorce and extra-marital relationships. Only 29 percent of the main female characters in novelas are married (27 in the sample younger than 50); 12 percent are divorced or separated (10 percent in the sample younger than 50). In the full sample, 26 percent of the main female characters are unfaithful to their partner (29 percent in the sample younger than 50 and 42.3 in the married sample younger than 50). While for the latter variable it is not possible to find a counterpart in Census data, in the fiction marriage rates are markedly lower and divorce rates markedly higher than in Brazilian contemporaneous society. In fact, in related work we analyze at the aggregate level the relationship between Globo presence and divorce rates (Chong and La Ferrara, 2008). These observations make us confident that the role models portrayed in the programs of the television channels we shall analyze were clearly consistent with a radical re-orientation of society's attitudes towards women's roles in the family, including fertility.

## 5 Econometric results

In this section we take advantage of variation in the timing of Globo entry into different areas to formally test the hypothesis that exposure to the programs

of this television network was associated with a reduction in fertility rates. We start by presenting evidence at the aggregate level, and then move to individual level regressions.

## 5.1 Aggregate regressions

Table 2 contains our first set of results, obtained using aggregate data at the Minimal Comparable Area (AMC) level for the Census years 1970-1991.

[Insert Table 2]

The dependent variable in this table is  $LIVEBIRTHS_{jt}$ , i.e. the average number of live births for women aged 15-49 in the AMC in any given Census year. Our key variable of interest (*Globo coverage*) is a dummy equal to one if the AMC receives the Globo signal in that year. The table reports OLS coefficients and standard errors clustered by AMC. In column 1 we run a simple regression on the full sample controlling only for time dummies. On average, after accounting for the secular declining trend in fertility, areas reached by Globo have an average number of live births that is lower by 0.3. Of course, this coefficient cannot be interpreted due to the fact that Globo presence in an area may be correlated with unobserved characteristics that are associated with lower fertility. In columns 2 and 3 we thus introduce different area fixed effects to control for differences in time-invariant unobservables across locations. We start with State (Unidade Federacao, UF) fixed effects in column 2, and move to AMC fixed effects in column 3, which gives a full panel fixed effects regression. In this last regression the coefficient of the Globo variable is  $-.027$ .

In columns 4 to 6 we include a number of controls to account for time-varying differences across AMCs. These variables are: the average age of women in the AMC, as well as the share of women ages 15 to 24 and the share of women aged 25 to 34; the average years of education of the household head; an index of wealth built from information on durable goods ownership and quality of the house; the share of married women in the AMC; the share of Catholic households in the AMC; and the number of doctors and nurses with a diploma per 1000 people in the AMC. We do not include the share of households owning a TV set as this is likely an endogenous variable, but we show this control in a sensitivity table below. After we include these time-varying controls and we control for AMC fixed effects, the coefficient on the Globo variable is  $-.03$ , and is significant at the 5 percent level (column 6). Surprisingly, once we control for AMC fixed effects, the education of the head has a very small effect on fertility. Age, wealth, marriage rates and health supply factors play a significant role in explaining fertility. The coefficient on the share of catholic households is not statistically significant.

Prima facie, the effect we find on Globo coverage may seem small. The mean of our dependent variable across AMCs is 2.67 and the standard deviation is .55. However, it should be noted that the average number of live births changes very little over time. In fact the mean value of  $LIVEBIRTHS$  is 2.98 in 1970,

2.66 in 1980 and 2.36 in 1991. If we compare the effect of Globo exposure with that of one more year of education of the household head, the effect of Globo is substantially larger. This is remarkable in a country where the average education of household heads over this period is 2.72 years (and the standard deviation is 2.37). Also, from column (6) of table 2 we see that the effect of Globo exposure is comparable in size to that of having one more doctor or nurse per 1000 people, which is also remarkable given that the mean of this variable is .2 (standard deviation .75).

Finally, to quantify the magnitude of the effect it can be useful to combine the estimated coefficient of *Globo coverage* with the rate of TV ownership in the population, which is .41 on average over this period. If all and only women living in households that owned a TV watched Rede Globo, the effect of Globo on women effectively watching TV would be a decrease in *LIVEBIRTHS* of .073. This rough estimate may still be downward biased if the audience of Rede Globo were below 100 percent. On the other hand, it may be biased upwards if people watched TV in their neighbors' house or in public places.

[Insert Table 3]

In table 3 we perform some sensitivity analysis adding to the specification of column 6 of table 2 a number of variables that we prefer not to include in our baseline specification as they may be endogenous, but that may have been relevant in shaping Globo's entry decisions. The first is the ownership rate of television sets among households in the AMC. As we see in column 1 of table 2B, this variable is positively correlated with fertility, and its inclusion does not substantially affect the coefficient of Globo coverage. In column 2 we control for female employment, and again find no effect on our Globo variable, despite the fact that higher female employment is associated with lower fertility. A similar consideration applies to population density. Finally, in column 4 we include the "Index of Potential Consumption" (IPC) estimated by the Instituto Target Pesquisas e Servicos de Marketing, an index use by Globo in order to measure the acquisitive power of the different areas.<sup>7</sup> This variable is not significantly correlated with fertility and its inclusion does not affect the coefficient on Globo coverage.

[Insert Table 4]

In table 4 we estimate a similar set of regressions, but we focus on the *length* of exposure to Globo programs, rather than simply on whether an area was reached by the signal. Our variable of interest is the number of years for which an AMC was covered by the Globo signal. The results we obtain are very similar to those of table 2. In the specification with all controls and AMC fixed effects (column 6), *ceteris paribus* one more year of Globo coverage is associated with a reduction in *LIVEBIRTHS* of .01.

<sup>7</sup>We were not able to receive the index directly from the Instituto Target, but we constructed it from raw data using the methodology described by Target in its supporting documentation.



## 5.2 Individual level regressions

We next move to a second set of results which employs yearly data at the individual level. The sample includes women aged 15 to 49 in the years 1979-1991. We estimate model (2) as a linear probability model and cluster the standard errors by AMC. We have also tried clustering by individual, to allow for arbitrary autocorrelation within a woman over time, and we found that our standard errors were actually smaller. In what follows we therefore chose to report the more conservative standard errors, i.e. those clustered by AMC.

The dependent variable  $BIRTH_{ijt}$  is a dummy equal to 1 if woman  $i$  living in area  $j$  gave birth in year  $t$ , and 0 otherwise. Our variable of interest is a dummy capturing whether the area where the woman lived received the Globo signal in that year.<sup>8</sup> Other controls include the age of the woman and its squared, the stock of children the woman already has (excluding the newborn) and the square of this variable, a dummy for whether the woman gave birth in the previous year, marital status of the woman, the average years of education of the household head (or of the woman, depending on the specification), and an index of wealth built from information on durable goods ownership and quality of the house.<sup>9</sup> The results are reported in table 5.

[Insert table 5]

Column 1 displays our baseline estimates for the full sample of women aged 15 to 49. The coefficient of *Globo coverage* is negative and significant at the 1 percent level. Ceteris paribus, a woman living in an area that receives Globo is .6 percentage points less likely to give birth in any given year (the mean of the dependent variable is .09). In column 2 we control for the number of years of education of the woman, rather than of the household head. The estimated coefficient of the Globo variable is unchanged. The magnitude of the coefficients indicates that, ceteris paribus, being exposed to Globo programs leads to the same decrease in the probability of giving birth as an increase of 2 years in the woman's education. This is quite relevant, given that the average education of women in our sample is 5.7 years.

In columns 3 to 5 we test for the presence of heterogeneous effects along the dimensions of education and wealth. We introduce among the regressors an interaction term between Globo coverage and (i) the years of education of the household head (column 3); (ii) the years of education of the woman (column 4); and (iv) the wealth index of the household (column 5). In all cases we find that the negative effect of Globo exposure on fertility is strongest for women living in poorer households and households with lower levels of education, and

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<sup>8</sup>To take into account the length of the pregnancy period, at any point in time we consider the AMC as covered if it was reached by the signal at least the year before.

<sup>9</sup>Age and the stock of children vary across women and are time-varying for each woman; marital status, education and wealth vary across women but are time invariant. We do not control for Doctors and nurses per 1000 people in these regressions because this variable only varies across AMCs and is absorbed by the AMC fixed effect. Our results are virtually unchanged if we include a dummy for whether the woman gave birth in the previous year.

is attenuated for richer and more educated households. This is quite important from a policy point of view, because it is exactly for the poorer and less educated individuals that we should expect a medium like television to have the most potential in terms of communication. Rich and educated households may already be exposed to different life-styles and role models through written media or social interactions.

[Insert table 6]

In table 6 we explore another dimension of heterogeneity in impact, that is, age. In columns 1 to 3 we split the sample into three age groups: 15-24, 25-34, 35-44. The results in the table suggest interesting differences among age groups. For the youngest age bracket, i.e. women aged 15-24, Globo coverage decreases the probability of giving birth by .2 percentage points, but the effect is not statistically significant (the mean of *BIRTH* for this group is .10). For the age group 25-34, which on average has a probability of giving birth in any given year of .135, Globo presence is associated with a reduction of 1 percentage point in the likelihood of giving birth. The effect is also very strong for the next age group, i.e. women aged 35 to 44. The average probability of giving birth for this group is .057 and exposure to Globo leads to a reduction of .7 percentage points, that is quite sizeable in relation to the mean.

In columns 4 and 5 of table 6 we estimate the effect of *length* of exposure to Globo, allowing for a differential effect of exposure at different ages.<sup>10</sup> We find that among women aged 30 to 49, one more year of exposure as a teenager (i.e., during age 10-19) decreases the likelihood of giving birth by .003, and has a similar impact in terms of magnitude as one more year of exposure during age 20 to 29. On the other hand, years of exposure during age 30 to 39 have the strongest effect on fertility, with an estimated coefficient of  $-.006$ . Among women aged 40 to 49 (column 5) we find that one more year of exposure during age 20 to 29 decreases the likelihood of giving birth by .008, a similar effect as one more year of exposure during age 30 to 39 (the estimate being  $-.009$ ). Exposure during the age 40-49 leads to a reduction of .2 percentage points in the probability of giving birth.

It is worth discussing the above findings in relation to the demographic literature on Brazil. An apparently puzzling result in table 6 is the absence of significance of Globo exposure for the youngest age group, women aged 15 to 24. However, this is very consistent with what is known about the nature of changing fertility patterns in Brazil. Martine (1996) and Flores and Nuñez (2003) find that changes in the starting age of fertility have been negligible in this country, related both to relatively stable marital patterns as well as persistently

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<sup>10</sup>The variables “Years exposed during 10-19”, ... “Years exposed during 40-49” are defined only for women who have reached the relevant age bracket. Therefore the sample in column 5 includes women aged 40 to 49 because these are the only ones for which “Years exposed during 40-49” is non-missing. On the other hand in this column “Years exposed during 10-19” is not included among the regressors because it is identically zero for the 40-49 age group. Column 4 enlarges the sample to women aged 30 to 49, and for this group the coefficient on “Years exposed during 10-19” can be estimated.

high rates of adolescent fertility. On the other hand, increased spacing of births and -especially- *stopping* of childbirth have been found to be more important (Moreno, 1991). These findings are confirmed in our data, as illustrated in figure 4.

[Insert figure 4]

The histograms in figure 4 represent the average number of live births for women aged 15-19, 20-24, and so on until 40-44, for the three Census years in our sample. Interestingly, over the period 1970-1991 there has been absolutely no decrease in the average number of live births for women younger than 25. By the age of 24, the average woman in our sample had one child both in 1970 and in 1991. What happens between the age of 25 and that of 35, on the other hand, is very different over this period. In 1970, a woman aged 30 to 34 would have had on average 4.4 live births in her life; in 1991 this number had decreased to 3.2. A similar decline occurred between 35 and 45 years of age. In 1970, a woman aged 40-45 would have had on average 6.4 live births in her life; in 1991 this number had decreased to 4.9. This data suggests that it is in the intermediate and late stages of their reproductive life that Brazilian women chose to have fewer children, which is consistent with our estimates in table 6.

### 5.3 Identification

The key identification assumption underlying our approach is that Globo entry in a market, though not random, was uncorrelated with pre-existing differences in fertility trends across areas, after controlling for time varying controls and time invariant area characteristics. To assess the plausibility of this assumption we proceed in several ways.

First of all we rely on the individual level data to exploit yearly variation in birth flows and test whether the decline in fertility occurs in correspondence with the introduction of Rede Globo in an area, or precedes it. For this purpose, we use four Census waves (1970, 1980, 1991, and 2000) in order to be able to include a full set of dummies going from 10 years before the introduction of Globo to 10 years after. For each AMC and each year we then construct the Age Specific Fertility Rate (ASFR) of women aged 15 to 49 in each given year as the number of births occurred for women in that age range over the number of women. We then estimate the following regression:

$$ASFR_{jt} = \alpha_{-10}D_{-10} + \alpha_{-9}D_{-9} + \dots + \alpha_0D_0 + \dots + \alpha_{+9}D_{+9} + \alpha_{+10}D_{+10} + \delta_t + \varepsilon_{jt}$$

where  $D_0$  is a dummy for the year of Globo entry,  $D_{-t}$  is a dummy for  $t$  years before Globo entry,  $D_{+t}$  is a dummy for  $t$  years after Globo entry, and  $\delta_t$  is a set of year dummies for the period 1958-2000. The estimated coefficients  $\{\hat{\alpha}_{-10}, \dots, \hat{\alpha}_{+10}\}$  are reported in figure 5, together with 95% confidence bands.

[Insert figure 5]

Figure 5 clearly shows that the decline in fertility does *not* occur *before* Globo entry. Also, the negative effect of Globo on fertility is realized immediately and persists at similar levels as in the immediate aftermath of entry in subsequent years.

A second way to investigate the nature of the possible selection in Globo entry is to estimate the following linear probability model:

$$\text{Globo coverage}_{jt} = X_{jt}\lambda_0 + \Delta X_{j(t-1,t)}\lambda_1 + \zeta\Delta y_{j,(t-1,t)} + \mu_i + \delta_t + \varepsilon_{jt}$$

where  $\text{Globo coverage}_{jt}$  is a dummy equal to 1 if AMC  $j$  receives the Globo signal in year  $t$  and 0 otherwise;  $X_{jt}$  is the set of time-varying controls that we use in all regressions,  $\Delta y_{j,(t-1,t)}$  is the change in fertility between  $t - 1$  and  $t$ ;  $\mu_i$  and  $\delta_t$  are AMC and time fixed effects. The results are reported in table 7.

[Insert Table 7]

In column 1 of table 7 we estimate the probability of having Globo in a given year as a function of contemporaneous controls, time and AMC dummies. The set of controls is the same employed in tables 2 and 3. As we can see from the table, the only two controls significantly correlated with Globo presence have signs that go in the opposite direction to those that may cause concerns of spurious correlation with fertility. In columns 2 and 3 we regress Globo presence at time  $t$  on the change in fertility between  $t - 1$  and  $t$ . In this regression, we control for contemporaneous levels of the controls (column 2) and additionally for changes in the controls between  $t - 1$  and  $t$  (column 3). We find no significant correlation between changes in fertility and Globo coverage (if anything, the coefficient is positive). Finally, in columns 4 and 5 we regress Globo presence at time  $t$  on the change in fertility between  $t - 2$  and  $t - 1$ .<sup>11</sup> Again, we find that the fertility trend is not a significant predictor of Globo presence.

[Insert table 8]

Finally, in table 8 we perform a falsification test, constructing a placebo treatment based on the timing of Globo entry. We perform analogous regressions to the ones we performed in table 2 (our baseline AMC-level specification), but instead of only looking at the effects of Globo past entry on current behavior, we also look at the effects of *future* entry. Our dependent variable is  $LIVEBIRTHS_{jt}$ , i.e. the average number of live births for women aged 15-49 in AMC  $j$  in Census wave  $t$ . Our regressor of interest is  $\text{Globo coverage in } t+1$ , i.e. a dummy equal to one if AMC  $j$  receives the Globo signal in Census wave  $t + 1$ . Because every area that receives the signal in  $t$  maintains its coverage status in  $t + 1$ , the coefficient on this variable effectively captures the effect of future entry for areas that are not covered by the signal in  $t$ . Our hypothesis for the “placebo” experiment is that fertility in places that do not receive the

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<sup>11</sup>Given that we are using three Census rounds, this means we can only exploit a cross section of AMCs for this regression, hence we do not include AMC and time fixed effects.

Globo signal should not be affected by the fact that the signal may become available in the future. Indeed, the results of table 8 show that both when we omit time-varying controls (column 1) and when we include them (column 2), the coefficient on future presence of Globo is virtually zero.

Taken together, we think the results in figure 5 and tables 7 and 8 increase our confidence that our findings are not spurious.

## 6 Interpretation: TV or novelas?

Our results so far indicate a robust and negative effect of Globo presence on fertility choices in Brazil. In this section we try to understand to what extent this is a general effect of television viewing, and to what extent it may be linked to the particular type of programs broadcast by Rede Globo. The data available does not allow to identify the effect of Globo programming separately from the effect of Globo entry, hence our arguments in this section should be considered only suggestive. Nonetheless, given that a lot of the anthropological and sociological literature on Brazil has stressed the role of novela content in shaping individual behavior, we think it can be interesting to explore different strategies to assess the plausibility of such hypotheses.

A first step is to show that indeed people watched novelas and that some of the decisions people made were affected by the content of novelas. We focus on *naming patterns* among children and test whether, *ceteris paribus*, it is more common for parents living in areas that are reached by Globo to name their children after popular characters in novelas. In particular, we use administrative data on the names of Brazilian fifth-graders in 2004 (Ministry of Education of Brazil, 2005) and compare the pattern of their first names with the first names of the main characters in the novelas aired in the year in which these children were born, typically 1994.<sup>12</sup> We do this for a 10 percent random sample of AMCs in the country, i.e. for 366 AMCs.<sup>13</sup>

Our variable of interest is a dummy *NAMESMATCH* that equals 1 if at least one of the top twenty most prevalent names of children born in 1994 is one of the names of the main novela characters of that year. Since novela names tend to be very idiosyncratic in Brazil and elsewhere in Latin America, we believe that evidence on possible name patterns strongly suggests a link between novela content and behavior. Table 9 reports the results of this exercise.

[Insert table 9]

Of the 366 AMCs for which we have data, 319 had received the Globo signal by 1994 (the birth year of the children in our sample), and 47 received it after

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<sup>12</sup>We coded the names of the three main male and female characters of Globo novelas aired in 1994 based on detailed plot descriptions provided by Globo itself.

<sup>13</sup>While we would have liked to compare names for the full spectrum of AMCs in our sample, this was not possible due to data limitations. However, we tested for possible differences in observables among the AMCs for which we had names and the remaining ones, and in no case we could reject the null of equality of means, suggesting that the randomization worked well.

1994 or did not receive it at all. Panel A of the table shows a simple comparison of means in the two subsamples. The mean of the *NAMESMATCH* variable is 0.329 in the group of AMCs covered by Globo and 0.085 in the other group. In other words, the likelihood that the twenty most popular names chosen by parents for their newborns would include one or more names of the main characters of novelas aired that year was about 33 percent if the area where parents lived received the Globo signal and only 8.5 percent if it did not. Panel A also reports confidence intervals and shows that the difference is statistically significant at the 1 percent level.

In Panel B we run a linear probability model and a probit model using as dependent variable *NAMESMATCH* and clustering the standard errors at the State (Unidade Federacao) level. The Globo coverage variable has a positive and significant effect also after we control for the same variables used in previous regressions (columns 2 and 4), and the size of the coefficient is basically the same as without the controls (columns 1 and 3). Our estimates suggest that, ceteris paribus, AMCs that receive the Globo signal have a 24 percent higher probability of displaying a “match” between children’s and novela characters’ names.

A second way to assess the role of Globo programming separately from general TV viewership is to test if the entry of other TV networks had similar effects on fertility. The channel we focus on is SBT (Sistema Brasileiro de Televisao), which started operating in 1980 and is the second most popular network after Globo in Brazil. Appendix Table A3 shows audience rates of all major networks in Brazil from 1975 to 2000, the only years for which data is available. The table clearly shows the virtual monopoly of Globo until the early 1990s, as well as the fact that SBT is the only other network whose impact may be easily detected, given its audience shares. Interestingly, the marketing strategy of SBT was very different from that of Rede Globo. While Globo heavily relied on national productions, strengthening the concept of “Brazilian identity”, SBT always relied heavily on imports, including foreign shows and Mexican and US soap operas.

[Insert table 10]

In table 10 we estimate equations (1) and (2) at the AMC and individual level, respectively, including among the controls the entry of SBT instead of Rede Globo. In particular, the dummy *SBTcoverage* is constructed exactly in the same way as *Globo coverage*, namely assigning a value of 1 to the observations reached by the SBT signal in a given year (as calculated from the radial reach of SBT broadcasting and retransmitting stations in that year) and 0 otherwise. In columns [1] to [4] the units of observations are AMCs for the Census years 1970, 1980 and 1991, and the dependent variable is the average number of live births for women aged 15-49 in the AMC in a given year (*LIVEBIRTHS<sub>jt</sub>*). In columns [5]-[6], the units are individual women aged 15-49 in the 12 years 1980-1991, and the dependent variable is a dummy equal to 1 if a woman gave birth in a given year (*BIRTH<sub>ijt</sub>*). All specifications include the same set of

controls as the AMC level and the individual level regressions. Columns [1], [2] and [5] use the full sample of AMCs available. In this sample, SBT presence has no significant effect on fertility. However, in its decisions to enter any given market, SBT may have been a follower with respect of Rede Globo. Therefore we cannot exclude that an AMC where SBT enters in a given year may have received Globo programming earlier on. To rule out this possibility, in columns [3], [4] and [6] we restrict the sample to areas that were not reached by Rede Globo in a given year (i.e. for which the variable *Globocoverage* was equal to 0 in that year). Also in this smaller sample, SBT presence never has a significant effect on fertility.

One way to interpret the above findings is that Globo programming had a stronger impact on fertility choices because it portrayed a reality with which Brazilian viewers could more easily identify. The role of “frame salience” has been underlined in the communications literature on Brazilian *novelas* (e.g., Vink, 1988), which has stressed how viewers tend to be more affected by the content of a novela when they can more easily relate to its main character(s) and to the environment.

To shed more light on the role of content and of “frame salience”, we turn to individual level Census data and explore the possibility that viewers may have been differently affected by novelas depending on their content or on the extent to which they could identify with the main characters. The results are displayed in table 11.

[Insert table 11]

In the first column we repeat a regression analogous to that of column 1 of table 5 and we include interactions of the Globo coverage variable with a dummy identifying the years in which at least one novela in the previous season featured upward social mobility for its main female character, according to our coding of novela plots. We find that while there is a generalized negative effect of Globo coverage on fertility, the effect is stronger the years after particularly appealing messages, such as those of improving one’s socioeconomic status. Notice that because there are several “reversals” over the years in the coverage of social mobility, it would be difficult to explain this result as originating from (monotonic) trends leading to fertility decline.

In column 2 we investigate the role of frame salience, as determined by the proximity in age between a novela character and its viewers. For each woman in the sample and each year between 1978 and 1990, we create a dummy *Age match* equal to 1 if the age of the woman (respondent) is within four years of the age of the main female character of at least one novela aired that year. For example, if a novela character was 35 years old, we assign *Age match* = 1 to respondents aged 31 to 39, and 0 otherwise.<sup>14</sup> Notice that there is substantial

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<sup>14</sup>In some years, e.g. 1978, 1985, 1986, 1998, there was only one 8 pm novela aired. In this case the attribution is unambiguous. In other years there were two novelas, and we chose to assign an “Age match” if at least one of the two characters was in the age range of the respondent. Results are unaffected if we construct the match with the mean age of the characters.

variation across years in the age of the main female characters displayed, with some years portraying only “young” characters, some only “mature” ones, and some a mix. The mean of *Age match* in our sample is .34.

We then interact this dummy with the Globo coverage variable, to test if exposure to Globo in a given year had a differential impact on the likelihood of giving birth for women who were close in age to the main female character portrayed that year. As before, to take into account the duration of pregnancy, the Globo coverage variable and the Age and Marital status match dummies refer to the year before the one in which a potential birth is recorded.

The results in column 2 confirm that on average exposure to Globo had a negative effect on the likelihood of giving birth for all women (the coefficient on Globo coverage is  $-.005$  and is significant at the 1 percent level). However, this effect was magnified for women who were in the same age range as the main novela characters displayed the year before. In fact, the coefficient on the interaction between Globo coverage and Age match is  $-.003$  and is significant at the 1 percent level.

## 7 Conclusions

This paper has explored the effects of television, and in particular of programs such as soap operas, on women’s fertility. Our analysis draws on the experience of Brazil, a country where soap opera watching is ubiquitous and cuts across social classes. We exploit differences in the timing of entry into different markets of Rede Globo, which until the early 1990s had an effective monopoly on novelas production in Brazil, to estimate the impact of Globo availability on fertility choices. We find that, after controlling for time varying controls and for time-invariant area characteristics, the presence of the Globo signal leads to significantly lower fertility. This effect is stronger for women of low socioeconomic status, as measured by education or durable goods ownership. The effect is also stronger for women who are in the middle and late phases of their child-bearing life, suggesting that television contributed more to stopping behavior than to delayed first births, consistently with demographic patterns documented for Brazil. Finally, suggestive evidence in the last part of the paper indicates that the results may be interpreted not only in terms of exposure to television, but also of exposure to the particular reality portrayed by Brazilian novelas.

Our findings have important policy implications for today’s developing countries. In societies where literacy is relatively low and newspaper circulation limited, television plays a crucial role in circulating ideas. Our work suggests that programs targeted to the culture of the local population have the potential of reaching an overwhelming amount of people at very low costs, and could thus be used by policymakers to convey important social and economic messages (e.g. about HIV/AIDS prevention, children’s education, the rights of minorities, etc.). Recent work by social psychologists (e.g., Paluck, 2007) stresses the role of the media, and of radio soap operas in particular, as a tool for conflict



prevention. Our paper suggests that this type of programmes may be usefully employed for a broader set of development policies.

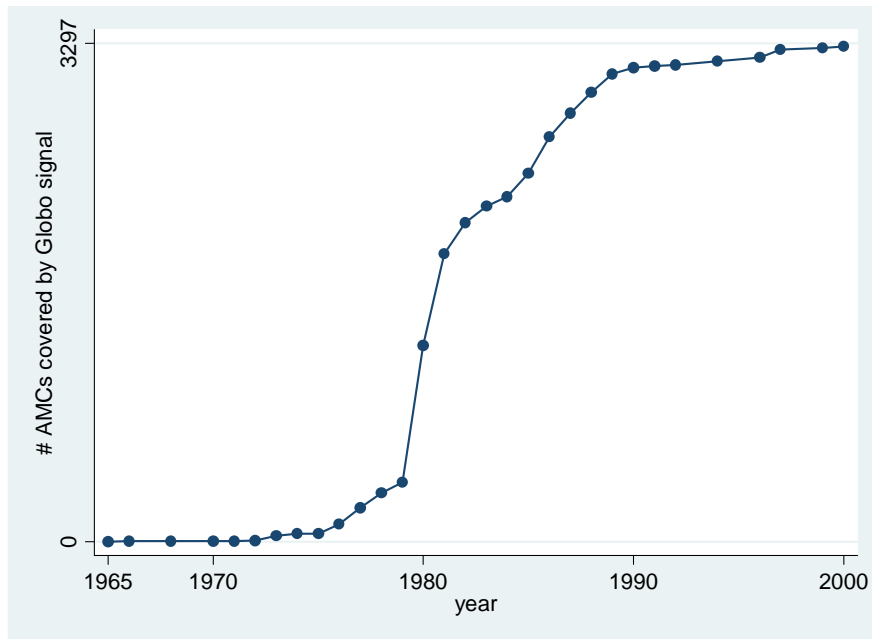
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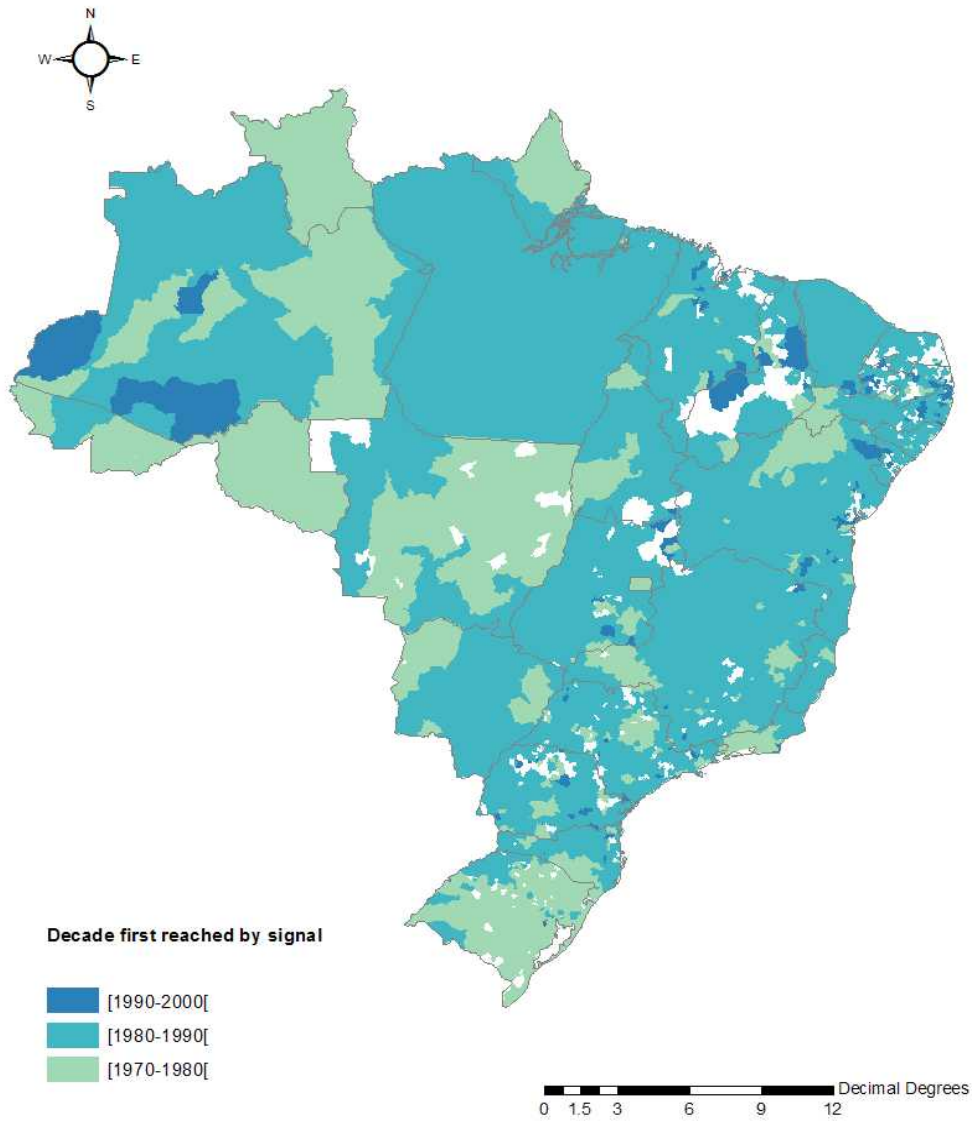
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## Annex - Figures

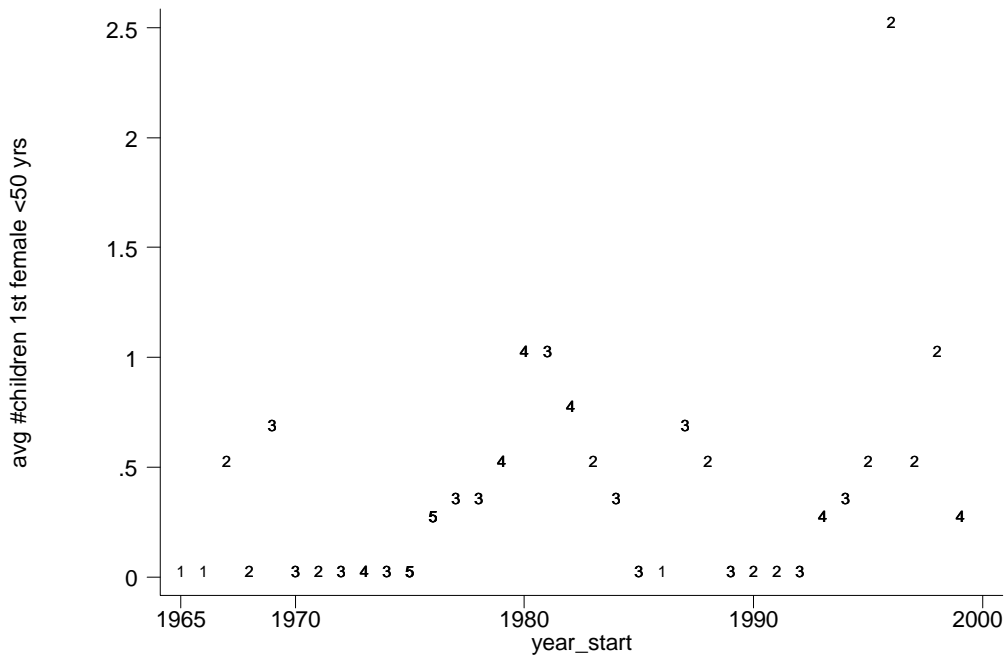


Number of areas (AMCs) covered by Globo signal

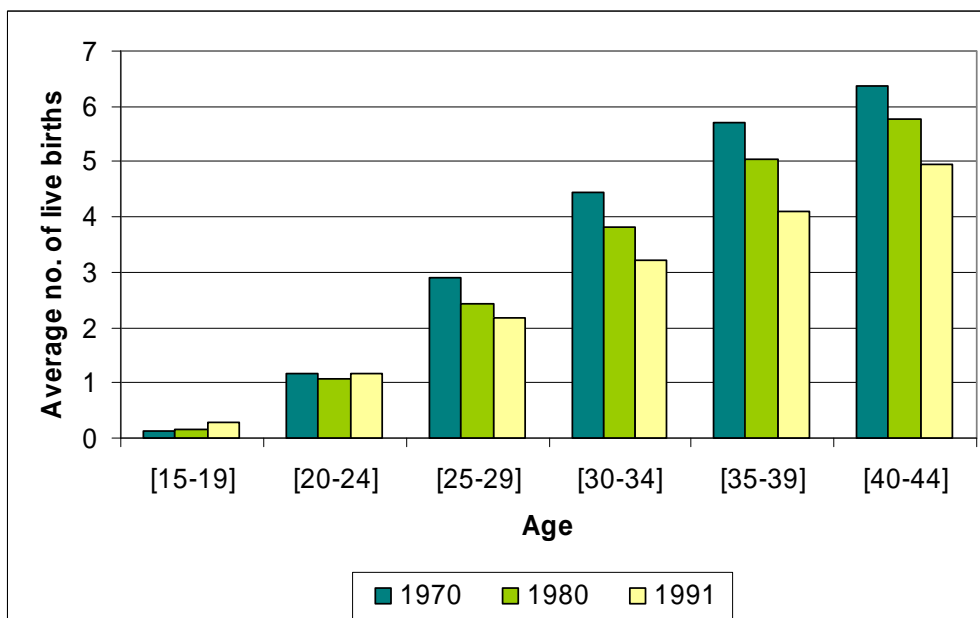
**Figure 1:**  
**Rede Globo expansion over time**



**Figure 2:**  
**Rede Globo expansion across space**

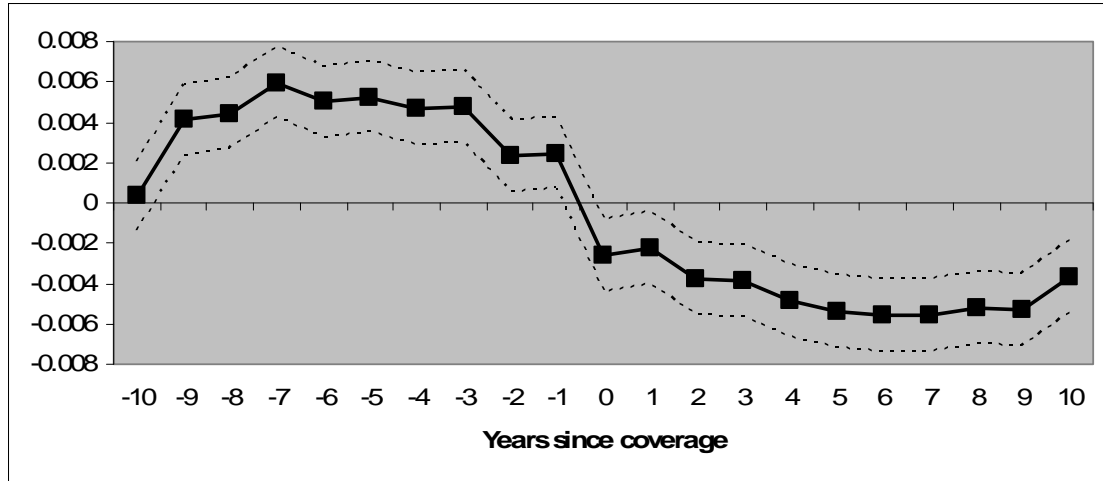


**Figure 3:**  
**Average number of children of main female character in *novelas*, by year**  
 (Numbers on each data point indicate the number of *novelas* from which average is computed)



Source: Authors' calculations on Census data.

**Figure 4:**  
**Average number of births, by age cohort**



Estimated coefficients and 95% confidence interval from a regression of fertility (ASFR15-49) on a set of year dummies and dummies from t-10 to t+10, where t=0 is the year of Globo entry.

**Figure 5:**  
**Timing of fertility decline around year of Globo entry**

**Table 1: Novela content analysis. Characteristics of main female character.**

	<i>Full sample % novelas</i>	<i>Age of Female1 &lt;50 % novelas</i>	<i>Age of Female1 &lt;50 &amp; married, % novelas</i>
Number of children			
0	62.2	71.6	41.2
1	20.7	21.1	33.3
2	9.0	6.3	20.1
3	4.5	1.1	4.2
4 or more	3.6	0	0
	(N=111)	(N=95)	(N=24)
Married			
Yes	29.0	26.8	-
	(N=114)	(N=97)	
Divorced or separated			
Yes	12.2	10.3	-
	(N=115)	(N=97)	
Unfaithful to partner			
Yes	26.1	28.9	42.3
	(N=115)	(N=97)	(N=26)

Source:

Authors' calculations based on *Novela* content analysis



**Table 2: Globo coverage and aggregate fertility***Dependent variable: Avg. number of live births for women aged 15-49 in AMC (LIVEBIRTHS)*

	[1]	[2]	[3]	[4]	[5]	[6]
Globo coverage	-0.302 (0.0191)***	-0.0634 (0.0143)***	-0.0267 (0.0155)*	-0.0722 (0.0109)***	-0.0194 (0.0104)*	-0.0304 (0.0145)**
Education of head				-0.0116 (0.0016)***	-0.006 (0.0016)***	-0.0045 (0.0019)**
Age				0.0457 (0.0154)***	0.06 (0.0142)***	0.0935 (0.0189)***
Share aged 15-24				0.7449 (0.3417)**	0.7708 (0.3138)**	-0.1652 (0.4317)
Share aged 25-34				-1.0441 (0.2138)***	-1.0262 (0.2011)***	-1.8727 (0.2820)***
Married				0.0329 (0.0701)	0.2803 (0.0764)***	0.1266 (0.1180)
Wealth				-0.1812 (0.0034)***	-0.1546 (0.0036)***	-0.1077 (0.0069)***
Catholic				-0.0028 (0.0583)	-0.2497 (0.0631)***	0.035 (0.1523)
Rural				-0.3079 (0.0306)***	-0.2002 (0.0272)***	0.3504 (0.0638)***
Doctors&nurses				-0.0173 (0.0038)***	-0.0271 (0.0037)***	-0.0244 (0.0058)***
Constant	2.9839 (0.0077)***	2.9836 (0.0067)***	2.984 (0.0057)***	1.865 (0.5980)***	1.4595 (0.5512)***	0.5835 (0.7620)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Area fixed effects	No	State	AMC	No	State	AMC
Number of Areas		27	3485		27	3485
Observations	10427	10427	10427	10427	10427	10427
R-squared	0.2479	0.5783	0.8286	0.6414	0.7041	0.85

Table reports OLS coefficients. Standard errors in parentheses are corrected for clustering at the AMC level.

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

AMC stands for Minimally Comparable Area and is a geographic aggregate slightly broader than a municipio.

Each observation is a couple AMC-Census year. Reference year: 1970

**Table 3: Sensitivity analysis***Dependent variable: Avg. number of live births for women aged 15-49 in AMC (LIVEBIRTHS)*

	[1]	[2]	[3]	[4]
Globo coverage	-0.0355 (0.0144)**	-0.03 (0.0143)**	-0.0305 (0.0145)**	-0.0305 (0.0145)**
TV ownership	0.1105 (0.0311)***			
Female employment		-0.4094 (0.0650)***		
Population density			-0.0582 (0.0293)**	
Index of Potential Consumption				0.8652 (4.7037)
Controls <sup>(a)</sup>	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
AMC fixed effects	Yes	Yes	Yes	Yes
Observations	10427	10427	10427	10427
R-squared	0.8503	0.852	0.85	0.85

Table reports OLS coefficients. Standard errors in parentheses are corrected for clustering at the AMC level.

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

AMC stands for Minimally Comparable Area and is a geographic aggregate slightly broader than a municipio.

Each observation is a couple AMC-Census year. Reference year: 1970

(a) Controls are the same as in col. 6 of Table 2.

**Table 4: Years of Globo coverage and aggregate fertility***Dependent variable: Avg. number of live births for women aged 15-49 in AMC (LIVEBIRTHS)*

	[1]	[2]	[3]	[4]	[5]	[6]
# years of Globo coverage	-0.0441 (0.0019)***	-0.0074 (0.0014)***	-0.008 (0.0017)***	-0.0138 (0.0012)***	-0.0056 (0.0011)***	-0.01 (0.0017)***
Education of head				-0.0106 (0.0016)***	-0.0052 (0.0016)***	-0.0031 (0.0019)
Age				0.0494 (0.0153)***	0.0614 (0.0142)***	0.0976 (0.0189)***
Share aged 15-24				0.6987 (0.3384)**	0.7574 (0.3131)**	-0.1935 (0.4297)
Share aged 25-34				-0.9954 (0.2122)***	-0.9968 (0.2010)***	-1.7933 (0.2818)***
Married				0.0856 (0.0697)	0.2996 (0.0761)***	0.1822 (0.1177)
Wealth				-0.1804 (0.0033)***	-0.155 (0.0036)***	-0.1086 (0.0069)***
Catholic				-0.0154 (0.0585)	-0.2521 (0.0636)***	-0.0273 (0.1526)
Rural				-0.3034 (0.0304)***	-0.1994 (0.0272)***	0.3508 (0.0636)***
Doctors&nurses				-0.0166 (0.0037)***	-0.0266 (0.0037)***	-0.0229 (0.0057)***
Constant	2.9836 (0.0077)***	2.9836 (0.0067)***	2.9839 (0.0056)***	1.7445 (0.5924)***	1.4092 (0.5503)**	0.4847 (0.7611)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Area fixed effects	No	State	AMC	No	State	AMC
Number of Areas		27	3485		27	3485
Observations	10427	10427	10427	10427	10427	10427
R-squared	0.2724	0.5785	0.8294	0.6443	0.7046	0.8512

Table reports OLS coefficients. Standard errors in parentheses are corrected for clustering at the AMC level.

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

AMC stands for Minimally Comparable Area and is a geographic aggregate slightly broader than a municipio.

Each observation is a couple AMC-Census year. Reference year: 1970

**Table 5: Globo coverage and probability of giving birth, individual level***Dependent variable =1 if gives birth in year t (BIRTH) -- Years 1979-1991*

	[1]	[2]	[3]	[4]	[5]
Globo coverage	-0.0055 (0.0014)***	-0.0055 (0.0014)***	-0.0109 (0.0014)***	-0.0137 (0.0015)***	-0.0051 (0.0014)***
Globo coverage*Education of head			0.0013 (0.0002)***		
Globo coverage*Education of woman				0.0018 (0.0002)***	
Globo coverage*Wealth					0.0018 (0.0005)***
Age	0.0231 (0.0006)***	0.0236 (0.0005)***	0.0231 (0.0005)***	0.0235 (0.0005)***	0.0231 (0.0006)***
Age sq. <sup>(a)</sup>	-0.4213 (0.0106)***	-0.431 (0.0106)***	-0.4206 (0.0105)***	-0.4297 (0.0105)***	-0.4212 (0.0106)***
Stock of children	0.0017 (0.0006)***	-0.0003 (0.0006)	0.0018 (0.0006)***	-0.0003 (0.0006)	0.0018 (0.0006)***
Stock of children sq. <sup>(a)</sup>	-0.022 (0.0341)	0.0893 (0.0352)**	-0.0253 (0.0341)	0.0815 (0.0351)**	-0.0232 (0.0341)
Education of head	-0.0002 (0.0001)		-0.0012 (0.0001)***		-0.0002 (0.0001)
Education of woman		-0.003 (0.0001)***		-0.0044 (0.0001)***	
Wealth	-0.0205 (0.0003)***	-0.0162 (0.0004)***	-0.0204 (0.0003)***	-0.0161 (0.0004)***	-0.0218 (0.0005)***
Married	0.0581 (0.0012)***	0.0588 (0.0012)***	0.0581 (0.0012)***	0.059 (0.0013)***	0.0581 (0.0012)***
Catholic	-0.0033 (0.0006)***	-0.0037 (0.0006)***	-0.0033 (0.0006)***	-0.0037 (0.0006)***	-0.0033 (0.0006)***
Constant	-0.1963 (0.0073)***	-0.1845 (0.0068)***	-0.1913 (0.0071)***	-0.177 (0.0069)***	-0.1964 (0.0074)***
Year fixed effects	Yes	Yes	Yes	Yes	Yes
AMC fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	2102136	2102136	2102136	2102136	2102136
R-squared	0.050	0.0507	0.050	0.0509	0.050

Standard errors in parentheses are corrected for clustering at the AMC level.

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

AMC stands for Minimally Comparable Area. Each observation is a woman in a given year.

(a) Coefficient and standard error multiplied by 1000.

**Table 6: Age effects, individual level***Dependent variable =1 if gives birth in year t (BIRTH) -- Years 1979-1991*

Age range:	15-24	25-34	35-44	30-49	40-49
	[1]	[2]	[3]	[4]	[5]
Globo coverage	-0.0024 (0.0015)***	-0.0093 (0.0027)***	-0.0073 (0.0024)**		
Yrs exposed 10-19				-0.0027 (0.0011)**	
Yrs exposed 20-29				-0.0045 (0.0007)***	-0.0097 (0.0011)***
Yrs exposed 30-39				-0.0066 (0.0006)***	-0.0101 (0.0008)***
Yrs exposed 40-49					-0.0021 (0.0007)***
Controls <sup>(a)</sup>	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
AMC fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	823218	653533	454836	1118600	602429
R-squared	0.068	0.038	0.0509	0.0546	0.0639

Standard errors in parentheses are corrected for clustering at the AMC level. \* significant at 5%; \*\* significant at 1%

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

AMC stands for Minimally Comparable Area. Each observation is a woman in a given year.

(a) Controls are the same as in col. 1 of Table 5.

**Table 7: Possible selection in Globo entry**

<i>Dependent variable =1 if Globo coverage in year t</i>					
	[1]	[2]	[3]	[4]	[5]
$\Delta$ LIVEBIRTHS (t-1,t)		0.0276 (0.0230)	0.0387 (0.0241)		
$\Delta$ LIVEBIRTHS (t-2,t-1)				-0.0139 (0.0189)	-0.0046 (0.0204)
Education of head	-0.0068 (0.0015)***	-0.0115 (0.0023)***	-0.0087 (0.0399)	0.0206 (0.0122)*	0.0436 (0.0130)***
Age	0.0046 (0.0160)	-0.032 (0.0299)	0.0374 (0.0544)	-0.0075 (0.0224)	0.0096 (0.0417)
Share aged 15-24	-0.1534 (0.3767)	-0.8843 (0.7112)	0.7872 (1.2308)	-0.6045 (0.4830)	0.1964 (0.8915)
Share aged 25-34	0.4642 (0.2458)*	-0.2005 (0.5046)	0.2849 (0.8275)	-0.3398 (0.3515)	-1.1683 (0.5510)**
Married	0.2471 (0.0775)***	0.1965 (0.2250)	0.5543 (0.2756)**	0.253 (0.1032)**	0.6442 (0.1214)***
Wealth	-0.002 (0.0061)	0.0528 (0.0170)***	0.0729 (0.0234)***	0.0125 (0.0082)	0.0014 (0.0085)
Catholic	-0.0357 (0.1427)	0.5079 (0.2675)*	-0.1862 (0.5007)	-0.257 (0.0661)***	-0.1526 (0.0737)**
Rural	0.0473 (0.0628)	0.089 (0.1455)	0.2737 (0.2067)	0.1381 (0.0458)***	0.0566 (0.0482)
Doctors&nurses	0.0052 (0.0057)	-0.0004 (0.0094)	-0.0386 (0.0286)	0.0057 (0.0044)	-0.0244 (0.0142)*
$\Delta$ Controls (t-1,t)	No	No	Yes	No	Yes
Constant	-0.1856 (0.6432)	0.8356 (1.1980)	-1.604 (2.1692)	1.3544 (0.8550)	0.4207 (1.6066)
Year fixed effects	Yes	Yes	Yes	Yes	Yes
AMC fixed effects	Yes	Yes	Yes	No	No
Observations	10427	6951	6951	3475	3475
R-squared	0.7962	0.8172	0.8189	0.0392	0.0634

Table reports OLS coefficients. Standard errors in parentheses are corrected for clustering at the AMC level.

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

AMC stands for Minimally Comparable Area and is a geographic aggregate slightly broader than a municipio.

Each observation is a couple AMC-Census year. Reference year: 1970

**Table 8: Placebo regressions, aggregate level**

<i>Dependent variable: Avg. number of live births in year t (LIVEBIRTHS<sub>t</sub>)</i>				
	[1]	[2]	[3]	[4]
Globo coverage in t	-0.0268 (0.0159)*	-0.0303 (0.0149)**		
Globo coverage in t+1	-0.0028 (0.0186)	0.0024 (0.0176)		
Globo coverage in neighboring AMC			0.008 (0.0108)	0.0143 (0.0102)
Controls <sup>(a)</sup> in t	No	Yes	No	Yes
AMC fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	10427	10427	10421	10421
R-squared	0.83	0.85	0.83	0.85

Standard errors in parentheses are corrected for clustering at the AMC level.

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

(a) Controls are the same as in col. 6 of Table 2.

**Table 9: Naming children after novela characters**

<b>Panel A: Test of means</b>					
	<i>Obs.</i>	<i>Mean of NAMESMATCH<sup>(a)</sup></i>	<i>95% Conf. Interval</i>		<i>Difference of means (p-value)</i>
			<i>Lower</i>	<i>Upper</i>	
Globo coverage					
Yes	319	0.329	0.277	0.381	
No	47	0.085	0.002	0.168	0.0003

**Panel B: Multivariate regression**

Dependent variable: *NAMESMATCH*

	<i>OLS coeff. <sup>(b)</sup></i>			<i>Marginal Probit coeff. <sup>(b)</sup></i>		
	[1]	[2]	[3]	[4]	[5]	[6]
Globo coverage	0.244 (0.0566)**	0.2368 (0.0541)***	0.1835 (0.0794)**	0.244 (0.0566)**	0.2401 (0.0572)***	0.2177 (0.0840)***
Controls <sup>(c)</sup>	No	Yes	Yes	No	Yes	Yes
State fixed effects	No	No	Yes	No	No	Yes
Predicted P				0.287	0.284	0.29
R-squared	0.032	0.049	0.123	0.032	0.047	0.097
No. Obs <sup>(d)</sup>	366	366	366	366	366	358

Notes:

(a) The variable NAMESMATCH is a dummy equal to 1 if any of the names of the three main characters of Globo novelas aired in 1994 appears among the top 20 names of children born that year.

(b) Standard errors in parenthesis are clustered by State (UF). \* significant at 10%, \*\* significant at 5%; \*\*\* significant at 1%

(c) AMC level controls include: education of the household head, wealth, married, catholic, doctors&nurses, log of population.

(d) In column 6 three State dummies (8 observations) predict failure perfectly and are dropped from the regression.



**Table 10: Fertility and other TV networks**

<i>Dependent variable:</i>	<i>Avg. Number of live births in AMC</i>				<i>B=1 if gives birth in year t</i>	
	[1]	[2]	[3]	[4]	[5]	[6]
SBT coverage	0.0271 (0.0194)	-0.007 (0.0191)	0.1255 (0.1347)	0.1062 (0.1439)	-0.0023 (0.0017)	-0.004 (0.0037)
Controls <sup>(a)</sup>	No	Yes	No	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Area fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Sample	Full	Full	Not covered by Globo	Not covered by Globo	Full	Not covered by Globo
Observations	10427	10427	6219	6219	2102136	472228
R-squared	0.829	0.850	0.831	0.860	0.050	0.061

Standard errors in parentheses are corrected for clustering at the AMC level. \* significant at 10%, \*\* significant at 5%; \*\*\* significant at 1%

AMC stands for Minimally Comparable Area and is a geographic aggregate slightly broader than a municipio.

Each observation in columns [1]-[4] is a couple AMC-Census year. In [5]-[6] it is a couple woman/year.

(a) In columns [2] and [4], controls are the same used in col. 6 of Table 2. In columns [5]-[6], controls are the same used in col. 1 of Table 5.

**Table 11: Effects of novela content, individual level**

*Dependent variable =1 if gives birth in year t (BIRTH) -- Years 1979-1991*

	[1]	[2]
Globo coverage	-0.003 (0.0017)*	-0.0045 (0.0015)***
Globo coverage*Social mobility	-0.0032 (0.0013)**	
Globo coverage*Age match		-0.003 (0.0008)***
Year fixed effects	Yes	Yes
AMC fixed effects	Yes	Yes
Observations	2102136	2102136
R-squared	0.0495	0.0495

Standard errors in parentheses are corrected for clustering at the AMC level.

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

AMC stands for Minimally Comparable Area. Each observation is a woman in a given year.

**Appendix Table A1: Summary statistics**

<i>AMC level (years 1970, 1980, 1991)</i>			
	<i>Mean</i>	<i>Std. Dev</i>	<i>No. Obs.</i>
LIVEBIRTHS	2.658	0.550	10427
Globo coverage	0.318	0.466	10427
Years Globo coverage	2.594	4.392	10427
Age	28.462	0.776	10427
Share aged 15-24	0.397	0.039	10427
Share aged 25-34	0.261	0.027	10427
Education of head	2.725	2.374	10427
Education of woman	3.192	1.546	10427
Wealth	0.066	2.103	10427
Married	0.539	0.082	10427
Catholic	0.924	0.077	10427
Doctors & nurses per 1000 people	0.199	0.751	10427
TV ownership	0.418	0.347	10427
Employment	0.243	0.129	10427
Population density	0.009	0.113	10427
IPC_GDP	0.000	0.003	10427
IPC_renta	0.000	0.003	10427
SBT coverage (full sample)	0.054	0.226	10427
SBT coverage (not covered by Globo)	0.006	0.076	7109
<i>Individual level (years 1979-1991)</i>			
BIRTH	0.094	0.292	2102136
BIRTH (sample aged 15-24)	0.099	0.299	823218
BIRTH (sample aged 25-34)	0.135	0.341	653533
BIRTH (sample aged 35-44)	0.057	0.231	454836
BIRTH (sample aged 45-54)	0.007	0.085	314761
BIRTH (sample aged 30-49)	0.082	0.275	1118600
BIRTH (sample aged 40-49)	0.057	0.232	602429
Globo coverage	0.750	0.433	2102136
Globo coverage in AMC of origin (migrants)	0.723	0.448	392810
Yrs exposed 10-19 (sample aged 30-49)	0.106	0.554	1118600
Yrs exposed 20-29 (sample aged 30-49)	2.607	3.655	1118600
Yrs exposed 30-39 (sample aged 30-49)	3.659	3.424	1118600
Yrs exposed 20-29 (sample aged 40-49)	0.136	0.620	602429
Yrs exposed 30-39 (sample aged 40-49)	3.256	3.842	602429
Yrs exposed 40-49 (sample aged 40-49)	2.832	3.223	602429
SBT coverage	0.095	0.293	2102136
Married	0.551	0.497	2102136
Education of head	5.206	4.559	2102136
Education of woman	5.696	4.445	2102136
Wealth	0.249	1.468	2102136
Age	28.891	9.604	2102136
Age squared	926.949	596.514	2102136
Stock of children	1.991	2.638	2102136
Stock of children sq.	10.925	10.925	2102136
Globo coverage*Wealth	0.333	1.219	2102136
Globo coverage*Education of head	4.221	4.677	2102136
Globo coverage*Education of woman	4.569	4.666	2102136

**Appendix Table A2: Globo Novelas in sample**

Title	Start date	End date	Title	Start date	End date
rosinha do sobrado	3/8/1965	1/10/1965	final feliz	29/11/1982	4/6/1983
o sheik de agadir	18/7/1966	17/2/1967	louco amor	11/4/1983	21/10/1983
o rei dos ciganos	12/9/1966	20/2/1967	guerra dos sexos	6/6/1983	7/1/1984
a sombra de rebecca	21/2/1967	23/6/1967	champagne	24/10/1983	5/5/1984
anastacia, a mulher sem destino	28/6/1967	16/12/1967	transas caretas	9/1/1984	21/7/1984
sangue e areia	18/12/1967	25/7/1968	partido alto	7/5/1984	24/11/1984
a grande mentira	5/6/1968	4/7/1969	vereda tropical	23/7/1984	2/2/1985
passo dos ventos	26/6/1968	1/1/1969	corpo a corpo	26/11/1984	21/6/1985
rosa rebelde	15/1/1969	13/10/1969	um sonho a mais	4/2/1985	2/8/1985
a cabana do pai tomas	7/7/1969	1/3/1970	roque santeiro	24/6/1985	22/2/1986
veu de noiva	10/11/1969	29/6/1970	ti ti ti	5/8/1985	8/3/1986
pigmalião 70	2/3/1970	24/10/1970	cambalacho	10/3/1986	4/10/1986
irmaos coragem	29/6/1970	15/7/1971	roda de fogo	25/8/1986	21/3/1987
a proxima atracao	26/10/1970	18/4/1971	hipertensao	6/10/1986	18/4/1987
minha doce namorada	19/4/1971	25/1/1972	o outro	23/3/1987	10/10/1987
o homen que deve morrer	16/7/1971	11/4/1972	brega e chique	20/4/1987	7/11/1987
o primeiro amor	24/1/1972	17/10/1972	mandala	12/10/1987	14/5/1988
selva de pedra	12/4/1972	23/1/1973	sassaricando	9/11/1987	11/6/1988
uma rosa com amor	18/10/1972	3/7/1973	vale tudo	16/5/1988	6/1/1989
cavalo de aço	24/1/1973	21/8/1973	bebe a bordo	13/6/1988	11/2/1989
o bem amado	24/1/1973	9/10/1973	o salvador da patria	9/1/1989	12/8/1989
carinhoso	4/7/1973	22/1/1974	que rei sou eu	13/2/1989	16/9/1989
o semi deus	22/8/1973	7/5/1974	tieta	14/8/1989	31/3/1990
super manoela	21/1/1974	2/7/1974	top model	18/9/1989	5/5/1990
fogo sobre a terra	8/5/1974	4/1/1975	rainha da sucata	2/4/1990	26/10/1990
corrida do ouro	3/7/1974	25/1/1975	mico preto	7/5/1990	1/12/1990
escalada	6/1/1975	26/8/1975	meu bem meu mal	29/10/1990	18/5/1991
cuca legal	27/1/1975	13/6/1975	lua cheia de amor	3/12/1990	13/7/1991
gabriela	14/4/1975	24/10/1975	o dono do mundo	20/5/1991	4/1/1992
bravo	16/6/1975	31/1/1976	vamp	15/7/1991	8/2/1992
pecado capital	24/11/1975	5/6/1976	pedra sobre pedra	6/1/1992	31/7/1992
anjo mau	2/2/1976	24/8/1976	perigosas peruas	10/2/1992	29/8/1992
o casarao	7/6/1976	11/12/1976	de corpo e alma	3/8/1992	6/3/1993
estupido cupido	25/8/1976	28/2/1977	deus nos acuda	31/8/1992	27/3/1993
escrava isaura	11/10/1976	5/2/1977	renascer	8/3/1993	13/11/1993
duas vidas	13/12/1976	13/6/1977	o mapa da mina	29/3/1993	4/9/1993
locomotiva	1/3/1977	12/9/1977	olho no olho	6/9/1993	9/4/1994
espelho magico	14/6/1977	5/12/1977	fera ferida	15/12/1993	16/7/1994
sem lenço sem documento	13/9/1977	4/3/1978	a viagem	11/4/1994	22/10/1994
o astro	6/12/1977	8/7/1978	patria minha	18/7/1994	10/3/1995
te contei?	6/3/1978	2/9/1978	quatro por quatro	24/10/1994	22/7/1995
dancin' days	10/7/1978	27/1/1979	a proxima vitima	13/3/1995	4/11/1995
pecado rasgado	4/9/1978	17/3/1979	cara & coroa	24/7/1995	30/3/1996
pai heroi	29/1/1979	18/8/1979	explode coração	6/12/1995	4/5/1996
feijao maravilha	19/3/1979	4/8/1979	vira lata	1/4/1996	28/9/1996
malu mulher	24/5/1979	22/12/1980	o rei do gado	17/6/1996	15/2/1997
marron glace	6/8/1979	1/3/1980	salsa e merengue	30/9/1996	3/5/1997
os gigantes	20/8/1979	2/2/1980	a indomanda	17/2/1997	11/10/1997
agua viva	4/2/1980	9/8/1980	zaza	5/5/1997	10/1/1998
chega mais	3/3/1980	6/9/1980	por amor	13/10/1997	23/5/1998
coração alado	11/8/1980	14/3/1981	corpo dourado	12/1/1998	22/8/1998
plumas e paetes	8/9/1980	25/5/1981	torre de babel	25/5/1998	16/1/1999
baila comigo	16/3/1981	26/9/1981	meu bem querer	24/8/1998	20/3/1999
o amor è nosso	27/4/1981	24/10/1981	suave veneno	18/1/1999	18/9/1999
brilhante	28/9/1981	27/3/1982	andando nas nuvens	22/3/1999	6/12/1999
jogo da vida	26/10/1981	8/5/1982	terra nostra	20/9/1999	3/6/2000
setimo sentido	29/3/1982	8/10/1982	vila madalena	8/11/1999	6/5/2000
elas por elas	10/5/1982	27/11/1982			
sol de verao	11/10/1982	19/3/1983			

**Appendix Table A3: Audience share of different TV networks in Brazil**

*Data refers to prime time (h. 18-24) and is in percentage points*

	Globo	SBT	Record	Bandeirantes	Other
1975	92	--	3	3	2
1980	87	6	2	2	3
1985	83	11	2	3	3
1990	79	14	2	4	1
1995	72	15	2	4	7
1996	65	14	4	6	11
1997	58	20	6	6	10
1998	61	20	9	4	6
1999	56	24	9	5	5
2000	58	21	7	4	9

Source: Brittos, Globo and Ibope