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Clémentine Garrouste
Arthur Juet
Anne-LaureSamson

Pôle Laboratoire d'Economie et de Gestion des Organisations de Santé (LEGOS)
Place du Maréchal de Lattre de Tassigny 75775 Paris Cedex 16
Tél (33) 01 44 05 44 46 Fax (33) 01 44 05 40 67
Site : www.legos.daupine.fr

Parental Attitudes and Beliefs about Vaccines: Unexpected Effects of a Hepatitis B Vaccination Campaign*

Clémentine Garrouste† Arthur Juet‡ Anne-Laure Samson§

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Abstract

We evaluate the impact of a French vaccination campaign against hepatitis B (HB) that took place in 1994. Using a regression discontinuity design, we show that this political measure created an exogenous shock on vaccination behaviors, increasing the vaccination rate against HB for children aged 11 and above. We also show that this vaccination scheme led to a decline in knowledge about the mode of transmission of the disease, confusion about the target population and, more importantly, a drop in measles, mumps, and rubella (MMR) vaccination rate. The effect on MMR vaccination was relatively unexpected and may imply a negative externality. Indeed, measles is an extremely contagious disease. If the vaccination rate falls, the disease will spread further, raising the question of the net effect of the HB vaccination campaign on the population well-being.

JEL Codes: I10, I12, J18

Keywords: *vaccination campaign, hepatitis B, measles, mumps, and rubella, spillover effects, regression discontinuity design, sharp design*

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†Université Paris-Dauphine, PSL Research University, LEDa-Legos; Place du Maréchal de Lattre de Tassigny, 75016 Paris, Tel: 0144054267, email: clementine.garrouste@dauphine.psl.eu

‡Université Paris-Dauphine, PSL Research University, LEDa-Legos; Place du Maréchal de Lattre de Tassigny, 75016 Paris, email: arthur.juet@dauphine.psl.eu

§LEM, Université de Lille, 59655 Villeneuve d'Ascq cedex, email: anne-laure.samson@univ-lille.fr

INTRODUCTION

Vaccination is an individual choice or a parent's decision for her child. However, this choice has positive collective externalities. An individual who gets vaccinated against an infectious disease, not only decreases her likelihood of being infected, but also decreases the likelihood of others becoming infected. This choice may also be affected by vaccination choices of others. As vaccination reduces transmission of an infectious disease, it can provide an incentive for individuals to be free-riders, i.e. to benefit from the vaccination of others while avoiding the costs of vaccination. There is no monetary cost, no wasted time to be vaccinated, no side effects, i.e. no adverse effects related to the injection of the vaccine. Overall, this means that the cost-benefit ratio at the individual level may be different from the cost-benefit ratio at the collective level.

In order to eradicate an infectious disease, 80 to 95% of the population (depending on the disease considered) has to be vaccinated. For public policymakers, implementing a vaccination campaign is one way to increase vaccination and to fight an infectious disease. However, they need to anticipate the reactions of the population to a vaccination campaign. If no one wants to be vaccinated, the disease continues to spread. On the contrary, if individuals react positively to the campaign and decide to vaccinate themselves, it can slow down the propagation of the disease. But the information provided during the campaign may also influence their beliefs about vaccination and modify individuals' perception of vaccination in general. Therefore, we could expect positive spillover effects of the campaign onto other vaccines and an increase in knowledge about the diseases in themselves.

Our paper focuses on Hepatitis B (HB). HB is an infectious disease leading to chronic disease with a risk of death from cirrhosis and liver cancer. The HB virus is transmitted through sexual relations and blood, or at birth from the mother to the child (Wright and Lau, 1993). Given these transmission modes, the risk to contract HB is not linear across age groups: it is low during childhood, a peak is reached for the 20-29 years old group, after which the risk decreases (Nauche, 2001). The transmission among drug users or via sexual relations are the most frequent modes of transmission. However, in 30% of the cases, the mode of transmission remains unknown (*INPES, Santé Publique France*, 2018).[1] Note that once an individual contracts HB, no treatment can be administered to recover from the disease. HB is a widespread world disease: two billion people have been or are infected worldwide and approximately 350 million have chronic HB. In France, endemicity is quite low: chronic HB is

[1] http://inpes.santepubliquefrance.fr/10000/themes/hepatite-B.asp

estimated to affect approximately 0.65% of adults aged 18 to 80 (prevalence), i.e about 280,000 individuals (French National Public Health Agency, 2018).

Following recommendations made by the World Health Organization to increase vaccination rates, the French government launched a major vaccination campaign against HB in 1994, that was implemented in two steps.

First, in June 1994, the French government subsidized and launched a major communication campaign against HB, mainly directed towards young people, through TV and radio commercials and the distribution of leaflets. It aimed at increasing knowledge about HB.

Second, from September 1994 on, free vaccination was offered to pupils starting their middle school, ie. to pupils aged 11 and above. This measure therefore created an exogenous shock on vaccination behavior. We examine the effects of the 1994 vaccination campaign on parental attitudes and beliefs about vaccines and parental understanding of the campaign.

We use data from the 1995 Health Barometer, collected by the French National Public Health Agency, to analyze the effects of child eligibility to the free vaccination campaign capturing both effects of the information campaign and the effect of the free vaccination scheme. Apart from its effect on HB vaccination, it is expected that the vaccination campaign, while delivering positive messages and underlining on the benefits of the vaccine, may also improve knowledge or confidence in vaccination in general, thus encouraging parents to vaccinate their children for other diseases, like MMR. It may also improve knowledge about vaccination (eg. HB mode of transmission).

Our data show a strong discontinuity in HB vaccination rates at the age of 11, which corresponds to the age at which pupils usually start middle school. The probability of being vaccinated against HB is approximately 40 percentage points higher for children aged 11 and above than for children below this threshold. The free vaccination scheme therefore led to a higher level of immunization among children. Moreover, we find that parents whose child was exposed to the vaccination scheme (ie. whose child was older than 11 in 1995) knew less about the modes of transmission, as well as a confusion about the target population. The HB vaccination campaign also had a strong impact on MMR vaccination, which decreased by about 13 percentage points.

The remainder of the paper is organized as follow. Section 1 presents a literature review on the impact of vaccination campaigns or polemics on vaccination behaviors and precises our contribution to literature. Section 2 describes in more detail the 1994 vaccination campaign. The empirical strategy is presented in Section 3. Section 4 presents the data used and provides some descriptive statistics. Section 5 reports on the main results, Section 5.4 some robustness checks and Section 5.5 the potential mechanisms. Section 6 presents the final discussion and conclusion.

1 PREVIOUS LITERATURE

There have been recent studies interested in individual reactions to vaccination campaigns in the form of information campaigns or mandatory vaccination campaigns. Lawler (2017) compares different states in the USA, characterized by different hepatitis A (HA) policies. They can recommend or mandate vaccination. The author shows that both policies are highly effective but that the long-term effect of recommendations, serving as a general nudge for vaccination, is larger than the direct and short-term effect of mandatory vaccination campaigns that focus on specific groups of individuals. Individuals facing the mandatory campaign immediately increase their vaccination rate while the recommendation campaign have a more gradual effect that continues to increase for up to 4 years following implementation. The results show that recommendations significantly increase HA vaccination rates by 20 percentage points for young children, while vaccination campaigns increase HA vaccination rates by only 8 percentage points. Abrevaya and Mulligan (2011) focus on a vaccination campaign in the United States: some states implemented a policy that forced children to get specific vaccines in order to start daycare or school. The authors show a strong and immediate causal effect of this campaign on vaccination rates, a peak of which is reached two years after the implementation of the policy. The impact however, decreases six years after vaccination policy adoption. These results seem coherent with those of Lawler (2017): a campaign of mandatory vaccination is more likely to have a short-term effect, while an information policy campaign is more likely to have a long run effect.

Vaccination campaigns could also lead to side effects or spillover effects. Moghtaderi and Dor (2016) study the impact of a recommendation campaign for vaccination against Human Papillomavirus (HPV) in the USA. Using a fuzzy regression discontinuity design, they show that women who have been vaccinated are more likely to do screening tests, possibly due to increased awareness of the benefits. Moreover, Carpenter and Lawler (2019) show the direct and spillover effects of state requirements for middle school pupils having a tetanus, diphtheria, and pertussis (TDP) vaccination before starting middle school. These mandates increased TDP vaccination adherence by 29 percent and reduced pertussis morbidity in the whole population by a much larger 53 percent due to herd immunity effects. They also document cross-vaccine spillovers: the mandates increased adolescent vaccination for meningococcal disease by 2 pp., HPV initiation by 4 to 5 pp and HPV completion by 2 to 3 pp. Spillover effects are higher for children from low socio-economic households.

Whatever the kind of campaign implemented, the information role is essential in vaccination acceptance of the population. Chamoux (2006) evaluates the impact of influenza vaccination campaigns for health professionals in France, combining both information and vaccination schedules. Three combined actions were carried out: letters with date and place of vaccination sessions were sent to every health-care worker, prevention meetings on were held, as well as vaccination sessions at work in risk units. This campaign had a strong impact : vaccination rate increased 2.6 fold compared to the previous year. Better information, facilitating vaccination injections directly at work therefore increasing the vaccination rate. Bruneau et al. (2001) implemented an experiment to promote HB vaccination coverage in Montreal. Like France, Montreal has implemented a universal vaccination program for all primary school students since 1994. However, the vaccination coverage is low. The experiment consisted in encouraging teachers to give informative lectures on HB and to warn parents and students about the dangers of the disease. The study shows that 66% of teachers involved in the campaign used the materials provided and 45% gave courses on HB. As a result, 38% of the students had received at least one dose of vaccine six months after the introduction of the campaign. The study also shows that the main reasons for non-vaccination were due to lack of information or no access to the vaccination site.

The effectiveness of vaccination policies may also depend on the population targeted. Baguelin et al. (2010) studied an economic evaluation of influenza A vaccination campaign in England. They show that vaccination policies targeting high-risk individuals are efficient. They also prove using a cost-benefit analysis that extending vaccination to school-age children would be the best cost-effective extension. Denis et al. (2004) highlight that the vaccine coverage rate (22%) is far too low to lead to the complete eradication of HB virus transmission. Eradication needs more efforts to vaccinate the general population, infants, children and teenagers especially, as well as high-risk groups (such as health-care workers, drug users,...). Only then can vaccination coverage prevent all modes of transmission.

Finally, recent studies underline the effects of a controversy concerning vaccination on the vaccination take-up. Anderberg et al. (2011) study the MMR (Measles, Mumps and Rubella) controversy (i.e. that there may be a link between autism and having the MMR vaccine) in the U.K. They show the adoption of the MMR vaccine declines sharply, dropping by over 5 percentage points in 5 years, before increasing again. Moreover, the uptake rate of the MMR vaccine declined faster in areas where a larger share of parents is educated. In other words, more educated parents respond more quickly to information. They also find possible spillover effects: they observe a decline in the uptake of other uncontroversial childhood vaccines. Chang (2018) studied the same MMR controversy in the United States and finds results in line with those of Anderberg et al. (2011). There is an immediate decline in MMR vaccination rate, negative spillovers onto other vaccines and more educated individuals respond more to the controversy (either by stopping vaccination for other diseases, or by delaying it). However, unlike Anderberg et al. (2011), the author does not find any reaction in vaccination behaviours once the potential correlation between MMR vaccination and autism was refuted.

In this paper, we focus on individuals' reactions to the 1994 HB vaccination campaign in France. As usual in literature, we observe a very strong causal impact of the campaign on HB vaccination adhesion. We also document potential spillover effects of the campaign onto other vaccines, as can already be seen in literature. However contrary to the positive spillover effects always observed in literature, we find negative spillover effects on another vaccine, the MMR. We also focus on several outcomes that, to our knowledge, have not yet been studied in literature: parental understanding of the campaign, parental beliefs about vaccines. Moreover, we investigate the mechanisms which could explain our results. In the following section, we describe the HB vaccination campaign implemented in France in 1994.

2 THE 1994 VACCINATION CAMPAIGN

The HB vaccine was created in 1976 by P. Maupas (see Figure A1 in the Appendix). France was one of the first countries worldwide to deliver the HB vaccine, in 1981. One year later, this vaccination was recommended for health professionals. In 1992, the World Health Assembly of WHO ratified the proposal for universal vaccination for HB, regardless of the level of HB endemicity in the country. In countries like France where the endemicity is lower than 2%[2], WHO recommended the vaccination of all teenagers besides the vaccination of newborns. The objective was to reach a 80% coverage of the population in order to eradicate the disease.

Therefore, in France, in July 1994, the Health Minister announced a massive and national vaccination campaign to eradicate HB, which was implemented in two steps.

First, in June 1994, the French government subsidized and launched a major HB communication campaign, mainly directed towards young people, through TV and radio commercials,

[2]It was estimated to be between 0.1% and 0.5% before the generalized vaccination coverage (Inserm, 1997)

ad inserts, billboards and the distribution of leaflets. A youth radio station, using a promotion truck for HB vaccination, was present in the major French cities. This campaign advertised the seriousness of the disease, the modes of transmission and the necessity to have preventive vaccination in teenage years. Unfortunately, there was misinformation during this campaign. In particular, the prevalence of the disease was overestimated and information about the modes of transmission were incorrect, saliva being wrongly listed as one of them (Nauche, 2001). Note that this period also coincides with the explosion of the debates about AIDS. Given that the target population is the same (drug users, teenagers), there may have been some confusion among individuals, assimilation between the two diseases and therefore assimilation about the risk and danger of contracting HB[3].

Second, from September 1994 onwards, a free vaccination campaign was launched jointly by the Ministry of Health and the Ministry of Education for pupils enrolled in middle school (therefore aged 11 and more). This second part of the campaign had been announced in June. Explanatory letters were first sent to parents, informing them about the health risks incurred by their non-vaccinated children, and about the implementation of a free vaccination campaign at their child's middle school. Meetings were also organized by school doctors and school nurses in middle schools, to answer questions parents and pupils had. Finally, parents could oppose to or accept the vaccination of their child - even if opposition to vaccination was more constraining than approval[4]. The three injections of the vaccines were administrated in all French middle schools between January and July 1995, for children aged 11 and above (Brice, 1996). The injections were planned to be done at school but parents also had the possibility to have it done independently, during a GP's or pediatrician consultation. However, there were financial incentives to have their children vaccinated at school. It was free at school, but payable when the injection was done during the family doctor's consultation. Only 65% of the price of the vaccine, the injection and the doctor's visit were reimbursed by the public health insurance; the remaining 35% (co-payments) and potential supplements were covered by parents or through private complementary health insurance. As a consequence, among pupils vaccinated against HB after age 11, only 21% of them were vaccinated by their family doctor, compared to 79% who were vaccinated at school (Brice, 1996). Finally, in January 1995, the HB vaccine was included in the vaccination schedule of children (see Figure A1 in the Appendix).

However, soon after this campaign launch, the HB vaccine was held responsible for causing

[3]For example, one leaflet was entitled "Hepatitis B/AIDS: we're fighting the same battle!".

[4]Reasons for opposition to vaccination at school were usually: i) an opposition to vaccination in general; ii) the decision to make the injection during a visit to the family doctor; iii) the child is already vaccinated.

multiple sclerosis, leading to a huge controversy regarding the effectiveness of the vaccine. The first French scientific article about central nervous system demyelination potentially caused by HB was published in June 1995 (Kaplanski et al., 1995)[5]. Access to this information was restricted to the scientific community. Articles in the press, that broadcasting this finding, were then published from 1996 onwards.Consequently, following the precautionary principle, the vaccination campaign was interrupted in schools in September 1998; it lasted only 4 academic years.

3 EMPIRICAL STRATEGY: REGRESSION DISCONTINUITY IN A SHARP DESIGN

In order to estimate the causal effect of the 1994 vaccination campaign on various outcomes, we estimate regression discontinuity in a sharp design. More precisely, our identifying strategy exploits the sharp discontinuity in the probability of eligibility to the vaccination campaign at the age of 11. Specifically, we use local linear regressions (Hahn et al., 2001; Imbens and Lemieux, 2008). It amounts to selecting the observations within a bandwidth on either side of the cut-off (11) and estimating the effect of exposure to the reform on Y_i (several outcomes that will be described later), as the effect of the dummy $\mathbb{1}_{A_i \geq 11}$ on Y_i in the following equation:

$$Y_i = a_0 + a_1 \mathbb{1}_{A_i \geq 11} + a_2 (A_i - 11) \mathbb{1}_{A_i \geq 11} + a_3 (A_i - 11) \mathbb{1}_{A_i < 11} + u_i \tag{1}$$

A_i is the age of the child in 1995 and a_1 identifies the causal effect of the 1994 vaccination campaign on the different outcomes. As the vaccination campaign was implemented in two steps, a_1 measures the impact of both the communication campaign and the eligibility to the free vaccination scheme, whose own effect cannot be distinguished, on several outcomes. Indeed, one may think that the *communication* campaign was nationwide and affected the whole population, without any apparent difference between the treated and untreated households. However, we think that households with children aged 11 and more, targeted by the communication campaign, may have paid more attention to this campaign and therefore may react differently. We therefore suppose that both steps of the campaign are therefore confounded in a_1.

In specification (1), $(A_i - 11)\mathbb{1}_{A_i \geq 11}$ and $(A_i - 11)\mathbb{1}_{A_i < 11}$ are local linear functions of age, continuous at the age of 11. We estimated the same equation using, instead, a local linear spline function of age or a local quadratic function of age (results are presented in the Appendix). To choose the best specification, we rely on the AIC criterion and choose the specification which

[5]The very first scientific article was written by a Belgium team (Herroelen et al. (1991)).

returns the lowest AIC. Regressions are performed using a bandwidth of 5 years around the reform: we restrict the sample to children aged between 6 and 15 years old. Robustness checks, using larger or smaller bandwidths are presented in the Appendix.

In order to be able to estimate a causal effect with a sharp regression discontinuity design, it is necessary to make 2 hypotheses.

First, the expectations of the potential outcomes conditional on A are to be continuous:

$$E(Y_{ik}|A_i = a) \text{ is continuous in } a = 11, \text{ for } k = 1, 0. \tag{2}$$

This condition cannot be tested. However, we checked that variables related to the outcomes (eg. gender, age and level of education of the household, percentage of married couples, size of the family, rural/urban location) are continuously distributed at the age of 11 (see Figures A2 in the Appendix).

Second, a_1 and treatment status $E_i(a)$ (i.e. eligibility to the free vaccination campaign) are assumed to be locally jointly independent of the age of the eldest child:

$$a_1, E_i(a) \perp\!\!\!\perp A_i \text{ close to } A_i = 11. \tag{3}$$

This condition implies that children and their parents do not have perfect control on the age at which children go to middle school: they cannot manipulate the age threshold in order to benefit from the vaccination campaign. This is very likely to be the case. Indeed, teachers are the most likely to have control on this (they ask children to repeat a grade or skip a year), even if parents can oppose to it. Moreover, making children skip a year in order to benefit from the reform seems very implausible, even impossible in our case.

4 THE DATA

The regression discontinuity design is applied using data from the 1995 Health Barometer, a periodic national survey, representative of the French population and collected by the French National Public Health Agency[6]. Data collection took place in November and December 1995, approximately one year after the beginning of the vaccination campaign and before the polemic about potential side effects of the HB vaccine[7]. For each household, the data set contains information on parents and all children still living at home. In addition to the usual socio-demographic characteristics (age, gender, profession, education of each member of the house-

[6] The survey was conducted by telephone and more specifically on hand-lines. As a result, some individuals - such as the homeless, people without a hand-line, or people in hospital - could not be included in the survey

[7] Our data are also collected before the polemic about the potential link between autism and MMR, that broke out in 1998. More generally, to our knowledge, no polemic on vaccination had ever broken out.

hold, ...), the survey contains detailed information on health status, access to health care and vaccination behavior (for different vaccines) of parents and their children.

The initial database contains 1993 households. However, for our econometric analysis, we need to distinguish households exposed to the campaign from those who were not. Given the timing of the reform, households of at least one child older than 11 in 1995 were eligible to the free vaccination campaign (treated), while those with children aged 10 and below were not (untreated).[8] We exclude households who are childless. For households with more than one child, we only keep information about their eldest child. Indeed, households with several children may be both treated and untreated, if some of their children are more than 11 while others are less than 10 in 1995. In this case, the estimated effect would be unclear. Our final sample contains 764 observations, with one observation per eldest child in the household.[9]

4.1 Descriptive statistics

Table 1 provides descriptive statistics on the whole sample and for both the treated and untreated households.[10] It first describes variables that concern the head of the household (i.e. the one who filled in the questionnaire). The average age of the respondent is approximately 38. Unsurprisingly, parents whose eldest child is older than 11 (treated group) are significantly older (approximately 4 years older) than parents whose eldest child is younger than 11 (untreated). However, our estimates is valid as soon as the age of the respondent is continuous at the 11 year-old threshold. This is the case, as shown in Figure A2b in the Appendix. Moreover, age at birth of their child does not show any significant difference between treated and non treated groups. Approximately 40% of the respondents are men; this proportion is the same on both sides of the discontinuity threshold.[11] Approximately 95% of the respondents hold French nationality and this proportion is also the same on both sides of the discontinuity threshold. The remaining socio-demographic characteristics of the respondents (chronic disease, education, religion) do not significantly differ between the treated and untreated groups. Note however that one variable significantly differs between both groups: the proportion of respondents belonging to the intermediate occupation category. This proportion is significantly lower in the treated

[8]Note that the database does not contain the children age in months so we cannot be more precise in the definition of treated and untreated households.

[9]In our robustness checks, we test the sensitivity of our results to the use of a sample composed of all children, and not only the eldest one.

[10]There are no variables characterizing the child, except their age and immunization status towards 2 diseases, MMR and HB.

[11]This proportion is much smaller than the proportion of men in the whole population. This could bias our results if mothers are more aware than fathers of their child's vaccinations, however our estimates are valid as soon as there is continuity in the proportion of mothers around the discontinuity threshold, which is the case (60% - see Figure A2a in the Appendix).

Table 1: Comparison of treated and untreated groups, using a bandwidth of 5 years around the 11 year-old threshold

	(1) Whole sample Mean	(2) Untreated Mean	(3) Treated Mean	(4) T-test b
Socio-demographic characteristics				
Head of household:				
Male	0.39	0.36	0.38	0.02
Age	37.40	35.97	40.63	4.66***
Age at child birth	27.62	27.91	27.48	-0.43
French nationality	0.95	0.98	0.95	-0.03
No religion	0.24	0.25	0.24	-0.00
Do not practice religion	0.39	0.39	0.38	-0.02
Occasionally practice religion	0.30	0.29	0.29	0.00
Regularly practice religion	0.07	0.07	0.08	0.01
High school diploma and more	0.41	0.43	0.34	-0.08
Chronic diseases	0.22	0.18	0.25	0.07
Farmer	0.03	0.04	0.02	-0.02
Craftsman	0.03	0.02	0.04	0.02
Executive	0.13	0.09	0.12	0.03
Intermediate occupation	0.27	0.37	0.22	-0.16***
Employee	0.17	0.15	0.22	0.08
Blue collar worker	0.34	0.31	0.35	0.04
Pensioner	0.01	0.00	0.02	0.02
Other profession	0.01	0.02	0.01	-0.02
Household:				
Urban	0.33	0.29	0.32	0.03
Rural	0.30	0.36	0.31	-0.06
Equivalised income>1,500€	0.70	0.73	0.68	-0.06
Married	0.89	0.91	0.85	-0.06
Single	0.03	0.03	0.01	-0.02
Separated	0.08	0.06	0.14	0.07*
One child	0.44	0.27	0.35	0.08
Two children	0.39	0.50	0.40	-0.09
Three children	0.14	0.20	0.19	-0.01
Four children and more	0.03	0.02	0.05	0.02
Outcomes				
HB vaccination:				
Child HB vaccination	0.52	0.25	0.77	0.52***
Parent HB vaccination	0.32	0.38	0.29	-0.09
Parent's understanding of the campaign:				
Vaccination for newborns	0.55	0.57	0.52	-0.05
Vaccination for middle school children	0.90	0.90	0.92	0.02
Vaccination for the whole population	0.82	0.84	0.79	-0.04
Correct knowledge about HB contamination	0.25	0.23	0.23	-0.00
HB is transmissible by saliva	0.40	0.32	0.45	0.13**
Don't know how HB is transmitted	0.35	0.42	0.31	-0.11*
HB is a serious illness	0.78	0.74	0.80	0.06
MMR vaccination:				
Child MMR vaccination	0.85	0.93	0.80	-0.13***
MMR is a begnin illness	0.35	0.31	0.36	0.06
Non vaccination against MMR is risky	0.66	0.69	0.64	-0.05
Number of obs.	764	171	242	

Note: ***Statistically significant at the 0.1% level; ** at the 1% level; * at the 5% level. The number of observations per variable may vary according to the number of missing values. The number of non-missing observations used for each variable is presented in table A1 in the appendix. In the last line of the table, we report the highest possible number of children observed in each group (treated, untreated and the whole sample). Column (1) computes the mean for the entire sample. Columns (2) and (3) compute, respectively, the mean for households whose eldest child is aged 6 to 10 years old (column (2) and for those whose eldest child is aged 11 to 15 years old (column (3). Column (4) reports the test for equal means.

Source: Health Barometer 1995.

Table 2: Full definition of the outcomes

Outcome	Question	Answer	Values
HB vaccination:			
1. Child HB vaccination	Have your under-18 child been HB vaccinated?	Yes/No	1/0
2. Parent HB vaccination	Have you been HB vaccinated ?	Yes/No	1/0
Parent's understanding of the campaign:			
3. HB vaccination for newborns	Do you believe that newborns should be HB vaccinated?	Yes/No	1/0
4. HB vaccination for middle school pupils	Do you believe that middle school children should be HB vaccinated?	Yes/No	1/0
5. HB vaccination for the whole population	Do you believe that the whole population should be HB vaccinated?	Yes/No	1/0
6. Correct knowledge about HB contamination	What are the different ways to become HB infected?	Sexual relations Blood	1
		Saliva Sweat Do not know	0
7. Saliva	Is HB transmissible by saliva ?	Yes/No	1/0
8. Don't know	Do you know how HB is transmissible ?	No/Yes	1/0
9. HB is a serious illness	Is HB a serious illness?	Yes/No	1/0
MMR vaccination:			
10. MMR child vaccination	Have your child aged between 1 and 16 been MMR vaccinated?	Yes/No	1/0
11. MMR is a benign illness	Is MMR benign?	Yes/No	1/0
12. Non MMR vaccination is risky	If your child does not have MMR vaccination, you are running a risk	Totally agree	1
		Rather agree Rather disagree Not agree at all	0

group (22% versus 37%). We will discuss later the potential impact of this difference on our results.

For variables that concern the entire household (such as the marital status, the urban/rural location and the number of children), we do not observe any significant difference between the treated and untreated groups.[12]

The second part of Table 1 provides some statistics on the outcomes that will be used in the analysis, both at the child's level or at their parent's level (see Table 2 for the description of these outcomes)[13]. Table 1 shows that children belonging to a treated household are 52 percentage points more likely to be vaccinated against HB than those belonging to untreated households. They are also 13 percentage points less likely to be vaccinated against MMR. Treated people are also more likely to list saliva as a mode of transmission (+13 pp) and less likely to be aware of the transmission modes (-11 pp). For the other outcomes, such as parental HB vaccination, listing the correct modes of transmission beliefs that newborns, middle-school children and the whole population should be vaccinated against HB, or beliefs that not being vaccinated against MMR is risky, HB is a serious disease and MMR is benign, no significant difference is observed between the treated and untreated groups.

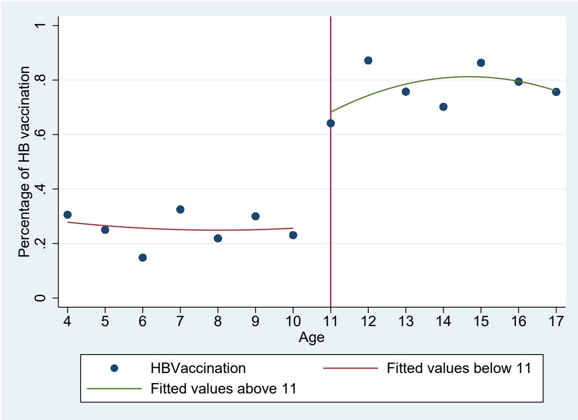
4.2 Graphical evidence

Before presenting the results obtained with the econometric analysis, we provide some graphical evidence on the impact of the vaccination campaign against HB. We first observe a huge impact of the campaign on the probability to be vaccinated against HB. Indeed, Figure 1a shows a large discontinuity at age 11 in 1995. About 70% of children aged 11 or more were vaccinated against HB, while this proportion is only 30% for pupils aged below 10. The vaccination campaign targeted children in middle school. This discontinuity at the age of 11 is consistent with figures of the starting age in middle school: 97% of children are 11 of more on starting middle school (65% are 11 years old, 24% are 12 and 8% are 13). Only 3% are under 10 (Brice, 1996). This explains the discontinuity at age 11 and over. The campaign targeted pupils starting middle school but also for all pupils in middle and high school who had never been vaccinated. This explains why the rate of HB vaccination remains high after the age of 11. This illustrates a better immunization coverage against hepatitis B thanks to the campaign.

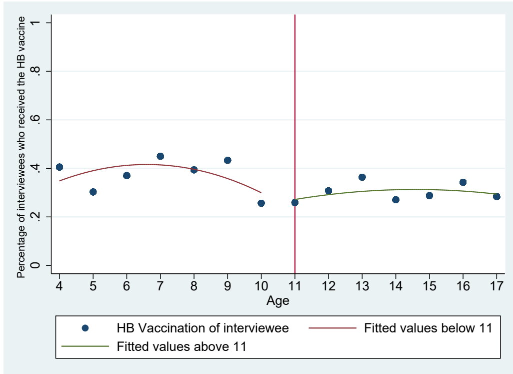
The proportion of individuals who believe that newborns and the whole population should be vaccinated against HB decreases at the 11 year-old threshold (see Figures 2a and 2c). In

[12] This is confirmed by Figure A2 in the Appendix.

[13] Here the "parent" is the one who filled in the survey.



(a) Child HB vaccination rate, by age of the eldest child



(b) Parent vaccination rate against HB, by age of the eldest child

Figure 1: HB vaccination

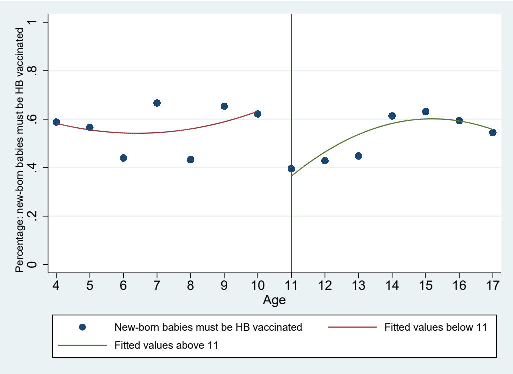
addition, parents of treated pupils report a poorer knowledge of HB transmission modes (see Figure 2d, 2e and 2f).

Finally, Figure 3a shows the MMR vaccination rate according to the age of the eldest child of the household. Again, there is a discontinuity around the threshold. Below 11 year-old, approximately 90% of the children are vaccinated for MMR; this proportion drops to 80% for pupils aged 11 and more. This figure illustrates a possible impact of the vaccination campaign against HB on MMR vaccination. Parents may have changed their attitude towards MMR vaccination. They are also less likely to believe that not being vaccinated for MMR is risky (64% against 69% - see Figure 3c).

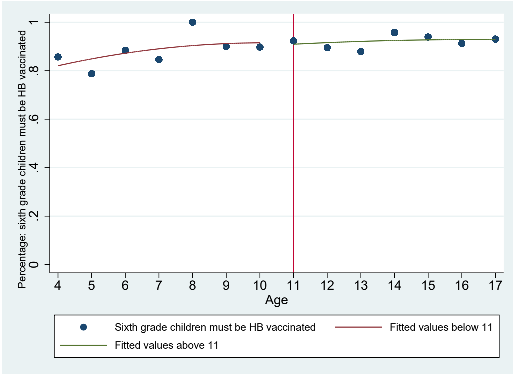
The econometric analysis presented in the following section will be necessary to evaluate the causal impact of the HB vaccination campaign on these outcomes.

5 RESULTS

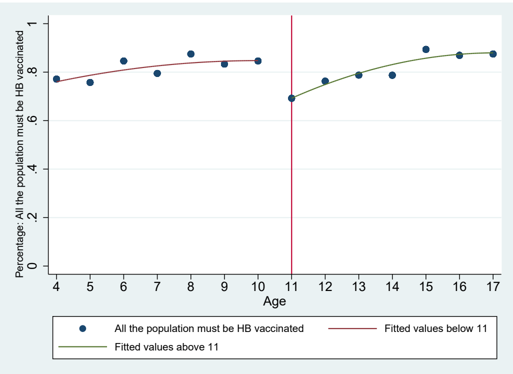
In our regressions, we consider several outcomes divided into three categories. First, outcomes that describe HB vaccination behaviors. They include both HB vaccination for the children and parent's. Second, outcomes that show parent's understanding of the 1994 campaign, ie. their knowledge of the target population for HB vaccination (HB vaccination is necessary for the newborn, for middle school pupils or for the whole population), their knowledge of HB transmission modes (listing of the correct transmission modes, listing saliva as one of them, having no idea of the transmission modes), and their belief that HB is a serious illness. Thirdly, outcomes that describe MMR vaccination. They include MMR vaccination of the child, parent's



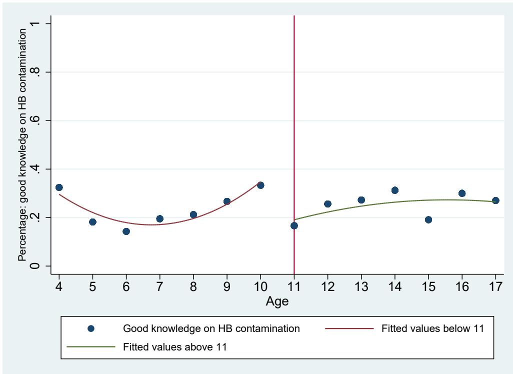
(a) Vaccination for newborns, by age of the eldest child



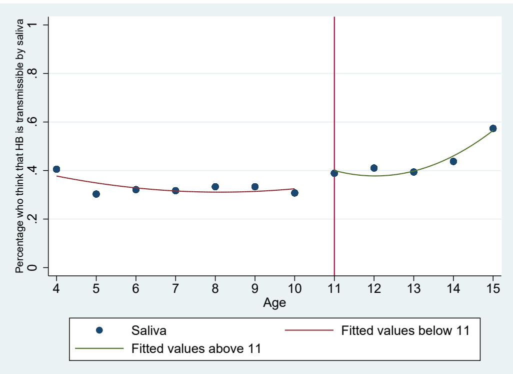
(b) Vaccination for middle school pupils, by age of the eldest child



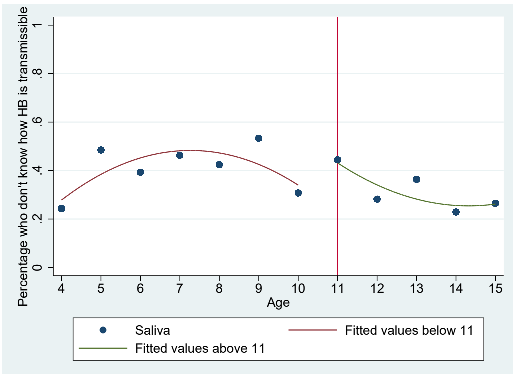
(c) Vaccination for the whole population, by age of the eldest child



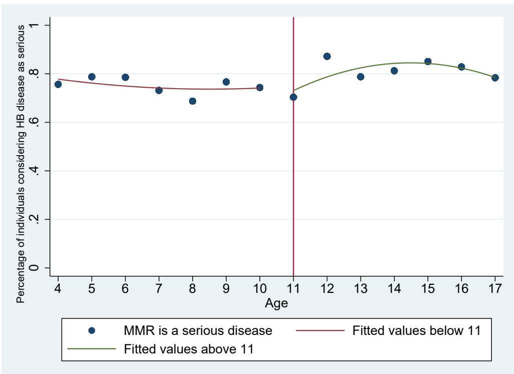
(d) Right answer about HB contamination



(e) Believe that HB is transmissible by saliva

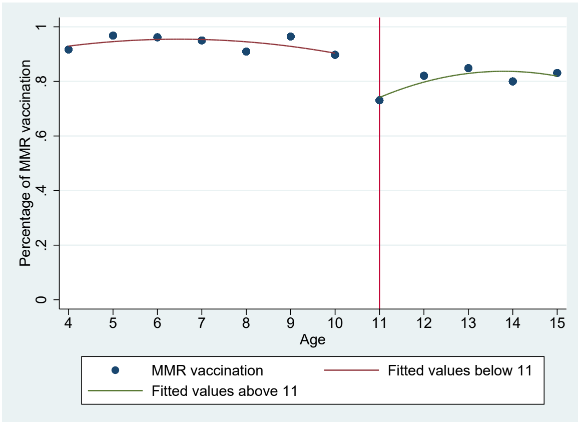


(f) Don't know how HB is transmitted

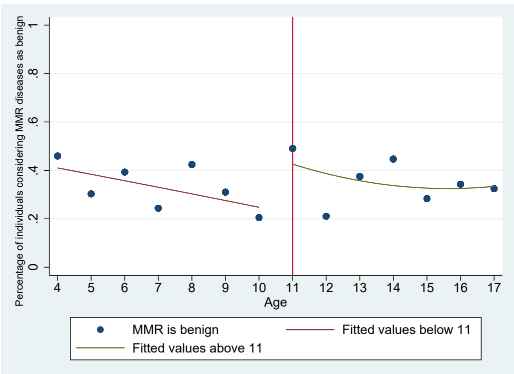


(g) HB is a serious illness, by age of the eldest child

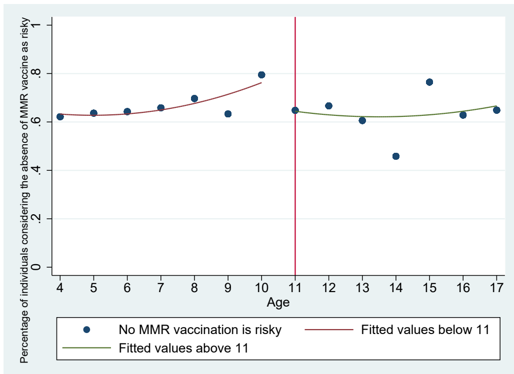
Figure 2: Parent's understanding of the campaign



(a) Child MMR vaccination, by age of the eldest child



(b) MMR is a benign illness, by age of the eldest child



(c) Non MMR vaccination is risky, by age of the eldest child

Note: There is no information on MMR vaccination for children aged 16 and 17 in the survey (see Table 2).

Figure 3: MMR vaccination

belief that MMR is a begnin illness, and that non vaccination against MMR is risky.

Tables 3, 4 and 5 show the results of the estimates of equation (1), using a linear function of age (upper part of the tables) and a linear spline function of age (bottom part of the tables) and a bandwidth of 5 years around the age of 11, ie. estimates are performed for children aged 6 to 15 years old[14]. Estimates in bold are those obtained using the best trend specification, according to the AIC criteria; these are the results that we comment in the text.

5.1 Impact of the campaign on attitudes regarding HB vaccination

We find a strong impact of the vaccination campaign on HB vaccination for the eldest child (see Table 3). There is a strong increase in the immunization coverage due to the vaccination campaign: while 25% of children below 11 are HB vaccinated, this probability significantly increases by 42 percentage points for children above 11, concerned by the school vaccination scheme. While the campaign was effective in increasing vaccination rates, it can noted that it is still below the immunization rate of the population targeted by the campaign which was 67%[15] against 80% as planned by the government.

This result is robust whatever the specification (local linear, local linear spline, local quadratic), the bandwidth used, and the use of control variables (see tables A2 to A4 in the Appendix). We find no impact of the distance to the threshold on the probability of being HB vaccinated: the coefficients of the trends before and after the age of 11 are never significant, meaning that there is no difference in the vaccination rate per age, to the left or to the right of the discontinuity (see Table A2 in Appendix for example).

The vaccination campaign did not have any impact on parental HB vaccination. Thus, the HB vaccination campaign didn't have any positive spillover effect across ages. Parents whose eldest child is older than 11 are no more vaccinated against HB than the other parents (see Table 3).

5.2 Parent's understanding of the campaign

We also observe a decrease in the knowledge about the HB transmission modes for treated households (see Table 4), i.e. those with a child older than 11 (-21 percentage points). This means that they listed wrong transmission modes more often than parents with younger chil-

[14]Full tables of results, that use different bandwidths, different local functions of age and include, or not, control variables, are presented in tables A25 to A18 in the Appendix.

[15]0.67 = 0.25+0.42, see Table 3)

dren[16]. More precisely, they more often listed saliva than untreated households as a mode of contamination (+5 percentage points). These results can arise from the disclosure of contradictory or erroneous information during the communication campaign. The Prime Minister claimed that HB could be transmitted through saliva, and this information was widely spread by the medias. During debates, it was said that this was not the case. Parents belonging to treated households could have paid more attention to the debates and may have been more confused than other parents by this contradictory information. Interestingly enough, we observe that treated and untreated parents report equally ignoring the transmission modes. What is striking is the very high percentage of parents who ignore the transmission modes: 42%. The effectiveness of the reform in informing the whole population should thus be questioned.

Table 4 also shows that there is no difference in the belief that HB is serious around the age threshold, about 74% of the parents think this is the case. The communication campaign of June 1994 therefore affected both treated and untreated parents identically by providing information that was accepted in the same way for all the parents. It also means that the additional campaign implemented at school and that specifically affected treated parents did not have any impact on their beliefs about the seriousness of the disease.

Finally, Table 4 shows that there is a non-significant impact of the campaign on the probability to believe that middle school pupils should be HB vaccinated. This means that the whole population, whatever their children's ages, were aware that the campaign was first directed at middle-school children. But parents of middle-school children may have focused their attention too much on the necessity of teenage vaccination. Indeed, we observe a negative impact of the vaccination campaign on the probability to believe that the newborns and the whole population should be HB vaccinated.[17] However, following the WHO recommendations, the campaign also aimed at promoting vaccination for the newborns and the whole population.[18] The fact that individuals with children aged 11 and older are less likely than individuals with younger children to believe than newborn babies and the whole population should be vaccinated means that they probably assimilated an incomplete information. The additional information given to them at school, which targeted the teenagers only, could have made them misinterpret the first information campaign (of June 1994). They focused their attention on the necessity of teenage vaccination, obscuring the risk for other populations. This may be interpreted as the existence

[16] Recall that this variable equal 1 if and only if the parent listed blood *and* sexual relations as modes of transmission, but 0 if the parent adds saliva to this list or if he lists only 1 out of the 2 modes of contamination.

[17] One cannot rule out a kind of "endogeneity" for the variable "vaccination for newborns": parents of children aged more then 11 may think that newborns do not need to be vaccinated against HB because they will be vaccinated later as teenagers.

[18] As mentioned in section 4, the HB vaccine was included in the French vaccination schedule of newborns and children in January 1995.

of a salience effect on the teenagers. Psychologists view salience detection as a key attentional mechanism enabling individuals to focus their cognitive resources on a subset of the available sensory data (Bordalo et al., 2012), i.e. the salience effect refers to elements which individuals are most drawn to and will focus their attention on.

5.3 Impact of the campaign on MMR vaccination

Our more striking and unexpected result can be found in Table 5. While the literature usually finds positive effects of a vaccination campaign onto other vaccines, we find a negative spillover effect on MMR, another child vaccine. This result confirms the graphical evidence of Figure 3a and suggest a direct effect of the HB vaccination campaign on MMR vaccination (-13 percentage points) for a bandwidth of 5 years around the age threshold (see Table 3). This result is robust whatever the specification (local linear, local linear spline, local quadratic), the bandwidth used, and the use of control variables. This effect varies from 13 to 15 percentage points depending on the specification (see Appendix, Table A25). At that time, MMR vaccination was not mandatory: it was only included in the recommended immunization schedule (see Figure A1 in the Appendix). Moreover, while the MMR vaccination is usually considered as an infantile vaccination, in practice, the injection can be given at any age between 0 and 16 (as well as during adulthood for all individuals previously not vaccinated). More precisely, the first injection of the MMR vaccine should be at aged 1 year and the second between aged 16 and 18 months. Some data however show that for children born before 1990, only 40% of them had already been vaccinated at the age of 4 (INVS, Institut de Veille Sanitaire, 2003). Therefore, there is a recall vaccination at every year after 4, and this recall vaccination is recommended even if the individual has already one of the diseases. Therefore, how can we explain the negative spillover on MMR vaccine? Four possible explanations are possible.

First, households may be reluctant to administer both vaccines to their children the same year. For some parents, there may be a trade-off between the different vaccines: both vaccines may be considered as substitutes[19]. Parents may be more reluctant to have their children MMR vaccinated while they had already had 3 HB injections. Note however, that given the decrease in MMR vaccination is lower than the increase in HB vaccination, this trade-off is not undertaken by all treated household. We would have liked to confirm our hypothesis testing the impact of HB vaccination on other vaccines; but individuals were not asked about other vaccines in this questionnaire.

[19]They are not perfect substitutes as HB vaccination increases by 42 pp but MMR vaccination only decreases by 13 pp for pupils aged 11 and more

A second explanation could be the price effect. If we consider that HB and MMR vaccines are substitutes, the relative cost of the MMR vaccine increases compared to the free HB vaccine. Indeed, the MMR vaccine is not free (it became free in 1999 only, INPES (2008)) and, on top of the cost of the vaccine, parents have to pay the cost of the doctor's visit. Some parents may therefore substitute the MMR vaccine .

Thirdly, there could be a salience effect. Individuals focused their attention on HB vaccination information. Consequently, they neglected the risk of MMR for their children: because the MMR vaccine is recommended, but not mandatory, parents may believe that MMR vaccination is not as essential as HB vaccination. If MMR vaccination was so important, there would have been information and a free vaccination campaign. Table 3 shows that this explanation is fully consistent with the fact that treated individuals tend to believe that it is risky not to vaccinate their child for MMR (between -13 and -16 percentage points). They are also more likely to report that MMR is benign (+20 to +27 percentage points). This is also consistent with the fact that treated parents are less likely to think that HB vaccination is directed towards other populations than merely middle-school pupils (see Table 4).

This salience effect could be driven by the supply side, ie. through doctors, and constitutes a fourth possibility for the decrease in MMR vaccination. Doctors, who are supposed to be more knowledgeable about the vaccination campaign, could have focused the parents' attention on the necessity for pupils to be HB vaccinated and could have omitted, during a consultation, to advise parents to get their children vaccinated for both MMR and HB.

All these possible explanations are discussed in more detail in the next section.

Note that these estimates are obtained without the use of control variables, because i) there is continuity of the characteristics around the threshold and ii) some control variables have missing values, which would reduce the size of the sample used for the estimates. However, given control variables are hardly ever significant, very similar results are obtained when these variables are added.[20] In Table 1, we observed that our treated and untreated groups differ significantly in terms of distribution per one occupation: the percentage of household whose head has an "intermediate occupation" is lower for treated than for untreated individuals. However, we think our results are not much affected by this difference. Indeed, children belonging to households whose head has an intermediate occupation are somewhat less vaccinated against HB (see table A2, A3 or A4 in the appendix). Therefore, the effect of the campaign on HB

[20]Control variables used for the estimates are the following: respondent's gender, age, level of education, profession, marital status and number of children. The others were excluded as they were never significant. Results can be found in Tables A2 to A4 in the Appendix, for the vaccination against HB outcome.

Table 3: RD estimates using a bandwidth of 5 years around the threshold of 11 years old – Attitudes about HB vaccination

	Child HB vaccination (1)	Parent HB vaccination (2)
	Linear	
$\mathbb{1}_{A_i \geq 11}$	**0.42*****	**-0.00**
se	**(0.081)**	**(0.08)**
AIC	**464.264**	**545.05**
	Linear Spline	
$\mathbb{1}_{A_i \geq 11}$	0.49***	0.08
se	(0.092)	(0.06)
AIC	464.638	545.80
N	406	409
Untreated Mean	0.25	0.38

Note: Standard errors in parentheses, clustered by age of the eldest child. ***Statistically significant at the 1% level; **Statistically significant at the 5% level; *Statistically significant at the 10% level. Results obtained for children aged between 6 and 15 years old. We control by $(A_i - 11)\mathbb{1}_{A_i \geq 11}$ and $(A_i - 11)\mathbb{1}_{A_i < 11}$, linear trends of age, continuous at the age of 11. $AIC = N \ln(\hat{\sigma}^2_\epsilon) + 2p$. Results in bold are those with the best trend specification, according to the AIC criteria.
Source: Health Barometer 1995. Sample restricted to the oldest child of the household.

Table 4: RD estimates using a bandwith of 5 years around the threshold of 11 years old – Parent's understanding of the campaign

	HB contamination knowledge			**Seriousness of the disease**	**The target population is...**		
	Correct Answers (1)	Saliva (2)	Don't know (3)	HB is serious (4)	Newborns (5)	Middle school pupils (6)	The whole population (7)
				Linear			
$\mathbb{1}_{A_i \geq 11}$	-0.15***	**0.05***	**0.03**	**0.02**	**-0.277*****	-0.022	**-0.157*****
s.e.	(0.040)	**(0.03)**	**(0.11)**	**(0.05)**	**(0.049)**	(0.032)	**(0.015)**
AIC	464.02	**578.65**	**563.18**	**447.17**	**527.79**	118.99	**386.32**
				Linear Spline			
$\mathbb{1}_{A_i \geq 11}$	**-0.207*****	0.09***	0.14	-0.04	-0.321***	**0.050**	-0.132***
s.e.	**(0.016)**	(0.01)	(0.09)	(0.05)	(0.078)	**(0.036)**	(0.025)
AIC	**462.23**	579.07	563.25	448.53	529.54	**118.65**	387.77
N	406	413	413	411	362	397	397
Untreated Mean	0.23	0.32	0.42	0.74	0.57	0.90	0.84

Note: Standard errors in parentheses, clustered by age of the eldest child. ***Statistically significant at the 1% level; **Statistically significant at the 5% level; *Statistically significant at the 10% level. Results obtained for children aged between 6 and 15 years old. We control by $(A_i - 11)\mathbb{1}_{A_i \geq 11}$ and $(A_i - 11)\mathbb{1}_{A_i < 11}$, linear trends of age, continuous at the age of 11. $AIC = N \ln(\hat{\sigma}^2_\epsilon) + 2p$. Results in bold are those with the best trend specification, according to the AIC criteria.
Source: Health Barometer 1995. Sample restricted to the oldest child of the household.

Table 5: RD estimates using a bandwith of 5 years around the threshold of 11 years old – Vaccination and beliefs about MMR

	Child MMR vaccination	**Seriousness of the disease** MMR is benign	non MMR vacc. is risky
	(1)	(2)	(3)
	Linear		
$\mathbb{1}_{A_i \geq 11}$	**-0.13*** **	0.20*	-0.16***
s.e.	**(0.040)**	(0.10)	(0.07)
AIC	**286.49**	549.82	559.44
	Linear Spline		
$\mathbb{1}_{A_i \geq 11}$	-0.15***	**0.27** **	**-0.13** *
s.e.	(0.039)	**(0.11)**	**(0.06)**
AIC	288.37	**549.71**	**550.55**
N	394	407	406
Untreated Mean	0.93	0.31	0.69

Note: Standard errors in parentheses, clustered by age of the eldest child. ***Statistically significant at the 1% level; **Statistically significant at the 5% level; *Statistically significant at the 10% level. Results obtained for children aged between 6 and 15 years old. We control by $(A_i - 11)\mathbb{1}_{A_i \geq 11}$ and $(A_i - 11)\mathbb{1}_{A_i < 11}$, linear trends of age, continuous at the age of 11. $AIC = N \ln(\hat{\sigma}^2_\epsilon) + 2p$. Results in bold are those with the best trend specification, according to the AIC criteria.

Source: Health Barometer 1995. Sample restricted to the oldest child of the household.

vaccination that we measure is probably a bit over-estimated. But the estimated effect we obtain is so huge that, even if the true effect is smaller, it still remains large. Moreover, estimates including all control variables show that the "intermediate occupation" dummy is rarely significant, and when it is significant (such as for trust in MMR vaccine), it is negative. This means that, overall, we probably under-estimate the true effects of the campaign: these effects could be larger.

We cannot go very deeply in order to test whether there would be an heterogeneous effect of the treatment across sub-groups: we only measure an average local treatment effect. Indeed, the number of observations per sub-groups (low versus highly educated households; small versus large households for example) is too small to perform a robust econometric analysis[21]. However, in the next section, we will try to investigate the heterogeneity between sub-groups in more details.

[21] Note also that we cannot split the sample according to the sex of the child: this variable is not available in the dataset.

5.4 Robustness checks

5.4.1 Use of another bandwidth

Our main results are obtained using a bandwidth of 5 years around the age threshold. Tables A25 to A18 in the Appendix provide estimates using a bandwidth of 4 (estimates are obtained on households whose eldest child is between 7 and 14 years old) or a bandwidth of 6 (estimates are obtained on households whose eldest child is between 5 and 16 years old). Our main results are maintained. Children aged more than 11, who were exposed to the vaccination campaign, experience a 13 to 15 percentage points reduction in their probability of getting vaccinated against MMR. A similar significant decrease in knowledge about the modes of transmission of HB is observed. The only difference observed is a significant increase in the belief that teenagers should be vaccinated for treated individuals.

5.4.2 Placebo tests using the Health Barometer 1992

We use the 1992 Health Barometer data to check two hypotheses: i) is this discontinuity in the MMR vaccination rate an "age effect", ie. is such a discontinuity usually found at the age of 11 ?; ii) is this discontinuity a "cohort effect", ie. is it specific to the cohort of individuals born in 1984 (aged 11 and 1995)? Unfortunately, the 1992 Health Barometer does not contain any question on HB vaccination, parent's HB vaccination, knowledge about the modes of transmission of the disease, etc. MMR vaccination for children is the only common variable between the 2 datasets so our robustness analysis can only be performed on this outcome[22].

First, we test whether there is a discontinuity in the MMR vaccination rate at the age of 11: the discontinuity observed at the age of 11 in 1995 could result from an "entry in middle school" effect more than an effect of the campaign[23]. We find a positive effect, significant at the 10% level, meaning that the MMR vaccination rate increases for pupils who start middle school in 1992 (top of Table 6). This confirms that the negative effect we find in 1995 is due to the 1994 vaccination campaign and that we probably underestimate it, since there is a positive effect at middle school entry in 1992 (see Table A28 in Appendix).

Second, the discontinuity at the age of 11 in 1995 could result from a cohort effect. As the 1995 Health Barometer is a cross section, the age effect cannot be distinguished from the cohort

[22] As in the main analysis, we only selected households composed of at least one child, and only kept information about the eldest child in the household.

[23] The immunization schedule in itself cannot explain such a jump at the age of 11: individuals who were not vaccinated when they were young (the first injection of the vaccine is recommended at the age of 12 months; the second one between 16 and 18 months) can make a catch-up vaccination at any age between 2 and 13 years old). Moreover, there is no reform in the health care sector during this period, that could explain the decrease in MMR vaccination at the age of 11.

effect. We therefore test if there is a discontinuity at the age of 8 in 1992, ie. a discontinuity between children aged 8 and more in 1992 (i.e. from cohorts 1984 and older) and children aged 8 and below in 1992 (i.e. cohorts 1985 and younger). We find no significant decrease in MMR vaccination rate (bottom of Table 6). The vaccination rate is the same around the 8 threshold. Our estimated effect in 1995 cannot be attributed to a cohort effect, neither (see Table A29 in Appendix).

Table 6: Placebo tests: RD estimates for MMR vaccination using 1992 and 2000 Health Barometers (Bandwidth=5)

Vaccination	Child MMR vaccination 1992 Health Barometer (1)	Child MMR vaccination 2000 Health Barometer (2)
	Linear	
$\mathbb{1}_{A_i \geq 11}$	0.19*	0.011
s.e.	(0.09)	(0.015)
AIC	194.36	9.076
	Linear Spline	
$\mathbb{1}_{A_i \geq 11}$	**0.33*****	**-0.001**
s.e.	**(0.05)**	**(0.005)**
AIC	**191.84**	**-3.965**
N	204	2066
Untreated Mean	0.85	0.95
	Linear	
$\mathbb{1}_{A_i \geq 8}$	**-0.01**	
s.e.	**(0.09)**	
AIC	**211.47**	
	Linear Spline	
$\mathbb{1}_{A_i \geq 8}$	-0.01	
s.e.	(0.07)	
AIC	212.95	
N	262	
Untreated Mean	0.86	

Note: Standard errors in parentheses, clustered by age of the eldest child. ***Statistically significant at the 1% level; **Statistically significant at the 5% level; *Statistically significant at the 10% level. We control by $(A_i - x)\mathbb{1}_{A_i \geq x}$ and $(A_i - x)\mathbb{1}_{A_i < x}$ with $x = 8, 11$, linear trends of age, continuous at the age of 11. $AIC = N \ln(\hat{\sigma}_\epsilon^2) + 2p$

Source: Health Barometer 1995.Health Barometer 2000. Sample restricted to the oldest child of the household.

5.4.3 Placebo test using the Health Barometer 2000

We also use the Health Barometer 2000 in order to check again if a discontinuity is observed at the age of 11 for the MMR vaccination rate, which is, again, the only variable common with the Health Barometer 1995[24]. Table 6 shows that this outcome is continuous at the 11 years

[24]This is very surprising to have no question on HB vaccination, since the Health Barometer 2000 survey was conducted just after the polemic about potential side effects of the HB vaccine.

old threshold (see columns 2).[25] Consequently, this confirms the robustness check produced with the Health Barometer 1992: the shock observed in the 1995 database is indeed exogenous and due to the vaccination campaign. The age of 11 does not correspond to a specific age at which parents decide to vaccinate less their children for MMR (see Table A30 in Appendix).

Note that we cannot use this additional database in order to analyze the behaviour of pupils who were affected by the 1995 vaccination campaign. Indeed, those children, born in 1984, were 16 in 2000 and the question on the MMR vaccination was only asked for children aged 15 and less.

However, in terms of magnitude, we observe in the Health Barometer 2000 that only 80% of pupils aged 15 in 2000 (ie. aged 10 in 1995) are vaccinated against the MMR but 95% of those between 11 and 14 years old in 2000 (ie. aged 6 to 9 in 1995) were vaccinated against the MMR. This shows that: i) the decrease in the MMR vaccination has only been temporary, the MMR vaccination increased again as soon as the campaign stopped; ii) this is not the case for cohorts affected by the campaign. For them, there is a long-lasting effect of the campaign: vaccination coverage against the MMR did not increase between their 11 and 16 years old.

5.4.4 Sample composed of all children

We finally check the robustness of our results using a sample composed of *all* children belonging to the household, and not only the eldest one. In the sample used for our main analysis, 54% of households are composed of only 1 child. In this robustness check, we add the remaining 46% of households (N=640), composed of at least 2 children. In that case, some households, composed of children aged below and over 11, may appear on both sides of the age threshold. We only consider the two variables that concern the children (presented in table 1): HB vaccination and MMR vaccination[26]. Table 7 shows approximately the same gap around the threshold than Table 3. The econometric analysis leads to the same estimated coefficients than the main analysis: our results are robust to the use of a different sample size.

[25] As in the main analysis, we only selected household composed of at least one child, and only kept information about the eldest child in the household.

[26] We do not consider outcomes defined at the parents' level (trust, knowledge about transmission,...). Indeed, these outcomes are declared by the head of household, whatever her number of children and the same value is assigned to all children of the household. Therefore, in an unweighted regression, parents of 3 children would have 3 times more weight than parents of one child.

Table 7: RD estimates for HB and MMR vaccination, using a sample composed of all children of the household

Vaccination	Child HB vaccination All children (1)	Child MMR vaccination All children (2)
	Linear	
$\mathbb{1}_{A_i \geq 11}$	**0.42*** **	**-0.15*** **
se	**(0.091)**	**(0.034)**
AIC	**843.619**	**589.476**
	Linear Spline	
$\mathbb{1}_{A_i \geq 11}$	0.45***	-0.11**
s.e.	(0.098)	(0.041)
AIC	846.841	592.568
N	743	733
Untreated Mean	0.24	0.90

Note: Standard errors in parentheses, clustered by age of the eldest child. ***Statistically significant at the 1% level; **significant at the 5% level; *significant at the 10% level. Results are obtained for children aged between 6 and 15 years old. We control for $(A_i - 11)\mathbb{1}_{A_i \geq 11}$ and $(A_i - 11)\mathbb{1}_{A_i < 11}$, linear trends of age, continuous at the age of 11. $AIC = N \ln(\widehat{\sigma}^2_\epsilon) + 2p$
Source: Health Barometer 1995.

5.5 Mechanisms

In this section, we investigate the potential mechanisms that may lead to the negative spillover effect of the campaign on MMR vaccination rates. We listed 4 potential mechanisms: i) the number of injections effect; ii) the price effect; iii) the salience effect; iv) the doctors' influence. In order to give some insight on the respective role of these mechanisms, we perform a graphical analysis, confirmed by estimates using a bandwidth of 5. In order to maximize sample size, we work on the sample composed of all children in the household, and not only the eldest one (the previous section shown that results are comparable to those obtained in the main analysis). However, even with this larger sample, results obtained on sub-groups of children are sometimes not significant.

5.5.1 Substitution effect

First, we need to investigate whether there is a substitution between MMR and HB vaccines. To do that, we check whether the same parents both increase HB vaccination rates and decrease MMR vaccination of their children. Indeed, this decrease in MMR vaccination rates could result from parents who refused to comply with the free vaccination scheme (protest) and who also chose not to vaccinate their children for MMR. First note that there is no significant difference around the age threshold between parents who refuse any vaccination in general (who do not vaccinate their children neither for HB nor for MMR). This proportion is stable and rather low around the threshold age as shown in Figure 4d. The total effect of the campaign on HB vaccination rates observed in Figure 1a can be broken up into the effect observed on 2 populations: those who are vaccinated for HB and MMR (Figure 4a) and those who are vaccinated for HB but not for MMR (Figure 4c). Figure 4c shows that among the untreated, no one was vaccinated for HB without being vaccinated for MMR. However, the jump at 11 is significant for those treated (+11 pp, significant at the 1% level). We find here a very close coefficient to the one obtained in Table 5 (a decrease in MMR vaccination of about -13 pp for the treated). Therefore, for about 11% of the treated population, there is a substitution between the 2 vaccines.

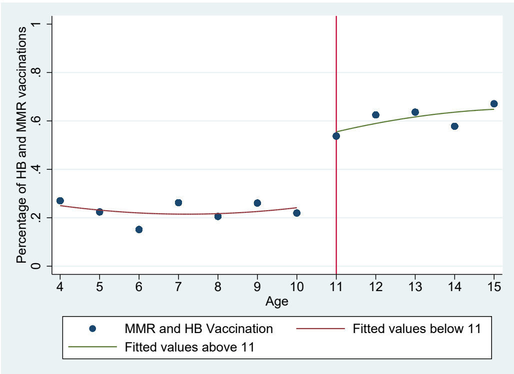
This substitution effect is higher for high-educated parents (i.e. who hold the high-school leaving diploma, i.e. the *baccalaureat*). Figure 4b shows that the jump at the age of 11 is higher for high-educated parents (+12 pp, but not significant) than for low-educated ones. This means that, if the total HB vaccination increase is constant between high and low educated parents – being the case – the decrease in MMR vaccination is mostly due to high-educated individuals who are more to substitute MMR for HB. The literature often finds that educated parents react more strongly to vaccination campaigns than less-educated ones (Anderberg et al., 2011). Better educated parents must have concentrated more on HB vaccination rather than MMR.

5.5.2 Price effect

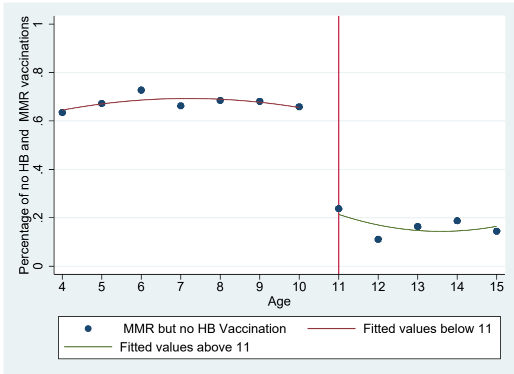
The negative effect we obtain on MMR vaccination rates could be the result of a price effect. Because HB and MMR vaccines are substitutes, the relative price of the MMR vaccine increased with the campaign, compared to the price of the HB vaccine (becoming 0€). In order to test whether this hypothesis can drive our results, we divided our sample according to the income level of the household: a monthly income higher than 1500€ versus a monthly income lower than 1500€. If the decrease is the result of a price effect, the poorest households would have reacted more strongly. However, we find the opposite. The substitution effect is higher for wealthier individuals: +15pp, significant at the 5% level (see Figure 6c) versus 0 for the low-income individuals (see Figure 6d). Thus, the price effect explanation seems negligible.

5.5.3 Physicians' beliefs and influence on parental decisions

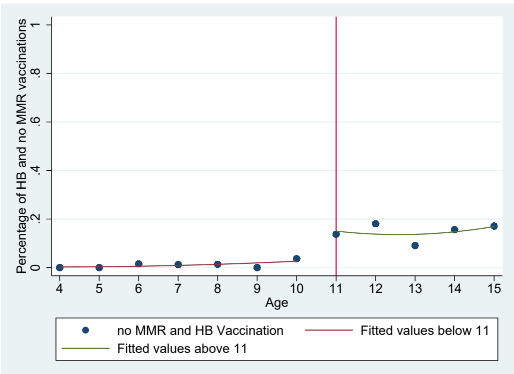
The substitution may also result from medical advice. Parents' attitudes could be driven by physicians' beliefs and practices. We therefore analyze the role of general practitioners during the campaign, using the 1994 Physicians Barometer. In this survey, information of physicians' beliefs on the target population for HB and MMR vaccines is available and answers given by



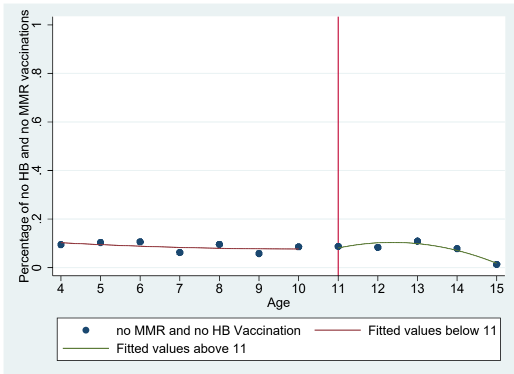
(a) % of children vaccinated against HB and MMR



(b) % of children vaccinated against MMR but not against HB

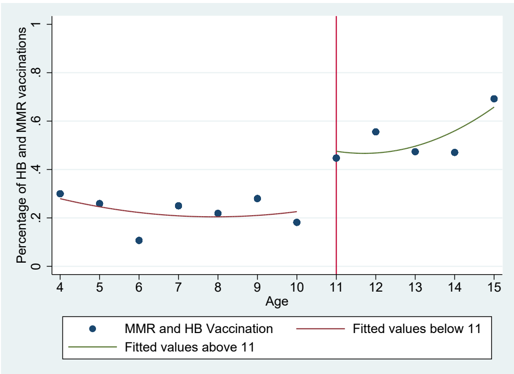


(c) % of children vaccinated against HB but not against MMR

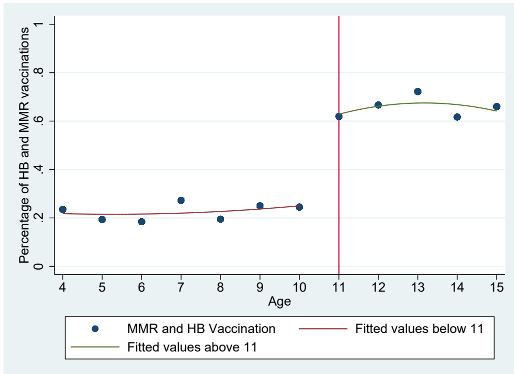


(d) % of children who are not vaccinated against HB and MMR

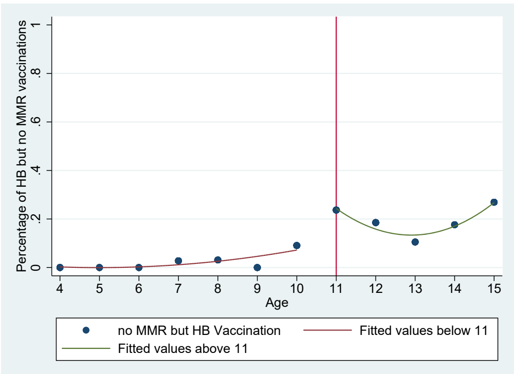
Figure 4: Substitution effect between the MMR and HB vaccines



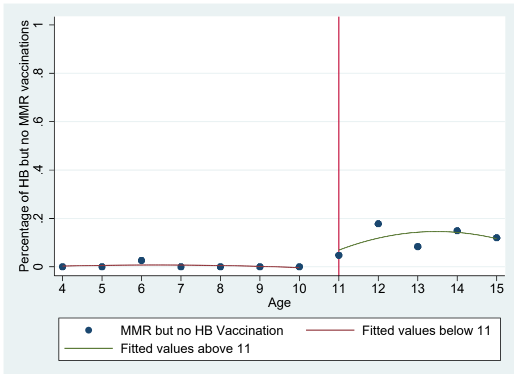
(a) % of children vaccinated against HB and MMR with parents with at least high school diploma



(b) % of children vaccinated against HB and MMR with parents with less than high school diploma

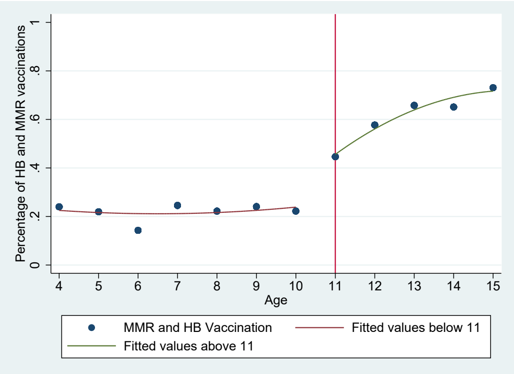


(c) % of children vaccinated against HB but not against MMR with parents with at least high school diploma

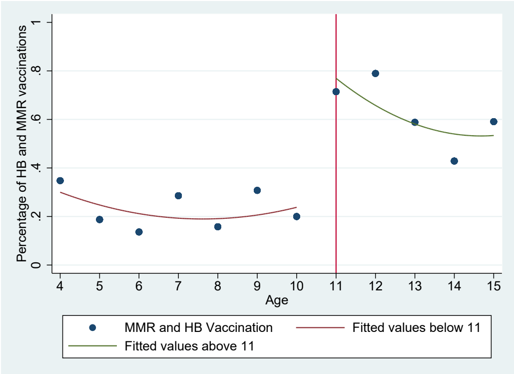


(d) % of children vaccinated against HB but not against MMR with parents with less than high school diploma

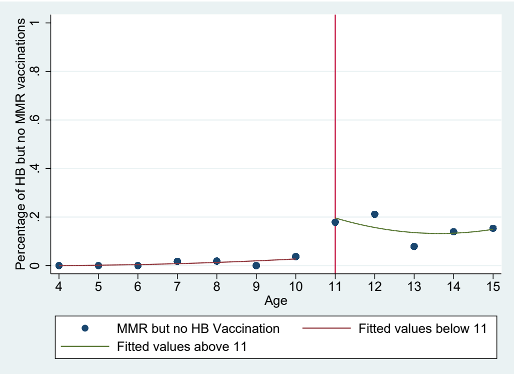
Figure 5: Substitution effect between MMR and HB vaccines according to the level of education



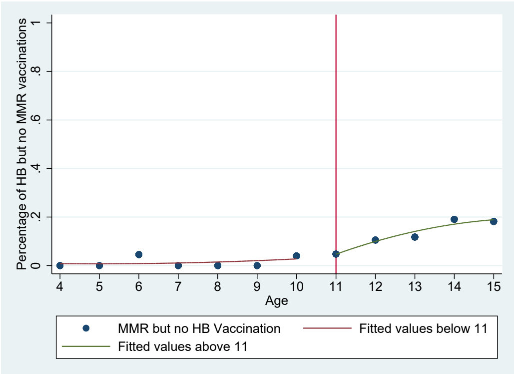
(a) % of children vaccinated against HB and MMR for households with equivalised income higher than 1500€



(b) % of children vaccinated against HB and MMR for households with equivalised income lower than 1500€



(c) % of children vaccinated against HB but not against MMR for households with equivalised income higher than 1500€



(d) % of children vaccinated against HB but not against MMR for households with equivalised income lower than 1500€

Figure 6: Substitution effect between MMR and HB vaccines according to the level of income of the household

doctors are summarized in Table 8. We find that 17.5% of the physicians were very favorable to the HB vaccination for newborns, 64.6% for middle school children, 85% for teenagers and 41.7% for the whole population. Thus, the salience effect on teenagers may be driven by physicians, who also seem to be focused on teenage vaccination, to the detriment of being HB vaccinated for the rest of the population.

And their beliefs on the MMR vaccination? Table 8 shows that physicians favour MMR vaccination for newborns: 83% of them propose the MMR vaccine to newborns systematically; only 40% of them propose the second injection of the MMR vaccine to children aged 2-16 years old and 59% propose both injections to children aged 2-16. They are focused on MMR for newborns and on HB for teenagers. Thus, our results on GP show that if there is a salience effect, it could partly be induced by the physician. Unfortunately, we are unable to compare with our results with those of other waves of the Physicians Barometer.

Table 8: Physicians beliefs during the 1995 campaign

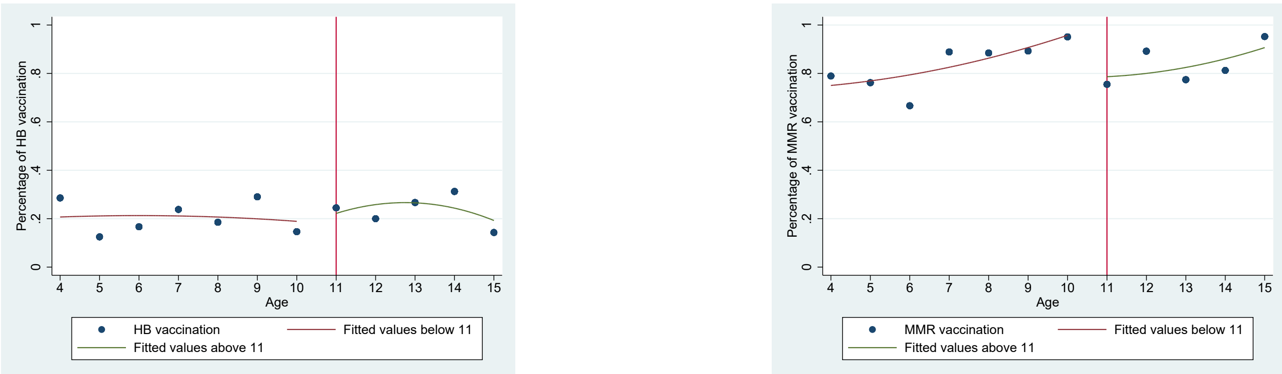
	%
HB vaccination	
Very favorable to HB vaccination for...	
newborns	17.47
middle school pupils (*6e* in France)	64.56
teenagers	85.29
the whole population	41.66
MMR vaccination	
Do you offer systematically MMR vaccination to...	
newborns	83.32
children aged 2 to 16 (2nd injection)	39.88
children aged 2 to 16 (both injections)	59.13
Number of obs.	1013

Source: 1994 Physicians Barometer.

5.5.4 Salience effect

In order to check whether our salience effect hypothesis is plausible, we analyzed the behaviour of parents regarding their younger children: Do treated parents vaccinate their youngest children more for HB? Do they also vaccinate them less for MMR? We can only perform a graphical analysis, as our sample size is too small for the econometric analysis. We observe (see Figure 7a), that treated parents do not vaccinate their younger children more for HB than untreated parents. Being untreated parents, they assume vaccination will be done at school later. However, for treated parents, Figure 7b shows a strong decrease in the probability to vaccinate their younger children for MMR. This result is consistent with the salience hypothesis: because no campaign is implemented for the MMR vaccine, which is not required for my elder and younger children.

This is however difficult to distinguish the salience effect from the number of infections effect. Among brothers and sisters of treated children, there is no increase in HB vaccination but there is a decrease in MMR vaccination. This means that, for them, the salience effect hypothesis is more plausible than the number of injections hypothesis. Unfortunately, the salience effect may be confounded with the number of injections effect. The salience effect hypothesis seems to be accepted, given the results described previously (erroneous beliefs about the target population, more beliefs that MMR is begign) but not excluding the number of injections effect. We cannot distinguish for both effects.



(a) % of siblings vaccinated against HB according to the age of the eldest

(b) % of siblings vaccinated against MMR according to the age of the eldest

Figure 7: Impact on the HB and MMR vaccination for the siblings

6 DISCUSSION AND CONCLUSION

In July 1994, the French government launched a major campaign against HB, via TV and radio spots, distribution of leaflets, followed by a free vaccination scheme against HB in middle schools from September 1994 on. In this paper, we measure the effect of the vaccination campaign against HB on HB vaccination for pupils older than 11, and on other outcomes such as MMR vaccination, as well as parental beliefs and attitudes about vaccinations.

The regressions show a strong impact of this public policy on children vaccination rates. Being 11 and above increases the probability of being exposed to the HB school vaccination scheme. This leads to a 40 to 60 percentage points increase in the probability to be vaccinated against HB. We also find that the increase in HB vaccination has a strong and negative impact on the MMR vaccination. The MMR vaccination decreases by 15 percentage points and this result is robust to several specifications. Moreover, we find a strong impact of the vaccination campaign on beliefs outcomes and understanding of the campaign. We observe a non-significant impact on the belief that middle school pupils should be vaccinated against HB. This suggests that the whole population, whatever the age of the child, was aware that the campaign was first directed towards middle-school children. However, we also find that individuals with children aged more than 11 are less likely than individuals with younger children to believe than newborn babies and the whole population should be vaccinated. However, given the WHO recommendations, the campaign also aimed at promoting vaccination for newborn babies and the whole population. Parents of older children probably assimilated incomplete information given the extra HB information, which targeted only the teenagers, whose families had the information at school. This could suggest that the campaign was wrongly interpreted. This could also suggest a decrease in household confidence for vaccines. Finally, there is a decrease in the knowledge of the modes of contamination for treated households, i.e. those with a child aged 11 and above. This can be the result of the disclosure of contradictory information during the campaign. The Prime Minister claimed that this disease could be transmitted by saliva, this information was broadcast by some radios, while other speakers refuted this (Sénat, 2001). Overall, the population may have been confused by the contradictory information.

The most striking consequence of this campaign is probably its unexpected effect on the MMR vaccination rate. Our favorite interpretation is a salience effect and may concern information transmission. The parents may have biased information about the HB vaccination, which reveals a communication issue between parents, teachers and doctors. Rather than reassuring individuals of vaccination benefits, this vaccination scheme led to a decline in knowledge about the contamination mode, a drop in confidence in other vaccine, i.e. a drop in MMR vaccination rate. Following Taylor and Thompson (1982), "salience refers to the phenomenon that when one's attention is differentially directed to one portion of the environment rather than to others, the information contained in that portion will receive disproportionate weighting in subsequent judgments". First, the focus on HB vaccination may lead to a decrease in vaccination for non-mandatory vaccines (MMR vaccine) and to a decrease in the probability to believe that the other vaccines are important. Secondly, the focus on teenage vaccination leads to a decrease in beliefs that other population should be vaccinated (specifically the newborns and the whole population). Treated individuals (those who have a child older than 11) focused their attention on the information on HB immunization. Consequently, they neglected the risk of MMR for their children. Perhaps parents perceived the MMR vaccine as less important than the hepatitis B vaccine, as MMR vaccine is recommended, but not free. Parents may believe

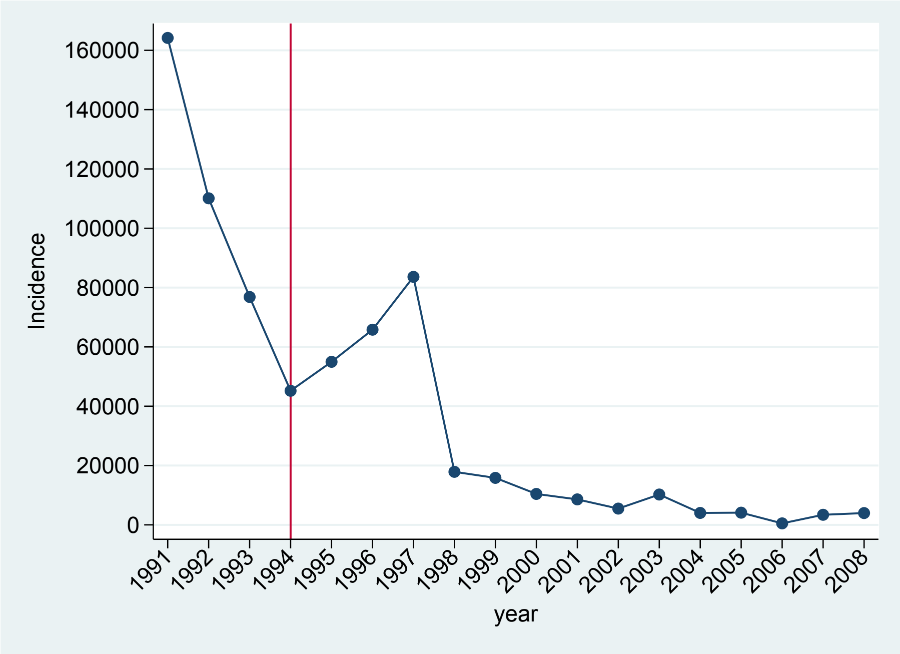


Figure 8: Evolution of measles incidence (*Réseau Sentinelles*)

that without a vaccination campaign, the MMR vaccination is not a necessity.

The negative effect on MMR vaccination was relatively unexpected and may imply a negative externality. Measles is an extremely contagious, potentially dangerous, disease. With a vaccination coverage exceeding 95%, measles would be eradicated (Christie and Gay, 2011). On the contrary, a decline in vaccine coverage will lead to increasingly large outbreaks of measles, and finally, the reappearance of measles as an endemic disease (Jansen et al., 2003). Thus, if the vaccination rate falls, the disease will spread further, raising the question of the net effect of the HB vaccination campaign on the well-being of the population. Without any causal interpretation, Figure 8, built using data from public health agency, shows a worrying increase in measles incidence between 1994 and 1997 in France, which could be the result of the decrease in MMR vaccination observed around the years of the HB campaign.

To conclude, during the 1994 vaccination campaign, people focused their attention on HB vaccination, which turn out to be detrimental to the MMR vaccination, or potentially, other vaccines. A vaccination package may be a good option to avoid the salience effects.

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Appendix

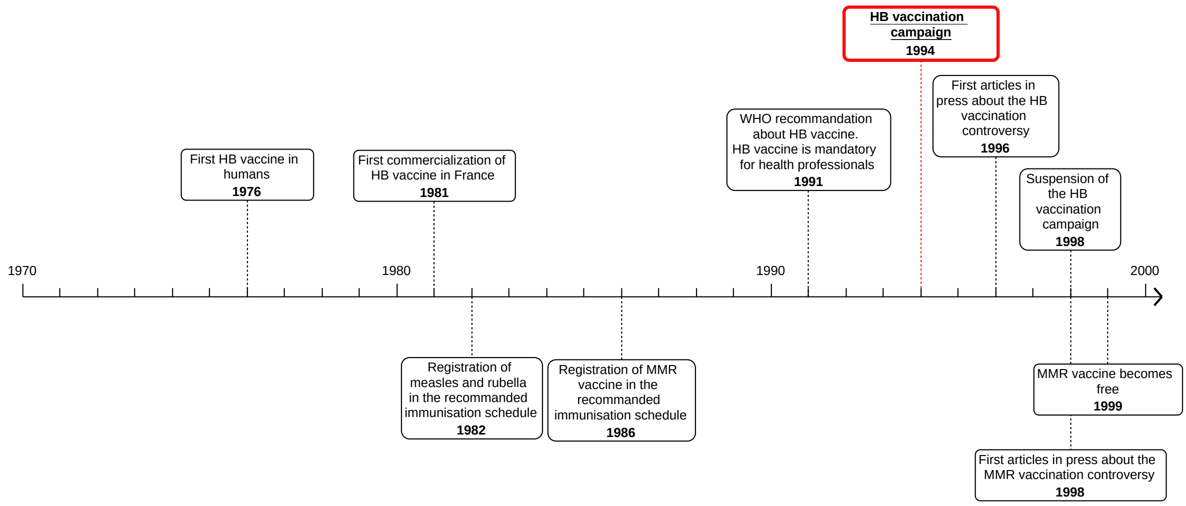
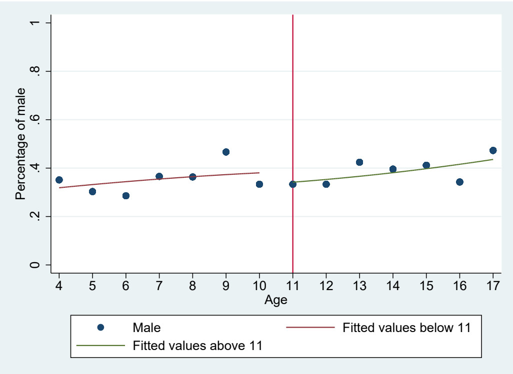
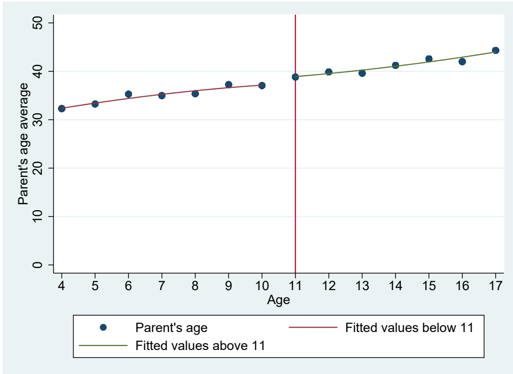


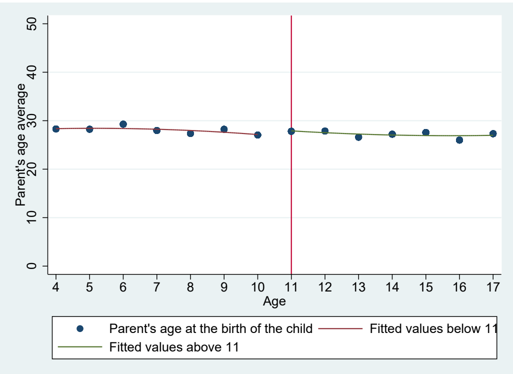
Figure A1: Chronological overview of vaccination policies regarding MMR and HB in France



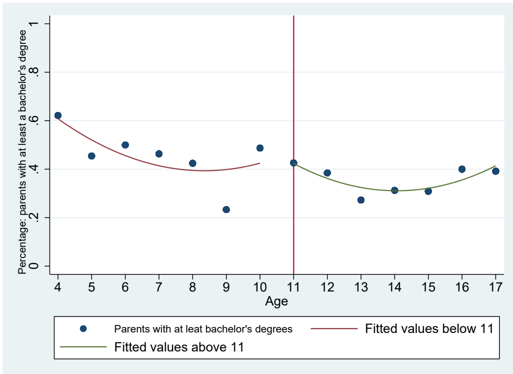
(a) % of head of household who are men



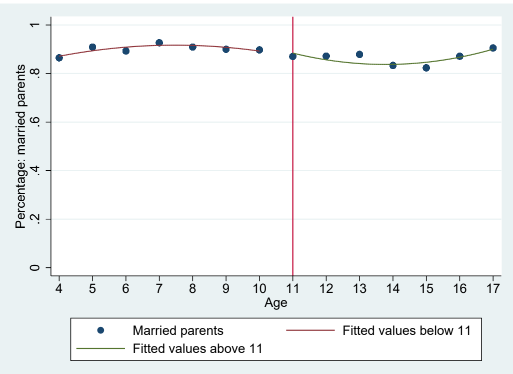
(b) Average age of the head of household



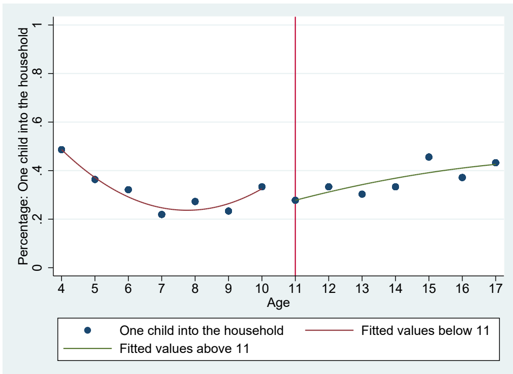
(c) Average age of the head of household at child birth



(d) % of head of household who hold a high school diploma at least



(e) % of married couples



(f) % of households with at least one child

Figure A2: Socio-demographic characteristics of the household

Table A1: Number of observations available for each variable in the whole sample and for the treated and untreated groups (using a bandwidth of 5 years around the reform)

	(1) Whole sample Nb.obs	(2) Untreated Nb.obs	(3) Treated Nb.obs
Socio-demographic characteristics			
Head of Household:			
Male	764	171	242
Age	764	171	242
Age at child birth	764	171	242
French nationality	764	171	242
No religion	764	171	242
Do not practice religion	764	171	242
Occasionally practice religion	764	171	242
Regularly practice religion	764	171	242
High school diploma and more	764	171	242
Chronic diseases	763	171	241
Farmer	764	171	242
Craftsman	764	171	242
Executive	764	171	242
Intermediate occupation	764	171	242
Employee	764	171	242
Blue collar worker	764	171	242
Pensioner	764	171	242
Other profession	764	171	242
Household:			
Urban	764	171	242
Rural	764	171	242
Equivalised income>1,500€	749	166	237
Married	764	171	242
Single	764	171	242
Separate	764	171	242
One child	764	171	242
Two children	764	171	242
Three children	764	171	242
Four children and more	764	171	242
Outcomes			
HB vaccination:			
Child vaccination against HB	748	168	238
Parents' HB vaccination	757	169	240
Parent's understanding of the campaign			
Vaccination for newborn	692	154	213
Vaccination for middle school children	744	166	236
Vaccination for the whole population	744	166	236
Correct knowledge about HB contamination	764	171	242
HB is transmissible by saliva	764	171	242
Don't know how HB is transmitted	764	171	242
HB is a serious illness	762	170	241
MMR vaccination:			
Child vaccination against MMR	576	166	234
MMR is a begnin illness	758	170	237
Non vaccination against MMR is risky	764	171	242

Note: We include all possible observations for each outcome to maximize sample size. Column (1) reports the number of observations within the entire sample. Columns (2) and (3) report, respectively, the number of observations for households whose eldest child is between 6 and 10 years old and for households whose eldest child is between 11 and 15 years old.

Source: Health Barometer 1995.

Table A2: Sharp Regression Discontinuity : Linear estimates

	All		Bandwidth=4		Bandwidth=5		Bandwidth=6	
	Dependent variable: hepatitis B vaccination							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se
$\mathbb{1}_{A_i \geq 11}$	0.467***	0.444***	0.503***	0.474***	0.424***	0.413***	0.446***	0.423***
	(0.073)	(0.083)	(0.083)	(0.120)	(0.081)	(0.103)	(0.072)	(0.089)
$\mathbb{1}_{A_i < 11}(A_i - 11)$	0.001	0.011	-0.022*	-0.018	0.008	0.012	0.004	0.015
	(0.007)	(0.009)	(0.010)	(0.019)	(0.021)	(0.023)	(0.010)	(0.011)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	0.012	0.013	0.012	0.024	0.034	0.033	0.023	0.021
	(0.014)	(0.014)	(0.032)	(0.033)	(0.020)	(0.019)	(0.017)	(0.015)
male		-0.025		-0.026		-0.015		-0.005
		(0.038)		(0.070)		(0.053)		(0.048)
parents' age		-0.003		-0.006		-0.004		-0.005
		(0.003)		(0.004)		(0.004)		(0.004)
h. school dipl.		-0.007		-0.040		-0.018		-0.043
		(0.042)		(0.051)		(0.046)		(0.051)
social category (reference: employee)								
farmer		-0.198***		-0.155		-0.189*		-0.186*
		(0.068)		(0.114)		(0.098)		(0.096)
craftsman		-0.041		-0.074		-0.039		-0.034
		(0.146)		(0.234)		(0.182)		(0.146)
executive		-0.098		0.059		0.014		-0.075
		(0.069)		(0.121)		(0.105)		(0.097)
int. prof.		-0.101**		-0.115		-0.112		-0.126*
		(0.046)		(0.091)		(0.068)		(0.061)
blue collar worker		-0.137**		-0.148		-0.152**		-0.197***
		(0.052)		(0.086)		(0.063)		(0.060)
pensioner		-0.276		0.009		-0.221		-0.210
		(0.212)		(0.250)		(0.276)		(0.246)
other profession		-0.119		-0.469***		-0.211		-0.226
		(0.142)		(0.121)		(0.215)		(0.216)
marital status (reference: married)								
single		-0.149		0.193		0.005		-0.152
		(0.117)		(0.285)		(0.260)		(0.204)
separate		-0.059		-0.070		-0.024		-0.069
		(0.059)		(0.073)		(0.065)		(0.066)
nb of children (reference: one child)								
2		-0.067**		-0.103**		-0.109**		-0.126***
		(0.031)		(0.037)		(0.035)		(0.034)
3		-0.120*		-0.083		-0.099		-0.122
		(0.063)		(0.094)		(0.085)		(0.073)
4 and +		-0.144*		-0.202		-0.144		-0.177
		(0.082)		(0.170)		(0.122)		(0.103)
R^2	0.267	0.286	0.214	0.255	0.271	0.296	0.272	0.302
AIC	860.151	867.156	386.073	375.607	464.264	460.105	572.547	565.253
N	748	748	313	313	406	406	506	506

Note: Standard errors in parentheses, clustered by age of the eldest child. ***Statistically significant at the 1% level; **significant at the 5% level; *significant at the 10% level. Columns 1 and 2 report estimates performed on the whole sample of children. Columns 3 and 4 report estimates obtained using children between 7 and 14 years old (bandwidth of 4). Columns 5 and 6 report estimates obtained using children between 6 and 15 years old (bandwidth of 5). Columns 7 and 8 report estimates obtained using children between 5 and 16 years old (bandwidth of 6). Columns 1, 3, 5 and 7 report estimates without control variables while columns 2, 4, 6 and 8 include them. Source: Health Barometer 1995.

Table A3: Sharp Regression Discontinuity : Linear Spline estimates

	All		Bandwidth=4		Bandwidth=5		Bandwidth=6	
	Dependent variable: hepatitis B vaccination							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se
$\mathbb{1}_{A_i \geq 11}$	0.470***	0.459***	0.461***	0.419**	0.492***	0.475***	0.474***	0.460***
	(0.079)	(0.101)	(0.088)	(0.127)	(0.092)	(0.125)	(0.084)	(0.111)
U1	0.032	0.028	0.012	0.023	0.012	0.014	0.024	0.023
	(0.033)	(0.032)	(0.032)	(0.034)	(0.031)	(0.034)	(0.033)	(0.033)
U2	-0.007	-0.001	0.000	0.000	0.113**	0.101*	0.020	0.018
	(0.026)	(0.025)	(.)	(.)	(0.045)	(0.051)	(0.037)	(0.037)
U3	-0.011	-0.004	0.004	0.017	-0.020	-0.015	-0.012	-0.006
	(0.023)	(0.029)	(0.017)	(0.030)	(0.034)	(0.044)	(0.027)	(0.036)
U4	0.003	0.014	-0.082**	-0.096	0.039	0.040	0.014	0.029
	(0.010)	(0.013)	(0.029)	(0.053)	(0.044)	(0.054)	(0.020)	(0.025)
male		-0.025		-0.025		-0.015		-0.005
		(0.039)		(0.071)		(0.054)		(0.050)
parents' age		-0.003		-0.006		-0.004		-0.005
		(0.003)		(0.004)		(0.004)		(0.004)
h. school dipl.		-0.005		-0.042		-0.018		-0.042
		(0.043)		(0.050)		(0.045)		(0.051)
social category (reference: employee)								
farmer		-0.194**		-0.166		-0.192*		-0.188*
		(0.069)		(0.119)		(0.100)		(0.099)
craftsman		-0.037		-0.071		-0.039		-0.034
		(0.148)		(0.234)		(0.180)		(0.146)
executive		-0.095		0.067		0.012		-0.076
		(0.070)		(0.122)		(0.102)		(0.098)
int. prof.		-0.100**		-0.115		-0.112		-0.128*
		(0.047)		(0.091)		(0.066)		(0.060)
blue collar		-0.134**		-0.145		-0.148**		-0.197***
		(0.053)		(0.087)		(0.063)		(0.060)
pensioner		-0.272		0.012		-0.224		-0.210
		(0.210)		(0.250)		(0.277)		(0.248)
other profession		-0.118		-0.464***		-0.206		-0.224
		(0.142)		(0.125)		(0.219)		(0.217)
marital status (reference: married)								
single		-0.145		0.190		0.006		-0.145
		(0.118)		(0.288)		(0.264)		(0.208)
separate		-0.063		-0.069		-0.023		-0.071
		(0.057)		(0.073)		(0.064)		(0.064)
nb of children (reference: one child)								
2		-0.070**		-0.101**		-0.110**		-0.128***
		(0.033)		(0.036)		(0.037)		(0.035)
3		-0.121*		-0.088		-0.093		-0.122
		(0.063)		(0.096)		(0.084)		(0.073)
4 and +		-0.146*		-0.206		-0.135		-0.177
		(0.083)		(0.171)		(0.131)		(0.110)
R^2	0.268	0.286	0.215	0.256	0.274	0.298	0.272	0.302
AIC	863.223	866.545	385.685	374.919	464.638	458.825	576.400	564.995
N	748	748	313	313	406	406	506	506

Note: Standard errors in parentheses, clustered by age of the eldest child. ***Statistically significant at the 1% level; **significant at the 5% level; *significant at the 10% level. Columns 1 and 2 report estimates performed on the whole sample of children. Columns 3 and 4 report estimates obtained using children between 7 and 14 years old (bandwidth of 4). Columns 5 and 6 report estimates obtained using children between 6 and 15 years old (bandwidth of 5). Columns 7 and 8 report estimates obtained using children between 5 and 16 years old (bandwidth of 6). Columns 1, 3, 5 and 7 report estimates without control variables while columns 2, 4, 6 and 8 include them. For the linear spline specification, the variables are defined as follows: $U1 = \mathbb{1}_{A_i \geq 11}[(A_i - 11)((A_i - 11) < 3) + 3((A_i - 11) \geq 3)]$; $U2 = ((A_i - 11) \geq 0)(A_i - 11 - 3)$; $U3 = (A_i - 11)(A_i - 11 \geq -3) - 3((A_i - 11) < -3)$; $U4 = ((A_i - 11) < -3)(A_i - 11 + 3)$. Source: Health Barometer 1995.

Table A4: Sharp Regression Discontinuity Quadratic estimates

	All		Bandwidth=4		Bandwidth=5		Bandwidth=6	
	Dependent variable: hepatitis B vaccination							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se
$\mathbb{1}_{A_i \geq 11}$	0.464***	0.461***	0.393***	0.366**	0.562***	0.559***	0.470***	0.473***
	(0.062)	(0.078)	(0.089)	(0.140)	(0.095)	(0.128)	(0.080)	(0.103)
$\mathbb{1}_{A_i<11}(A_i - 11)$	-0.020	-0.016	0.028	0.033	-0.121	-0.128	-0.034	-0.043
	(0.018)	(0.020)	(0.102)	(0.162)	(0.079)	(0.101)	(0.051)	(0.062)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	0.070*	0.062	0.234**	0.250***	0.047	0.057	0.065	0.064
	(0.038)	(0.037)	(0.074)	(0.057)	(0.075)	(0.075)	(0.053)	(0.052)
$\mathbb{1}_{A_i<11}(A_i - 11)^2$	-0.002	-0.002	0.010	0.010	-0.022	-0.024	-0.006	-0.009
	(0.002)	(0.002)	(0.020)	(0.033)	(0.013)	(0.017)	(0.007)	(0.009)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)^2$	-0.010	-0.008	-0.074**	-0.076***	-0.003	-0.006	-0.008	-0.008
	(0.006)	(0.006)	(0.024)	(0.019)	(0.018)	(0.018)	(0.010)	(0.010)
male		-0.024		-0.026		-0.019		-0.007
		(0.039)		(0.068)		(0.054)		(0.050)
parents' age		-0.004		-0.005		-0.004		-0.006
		(0.003)		(0.004)		(0.004)		(0.004)
h. school dipl.		-0.005		-0.035		-0.013		-0.039
		(0.043)		(0.046)		(0.044)		(0.051)
social category (reference: employee)								
farmer		-0.193**		-0.182		-0.194*		-0.189*
		(0.069)		(0.108)		(0.096)		(0.099)
craftsman		-0.035		-0.145		-0.045		-0.040
		(0.148)		(0.239)		(0.184)		(0.147)
executive		-0.091		0.054		0.007		-0.072
		(0.070)		(0.125)		(0.102)		(0.098)
intermediate profession		-0.097*		-0.112		-0.115		-0.128*
		(0.047)		(0.091)		(0.066)		(0.060)
blue collar		-0.132**		-0.152		-0.152**		-0.198***
		(0.052)		(0.086)		(0.063)		(0.060)
pensioner		-0.272		-0.059		-0.228		-0.207
		(0.208)		(0.264)		(0.273)		(0.247)
other profession		-0.116		-0.446***		-0.206		-0.227
		(0.141)		(0.122)		(0.225)		(0.218)
marital status (reference: married)								
single		-0.145		0.213		0.020		-0.136
		(0.118)		(0.281)		(0.258)		(0.206)
separate		-0.066		-0.073		-0.028		-0.075
		(0.057)		(0.077)		(0.065)		(0.065)
nb of children (reference: one child)								
two children		-0.075**		-0.092**		-0.114**		-0.129***
		(0.032)		(0.038)		(0.036)		(0.035)
three children		-0.123*		-0.084		-0.100		-0.124
		(0.063)		(0.095)		(0.083)		(0.074)
4 children and +		-0.147*		-0.177		-0.138		-0.182
		(0.080)		(0.167)		(0.124)		(0.105)
R^2	0.270	0.288	0.227	0.266	0.273	0.299	0.274	0.304
AIC	861.274	864.658	385.225	370.636	467.008	458.547	575.572	563.959
N	748	748	313	313	406	406	506	506

Note: Standard errors in parentheses, clustered by age of the eldest child. ***Statistically significant at the 1% level; **significant at the 5% level; *significant at the 10% level. Columns 1 and 2 report estimates performed on the whole sample of children. Columns 3 and 4 report estimates obtained using children between 7 and 14 years old (bandwidth of 4). Columns 5 and 6 report estimates obtained using children between 6 and 15 years old (bandwidth of 5). Columns 7 and 8 report estimates obtained using children between 5 and 16 years old (bandwidth of 6). Columns 1, 3, 5 and 7 report estimates without control variables while columns 2, 4, 6 and 8 include them.

Source: Health Barometer 1995.

Table A5: Continuity in the characteristics: Sharp Regression Discontinuity with y=father

	All	Bandwidth=4	Bandwidth=5	Bandwidth=6
	(1)	(2)	(3)	(4)
	Dependent variable: father			
	b/se	b/se	b/se	b/se
	Linear			
$\mathbb{1}_{A_i \geq 11}$	0.015	-0.043	-0.071	-0.056
	(0.046)	(0.063)	(0.070)	(0.064)
$\mathbb{1}_{A_i<11}(A_i - 11)$	-0.011	-0.002	0.015	0.017
	(0.008)	(0.017)	(0.018)	(0.013)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	0.016*	0.026***	0.021***	0.006
	(0.008)	(0.006)	(0.003)	(0.008)
R^2	0.004	0.002	0.004	0.002
AIC	1038.750	445.999	578.384	716.478
	Linear Spline			
$\mathbb{1}_{A_i \geq 11}$	-0.071	-0.017	-0.011	-0.023
	(0.079)	(0.059)	(0.057)	(0.057)
U1	0.018**	0.026***	0.026***	0.031***
	(0.006)	(0.006)	(0.006)	(0.008)
U2	0.014	0.000	0.003	-0.033**
	(0.016)	(.)	(0.017)	(0.013)
U3	0.028	-0.018	-0.022	-0.016
	(0.029)	(0.027)	(0.026)	(0.021)
U4	-0.018*	0.036	0.056*	0.037**
	(0.009)	(0.045)	(0.026)	(0.014)
R^2	0.005	0.003	0.005	0.005
AIC	1042.032	445.867	579.725	718.970
	Quadratic			
$\mathbb{1}_{A_i \geq 11}$	-0.118	0.106	0.072	-0.009
	(0.088)	(0.089)	(0.051)	(0.061)
$\mathbb{1}_{A_i<11}(A_i - 11)$	0.059*	-0.158	-0.121**	-0.047
	(0.029)	(0.103)	(0.050)	(0.032)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	0.011	0.042	0.041*	0.064***
	(0.017)	(0.038)	(0.020)	(0.013)
$\mathbb{1}_{A_i<11}(A_i - 11)^2$	0.006**	-0.031	-0.023**	-0.009*
	(0.002)	(0.021)	(0.009)	(0.004)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)^2$	0.001	-0.006	-0.005	-0.012***
	(0.003)	(0.013)	(0.005)	(0.003)
R^2	0.009	0.004	0.006	0.005
AIC	1039.490	449.382	581.244	718.860
N	739	317	413	516

Note: Standard errors in parentheses, clustered by age of the eldest child. ***Statistically significant at the 1% level; **significant at the 5% level; *significant at the 10% level. Regressions are performed without any control variable. The first column corresponds to the whole sample. Column 2 reports estimates obtained using households whose eldest child is between 7 and 14 years old (bandwidth of 4). Respectively, columns 3 and 4 report the results for households whose eldest child is between 6 and 15 (bandwidth of 5) years old or between 5 and 16 years old (bandwidth of 6).

Source: Health Barometer 1995.

Table A6: Continuity in the characteristics: Sharp Regression Discontinuity with y=age of the head of household

	All	Bandwidth=4	Bandwidth=5	Bandwidth=6
	(1)	(2)	(3)	(4)
	Dependent variable: age of the head of household			
	b/se	b/se	b/se	b/se
	Linear			
$\mathbb{1}_{A_i \geq 11}$	0.199	0.732	0.949*	0.903*
	(0.437)	(0.450)	(0.447)	(0.447)
$\mathbb{1}_{A_i<11}(A_i - 11)$	0.905***	0.787***	0.595***	0.723***
	(0.068)	(0.110)	(0.127)	(0.114)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	0.850***	0.725***	0.911***	0.724***
	(0.100)	(0.095)	(0.075)	(0.112)
R^2	0.400	0.100	0.151	0.197
AIC	4671.721	2067.605	2677.626	3308.887
	Linear Spline			
$\mathbb{1}_{A_i \geq 11}$	0.894*	0.682	0.560	0.691
	(0.486)	(0.521)	(0.530)	(0.504)
U1	0.748***	0.725***	0.725***	0.879***
	(0.127)	(0.095)	(0.094)	(0.131)
U2	0.946***	0.000	1.568***	0.480*
	(0.191)	(.)	(0.287)	(0.242)
U3	0.644**	0.819***	0.914***	0.749***
	(0.232)	(0.231)	(0.188)	(0.220)
U4	0.953***	0.717	0.236	0.707***
	(0.092)	(0.390)	(0.202)	(0.218)
R^2	0.400	0.100	0.153	0.197
AIC	4675.356	2067.602	2678.944	3312.624
	Quadratic			
$\mathbb{1}_{A_i \geq 11}$	0.747	1.452	0.433	1.027**
	(0.597)	(0.922)	(0.665)	(0.467)
$\mathbb{1}_{A_i<11}(A_i - 11)$	0.738**	0.147	1.304*	0.465
	(0.258)	(1.066)	(0.578)	(0.379)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	0.581*	0.375	0.266	1.074***
	(0.275)	(0.587)	(0.299)	(0.344)
$\mathbb{1}_{A_i<11}(A_i - 11)^2$	-0.015	-0.128	0.121	-0.037
	(0.021)	(0.213)	(0.102)	(0.056)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)^2$	0.044	0.117	0.159*	-0.069
	(0.044)	(0.193)	(0.077)	(0.070)
R^2	0.400	0.100	0.153	0.197
AIC	4675.292	2071.486	2680.993	3312.566
N	739	317	413	516

Note: Standard errors in parentheses, clustered by age of the eldest child. ***Statistically significant at the 1% level; **significant at the 5% level; *significant at the 10% level. Regressions are performed without any control variable. The first column corresponds to the whole sample. Column 2 reports estimates obtained using households whose eldest child is between 7 and 14 years old (bandwidth of 4). Respectively, columns 3 and 4 report the results for households whose eldest child is between 6 and 15 (bandwidth of 5) years old or between 5 and 16 years old (bandwidth of 6).

Source: Health Barometer 1995.

Table A7: Continuity in the characteristics: Sharp Regression Discontinuity with y=high school diploma or more

	All	Bandwidth=4	Bandwidth=5	Bandwidth=6
	(1)	(2)	(3)	(4)
	Dependent variable: high school diploma or more			
	b/se	b/se	b/se	b/se
	Linear			
$\mathbb{1}_{A_i \geq 11}$	-0.059	0.027	0.037	-0.002
	(0.079)	(0.128)	(0.123)	(0.109)
$\mathbb{1}_{A_i < 11}(A_i - 11)$	-0.004	-0.008	-0.020	-0.015
	(0.011)	(0.035)	(0.029)	(0.021)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	-0.001	-0.043***	-0.029***	-0.008
	(0.009)	(0.010)	(0.006)	(0.013)
R^2	0.008	0.010	0.014	0.007
AIC	1046.731	446.789	576.348	725.475
	Linear Spline			
$\mathbb{1}_{A_i \geq 11}$	0.025	-0.045	-0.037	-0.015
	(0.130)	(0.110)	(0.108)	(0.112)
U1	-0.044***	-0.043***	-0.043***	-0.049***
	(0.007)	(0.010)	(0.010)	(0.011)
U2	0.040***	0.000	0.021	0.057***
	(0.010)	(.)	(0.028)	(0.018)
U3	-0.018	0.037	0.030	0.016
	(0.042)	(0.050)	(0.042)	(0.038)
U4	-0.002	-0.110	-0.076	-0.035
	(0.011)	(0.085)	(0.042)	(0.024)
R^2	0.012	0.013	0.017	0.013
AIC	1047.642	445.793	576.854	726.351
	Quadratic			
$\mathbb{1}_{A_i \geq 11}$	0.102	-0.304*	-0.141	-0.013
	(0.144)	(0.154)	(0.107)	(0.125)
$\mathbb{1}_{A_i < 11}(A_i - 11)$	-0.056	0.346*	0.162	0.039
	(0.049)	(0.180)	(0.096)	(0.067)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	-0.073***	-0.099**	-0.088***	-0.105***
	(0.011)	(0.041)	(0.023)	(0.013)
$\mathbb{1}_{A_i < 11}(A_i - 11)^2$	-0.005	0.071*	0.031	0.008
	(0.004)	(0.036)	(0.017)	(0.009)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)^2$	0.012***	0.019	0.015**	0.019***
	(0.002)	(0.013)	(0.006)	(0.003)
R^2	0.014	0.020	0.020	0.014
AIC	1046.100	447.501	577.798	726.040
N	739	317	413	516

Note: Standard errors in parentheses, clustered by age of the eldest child. ***Statistically significant at the 1% level; **significant at the 5% level; *significant at the 10% level. Regressions are performed without any control variable. The first column corresponds to the whole sample. Column 2 reports estimates obtained using households whose eldest child is between 7 and 14 years old (bandwidth of 4). Respectively, columns 3 and 4 report the results for households whose eldest child is between 6 and 15 (bandwidth of 5) years old or between 5 and 16 years old (bandwidth of 6).

Source: Health Barometer 1995.

Table A8: Continuity in the characteristics: Sharp Regression Discontinuity for y=craftsman

	All	Bandwidth=4	Bandwidth=5	Bandwidth=6
	(1)	(2)	(3)	(4)
	Dependent variable: craftsman			
	b/se	b/se	b/se	b/se
	Linear			
$\mathbb{1}_{A_i \geq 11}$	0.001	-0.005	-0.014	0.002
	(0.021)	(0.023)	(0.020)	(0.023)
$\mathbb{1}_{A_i<11}(A_i - 11)$	0.001	0.003	0.005**	0.001
	(0.001)	(0.003)	(0.002)	(0.003)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	0.004	0.003	0.008	0.003
	(0.004)	(0.015)	(0.006)	(0.005)
R^2	0.006	0.001	0.007	0.003
AIC	-551.936	-267.268	-296.607	-369.999
	Linear Spline			
$\mathbb{1}_{A_i \geq 11}$	-0.015	-0.020	-0.015	-0.020
	(0.023)	(0.025)	(0.025)	(0.023)
U1	0.006	0.003	0.003	0.007
	(0.012)	(0.015)	(0.015)	(0.014)
U2	0.003	0.000	0.025	-0.003
	(0.011)	(.)	(0.034)	(0.020)
U3	0.008	0.012**	0.008	0.011*
	(0.005)	(0.005)	(0.007)	(0.005)
U4	-0.000	-0.018*	0.002	-0.005
	(0.002)	(0.008)	(0.008)	(0.004)
R^2	0.006	0.002	0.008	0.004
AIC	-548.141	-267.664	-294.985	-366.562
	Quadratic			
$\mathbb{1}_{A_i \geq 11}$	-0.009	-0.055*	-0.020	-0.034*
	(0.019)	(0.026)	(0.021)	(0.018)
$\mathbb{1}_{A_i<11}(A_i - 11)$	0.003	0.026	0.002	0.018
	(0.005)	(0.030)	(0.018)	(0.011)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	0.013	0.107***	0.030	0.029
	(0.016)	(0.022)	(0.036)	(0.025)
$\mathbb{1}_{A_i<11}(A_i - 11)^2$	0.000	0.005	-0.001	0.002
	(0.001)	(0.006)	(0.003)	(0.002)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)^2$	-0.001	-0.035***	-0.005	-0.005
	(0.003)	(0.007)	(0.008)	(0.005)
R^2	0.006	0.028	0.009	0.007
AIC	-548.341	-271.750	-293.323	-368.069
N	739	317	413	516

Note: Standard errors in parentheses, clustered by age of the eldest child. ***Statistically significant at the 1% level; **significant at the 5% level; *significant at the 10% level. Regressions are performed without any control variable. The first column corresponds to the whole sample. Column 2 reports estimates obtained using households whose eldest child is between 7 and 14 years old (bandwidth of 4). Respectively, columns 3 and 4 report the results for households whose eldest child is between 6 and 15 (bandwidth of 5) years old or between 5 and 16 years old (bandwidth of 6).

Source: Health Barometer 1995.

Table A9: Continuity in the characteristics: Sharp Regression Discontinuity for y=executive

	All	Bandwidth=4	Bandwidth=5	Bandwidth=6
	(1)	(2)	(3)	(4)
	Dependent variable: executive			
	b/se	b/se	b/se	b/se
	Linear			
$\mathbb{1}_{A_i \geq 11}$	0.020	0.051	0.044	0.062
	(0.039)	(0.035)	(0.034)	(0.042)
$\mathbb{1}_{A_i<11}(A_i - 11)$	-0.003	-0.000	0.003	-0.016
	(0.004)	(0.017)	(0.007)	(0.011)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	0.013*	-0.010	-0.010*	0.009
	(0.006)	(0.009)	(0.005)	(0.011)
R^2	0.008	0.004	0.004	0.006
AIC	494.594	170.727	207.038	337.266
	Linear Spline			
$\mathbb{1}_{A_i \geq 11}$	0.101**	0.132***	0.116**	0.091
	(0.040)	(0.037)	(0.039)	(0.051)
U1	-0.015	-0.010	-0.010	-0.019
	(0.011)	(0.009)	(0.008)	(0.013)
U2	0.039***	0.000	-0.008	0.053**
	(0.010)	(.)	(0.024)	(0.019)
U3	-0.025	-0.051***	-0.038	-0.015
	(0.024)	(0.014)	(0.021)	(0.035)
U4	0.001	0.113***	0.050*	-0.016
	(0.007)	(0.024)	(0.026)	(0.031)
R^2	0.012	0.013	0.009	0.012
AIC	495.564	167.773	207.160	338.609
	Quadratic			
$\mathbb{1}_{A_i \geq 11}$	0.079*	0.210*	0.128*	0.035
	(0.040)	(0.098)	(0.066)	(0.067)
$\mathbb{1}_{A_i<11}(A_i - 11)$	-0.015	-0.162	-0.072	0.035
	(0.020)	(0.113)	(0.070)	(0.060)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	-0.031*	-0.013	-0.012	-0.054**
	(0.016)	(0.064)	(0.034)	(0.023)
$\mathbb{1}_{A_i<11}(A_i - 11)^2$	-0.001	-0.032	-0.013	0.007
	(0.002)	(0.023)	(0.012)	(0.009)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)^2$	0.007**	0.001	0.001	0.013**
	(0.003)	(0.021)	(0.009)	(0.004)
R^2	0.011	0.009	0.006	0.013
AIC	496.136	173.223	210.238	337.835
N	739	317	413	516

Note: Standard errors in parentheses, clustered by age of the eldest child. ***Statistically significant at the 1% level; **significant at the 5% level; *significant at the 10% level. Regressions are performed without any control variable. The first column corresponds to the whole sample. Column 2 reports estimates obtained using households whose eldest child is between 7 and 14 years old (bandwidth of 4). Respectively, columns 3 and 4 report the results for households whose eldest child is between 6 and 15 (bandwidth of 5) years old or between 5 and 16 years old (bandwidth of 6).

Source: Health Barometer 1995.

Table A10: Continuity in the characteristics: Sharp Regression Discontinuity for y=intermediate occupation

	All	Bandwidth=4	Bandwidth=5	Bandwidth=6
	(1)	(2)	(3)	(4)
	Dependent variable: intermediate occupation			
	b/se	b/se	b/se	b/se
	Linear			
$\mathbb{1}_{A_i \geq 11}$	-0.165**	-0.024	-0.065	-0.164**
	(0.058)	(0.073)	(0.058)	(0.073)
$\mathbb{1}_{A_i<11}(A_i-11)$	0.011*	-0.055**	-0.036*	0.007
	(0.006)	(0.021)	(0.017)	(0.024)
$\mathbb{1}_{A_i \geq 11}(A_i-11)$	0.004	0.004	0.007	0.008
	(0.006)	(0.022)	(0.009)	(0.007)
R^2	0.013	0.040	0.034	0.018
AIC	496.136	173.223	210.238	337.835
	Linear Spline			
$\mathbb{1}_{A_i \geq 11}$	-0.059	-0.091	-0.062	-0.022
	(0.072)	(0.052)	(0.061)	(0.085)
U1	0.008	0.004	0.004	0.005
	(0.015)	(0.022)	(0.022)	(0.018)
U2	-0.001	0.000	0.016	0.012
	(0.014)	(.)	(0.052)	(0.025)
U3	-0.040	-0.013	-0.036	-0.068
	(0.035)	(0.018)	(0.023)	(0.043)
U4	0.021*	-0.150***	-0.036	0.055
	(0.010)	(0.031)	(0.032)	(0.036)
R^2	0.015	0.043	0.034	0.024
AIC	889.401	388.711	509.143	627.619
	Quadratic			
$\mathbb{1}_{A_i \geq 11}$	-0.129*	-0.213***	-0.026	0.096
	(0.067)	(0.036)	(0.086)	(0.115)
$\mathbb{1}_{A_i<11}(A_i-11)$	-0.007	0.181***	-0.047	-0.180**
	(0.038)	(0.041)	(0.073)	(0.075)
$\mathbb{1}_{A_i \geq 11}(A_i-11)$	0.003	-0.148***	-0.053	-0.020
	(0.023)	(0.037)	(0.048)	(0.035)
$\mathbb{1}_{A_i<11}(A_i-11)^2$	-0.002	0.047***	-0.002	-0.027**
	(0.003)	(0.008)	(0.012)	(0.010)
$\mathbb{1}_{A_i \geq 11}(A_i-11)^2$	0.000	0.051***	0.015	0.005
	(0.004)	(0.012)	(0.011)	(0.007)
R^2	0.013	0.051	0.036	0.028
AIC	890.737	389.852	510.412	625.181
N	739	317	413	516

Note: Standard errors in parentheses, clustered by age of the eldest child. ***Statistically significant at the 1% level; **significant at the 5% level; *significant at the 10% level. Regressions are performed without any control variable. The first column corresponds to the whole sample. Column 2 reports estimates obtained using households whose eldest child is between 7 and 14 years old (bandwidth of 4). Respectively, columns 3 and 4 report the results for households whose eldest child is between 6 and 15 (bandwidth of 5) years old or between 5 and 16 years old (bandwidth of 6).

Source: Health Barometer 1995.

Table A11: Continuity in the characteristics: Sharp Regression Discontinuity for y=employee

	All	Bandwidth=4	Bandwidth=5	Bandwidth=6
	(1)	(2)	(3)	(4)
	Dependent variable: employee			
	b/se	b/se	b/se	b/se
	Linear			
$\mathbb{1}_{A_i \geq 11}$	0.075*	0.089	0.084	0.128**
	(0.043)	(0.054)	(0.052)	(0.053)
$\mathbb{1}_{A_i < 11}(A_i - 11)$	0.001	-0.012	-0.014	-0.026**
	(0.006)	(0.013)	(0.010)	(0.011)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	-0.012	0.006	0.015	0.003
	(0.009)	(0.010)	(0.009)	(0.008)
R^2	0.005	0.008	0.012	0.008
AIC	670.120	293.757	404.118	513.974
	Linear Spline			
$\mathbb{1}_{A_i \geq 11}$	0.100	0.064	0.069	0.057
	(0.067)	(0.050)	(0.049)	(0.050)
U1	0.023	0.006	0.006	0.015
	(0.016)	(0.010)	(0.010)	(0.012)
U2	-0.046***	0.000	0.048***	-0.016
	(0.013)	(.)	(0.013)	(0.012)
U3	-0.031	0.003	-0.000	0.006
	(0.022)	(0.019)	(0.016)	(0.016)
U4	0.006	-0.047	-0.029	-0.046***
	(0.007)	(0.033)	(0.016)	(0.012)
R^2	0.010	0.009	0.013	0.010
AIC	669.881	293.571	405.749	516.964
	Quadratic			
$\mathbb{1}_{A_i \geq 11}$	0.130	-0.018	0.046	0.021
	(0.076)	(0.062)	(0.045)	(0.046)
$\mathbb{1}_{A_i < 11}(A_i - 11)$	-0.053**	0.116	0.039	0.047*
	(0.024)	(0.072)	(0.039)	(0.021)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	0.051*	-0.061*	-0.034*	0.023
	(0.025)	(0.031)	(0.017)	(0.023)
$\mathbb{1}_{A_i < 11}(A_i - 11)^2$	-0.005**	0.026	0.009	0.011***
	(0.002)	(0.014)	(0.007)	(0.003)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)^2$	-0.010**	0.023*	0.012**	-0.004
	(0.004)	(0.010)	(0.004)	(0.004)
R^2	0.014	0.012	0.015	0.011
AIC	667.300	296.515	407.215	516.815
N	739	317	413	516

Note: Standard errors in parentheses, clustered by age of the eldest child. ***Statistically significant at the 1% level; **significant at the 5% level; *significant at the 10% level. Regressions are performed without any control variable. The first column corresponds to the whole sample. Column 2 reports estimates obtained using households whose eldest child is between 7 and 14 years old (bandwidth of 4). Respectively, columns 3 and 4 report the results for households whose eldest child is between 6 and 15 (bandwidth of 5) years old or between 5 and 16 years old (bandwidth of 6).

Source: Health Barometer 1995.

Table A12: Continuity in the characteristics: Sharp Regression Discontinuity for y=blue collar worker

	All	Bandwidth=4	Bandwidth=5	Bandwidth=6
	(1)	(2)	(3)	(4)
	Dependent variable: blue collar worker			
	b/se	b/se	b/se	b/se
	Linear			
$\mathbb{1}_{A_i \geq 11}$	0.101	-0.100	-0.022	0.014
	(0.074)	(0.102)	(0.080)	(0.066)
$\mathbb{1}_{A_i<11}(A_i-11)$	-0.014	0.063*	0.034	0.020
	(0.010)	(0.030)	(0.025)	(0.014)
$\mathbb{1}_{A_i \geq 11}(A_i-11)$	-0.011	0.004	-0.019*	-0.022***
	(0.008)	(0.011)	(0.009)	(0.006)
R^2	0.005	0.016	0.008	0.007
AIC	999.470	430.578	554.492	683.129
	Linear Spline			
$\mathbb{1}_{A_i \geq 11}$	-0.089	-0.017	-0.057	-0.064
	(0.106)	(0.075)	(0.086)	(0.094)
U1	-0.016	0.004	0.004	-0.003
	(0.012)	(0.011)	(0.011)	(0.008)
U2	-0.007	0.000	-0.100**	-0.053***
	(0.019)	(.)	(0.033)	(0.017)
U3	0.076*	0.011	0.042	0.051
	(0.041)	(0.033)	(0.034)	(0.039)
U4	-0.031**	0.180**	0.025	0.001
	(0.011)	(0.056)	(0.044)	(0.020)
R^2	0.011	0.020	0.011	0.009
AIC	999.316	429.208	555.411	686.001
	Quadratic			
$\mathbb{1}_{A_i \geq 11}$	-0.068	0.208**	-0.085	-0.104
	(0.081)	(0.086)	(0.127)	(0.120)
$\mathbb{1}_{A_i<11}(A_i-11)$	0.078**	-0.262**	0.060	0.090
	(0.028)	(0.099)	(0.107)	(0.078)
$\mathbb{1}_{A_i \geq 11}(A_i-11)$	-0.028	0.043	0.059	0.022
	(0.024)	(0.069)	(0.035)	(0.023)
$\mathbb{1}_{A_i<11}(A_i-11)^2$	0.008***	-0.065**	0.004	0.010
	(0.002)	(0.020)	(0.018)	(0.010)
$\mathbb{1}_{A_i \geq 11}(A_i-11)^2$	0.003	-0.013	-0.019*	-0.009
	(0.004)	(0.023)	(0.009)	(0.005)
R^2	0.013	0.025	0.011	0.010
AIC	997.323	431.751	557.312	685.794
N	739	317	413	516

Note: Standard errors in parentheses, clustered by age of the eldest child. ***Statistically significant at the 1% level; **significant at the 5% level; *significant at the 10% level. Regressions are performed without any control variable. The first column corresponds to the whole sample. Column 2 reports estimates obtained using households whose eldest child is between 7 and 14 years old (bandwidth of 4). Respectively, columns 3 and 4 report the results for households whose eldest child is between 6 and 15 (bandwidth of 5) years old or between 5 and 16 years old (bandwidth of 6).

Source: Health Barometer 1995.

Table A13: Continuity in the characteristics: Sharp Regression Discontinuity for y=pensioner

	All	Bandwidth=4	Bandwidth=5	Bandwidth=6
	(1)	(2)	(3)	(4)
	Dependent variable: pensioner			
	b/se	b/se	b/se	b/se
	Linear			
$\mathbb{1}_{A_i \geq 11}$	0.028**	0.033*	0.031**	0.030**
	(0.010)	(0.015)	(0.013)	(0.011)
$\mathbb{1}_{A_i<11}(A_i - 11)$	-0.000	-0.000	-0.000*	-0.000
	(.)	(0.000)	(0.000)	(0.000)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	-0.003	-0.007	-0.005	-0.004
	(0.002)	(0.007)	(0.004)	(0.003)
R^2	0.011	0.014	0.011	0.010
AIC	-1357.177	-490.861	-656.699	-841.341
	Linear Spline			
$\mathbb{1}_{A_i \geq 11}$	0.033**	0.033*	0.033*	0.033**
	(0.014)	(0.015)	(0.015)	(0.014)
U1	-0.007	-0.007	-0.007	-0.007
	(0.006)	(0.007)	(0.007)	(0.006)
U2	0.000	0.000	0.003	0.001
	(0.003)	(.)	(0.011)	(0.006)
U3	0.000	-0.000	-0.000**	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
U4	-0.000	0.000	0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
R^2	0.012	0.014	0.012	0.011
AIC	-1355.703	-490.861	-656.867	-839.655
	Quadratic			
$\mathbb{1}_{A_i \geq 11}$	0.030**	0.020***	0.027**	0.029**
	(0.012)	(0.002)	(0.010)	(0.012)
$\mathbb{1}_{A_i<11}(A_i - 11)$	0.000	-0.000	-0.000	-0.000*
	(0.000)	(.)	(0.000)	(0.000)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	-0.005	0.041***	0.006	-0.003
	(0.007)	(0.008)	(0.014)	(0.010)
$\mathbb{1}_{A_i<11}(A_i - 11)^2$	0.000	-0.000	-0.000	-0.000*
	(0.000)	(.)	(0.000)	(0.000)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)^2$	0.000	-0.016***	-0.003	-0.000
	(0.001)	(0.003)	(0.003)	(0.002)
R^2	0.011	0.025	0.012	0.010
AIC	-1355.248	-492.441	-655.072	-839.344
N	739	317	413	516

Note: Standard errors in parentheses, clustered by age of the eldest child. ***Statistically significant at the 1% level; **significant at the 5% level; *significant at the 10% level. Regressions are performed without any control variable. The first column corresponds to the whole sample. Column 2 reports estimates obtained using households whose eldest child is between 7 and 14 years old (bandwidth of 4). Respectively, columns 3 and 4 report the results for households whose eldest child is between 6 and 15 (bandwidth of 5) years old or between 5 and 16 years old (bandwidth of 6).

Source: Health Barometer 1995.

Table A14: Continuity in the characteristics: Sharp Regression Discontinuity for y=other situation

	All	Bandwidth=4	Bandwidth=5	Bandwidth=6
	(1)	(2)	(3)	(4)
	Dependent variable: other profession			
	b/se	b/se	b/se	b/se
	Linear			
$\mathbb{1}_{A_i \geq 11}$	-0.033**	-0.058*	-0.040*	-0.038*
	(0.015)	(0.025)	(0.021)	(0.019)
$\mathbb{1}_{A_i<11}(A_i - 11)$	0.003	0.013*	0.005	0.006
	(0.002)	(0.006)	(0.006)	(0.004)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	0.002*	0.006**	0.005***	0.001
	(0.001)	(0.002)	(0.001)	(0.002)
R^2	0.005	0.016	0.008	0.008
AIC	-1088.562	-487.600	-576.819	-836.212
	Linear Spline			
$\mathbb{1}_{A_i \geq 11}$	-0.052*	-0.055*	-0.061*	-0.058*
	(0.026)	(0.027)	(0.027)	(0.026)
U1	0.006**	0.006**	0.006**	0.007***
	(0.002)	(0.002)	(0.002)	(0.002)
U2	-0.002	0.000	-0.001	-0.008***
	(0.003)	(.)	(0.005)	(0.002)
U3	0.009	0.011	0.016	0.013
	(0.011)	(0.012)	(0.010)	(0.010)
U4	0.001	0.017	-0.008	0.002
	(0.003)	(0.020)	(0.011)	(0.007)
R^2	0.006	0.016	0.010	0.011
AIC	-1085.365	-487.629	-575.831	-833.829
	Quadratic			
$\mathbb{1}_{A_i \geq 11}$	-0.027	-0.007	-0.065*	-0.051*
	(0.025)	(0.045)	(0.033)	(0.025)
$\mathbb{1}_{A_i<11}(A_i - 11)$	-0.002	-0.034	0.028	0.011
	(0.012)	(0.053)	(0.029)	(0.017)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	0.006	-0.009*	0.004	0.012**
	(0.004)	(0.004)	(0.006)	(0.005)
$\mathbb{1}_{A_i<11}(A_i - 11)^2$	-0.000	-0.010	0.004	0.001
	(0.001)	(0.011)	(0.005)	(0.002)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)^2$	-0.001	0.005***	0.000	-0.002*
	(0.001)	(0.001)	(0.001)	(0.001)
R^2	0.006	0.020	0.009	0.010
AIC	-1084.980	-484.999	-573.306	-833.061
N	739	317	413	516

Note: Standard errors in parentheses, clustered by age of the eldest child. ***Statistically significant at the 1% level; **significant at the 5% level; *significant at the 10% level. Regressions are performed without any control variable. The first column corresponds to the whole sample. Column 2 reports estimates obtained using households whose eldest child is between 7 and 14 years old (bandwidth of 4). Respectively, columns 3 and 4 report the results for households whose eldest child is between 6 and 15 (bandwidth of 5) years old or between 5 and 16 years old (bandwidth of 6).

Source: Health Barometer 1995.

Table A15: Continuity in the characteristics: Sharp Regression Discontinuity for y=married household

	All	Bandwidth=4	Bandwidth=5	Bandwidth=6
	(1)	(2)	(3)	(4)
	Dependent variable: married household			
	b/se	b/se	b/se	b/se
	Linear			
$\mathbb{1}_{A_i \geq 11}$	-0.036*	-0.007	-0.018	-0.032***
	(0.019)	(0.008)	(0.011)	(0.009)
$\mathbb{1}_{A_i<11}(A_i - 11)$	-0.003	-0.010***	-0.003	-0.002
	(0.003)	(0.002)	(0.004)	(0.002)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	0.003	-0.011*	-0.013***	-0.004
	(0.005)	(0.005)	(0.002)	(0.005)
R^2	0.006	0.007	0.009	0.006
AIC	404.996	185.204	264.934	323.836
	Linear Spline			
$\mathbb{1}_{A_i \geq 11}$	-0.017	-0.013*	-0.007	-0.006
	(0.015)	(0.007)	(0.010)	(0.011)
U1	-0.018***	-0.011*	-0.011*	-0.016***
	(0.006)	(0.005)	(0.005)	(0.005)
U2	0.023***	0.000	-0.022	0.014
	(0.006)	(.)	(0.012)	(0.008)
U3	0.001	-0.006***	-0.011*	-0.010*
	(0.008)	(0.001)	(0.005)	(0.004)
U4	-0.004	-0.019***	0.006	0.003
	(0.005)	(0.001)	(0.007)	(0.003)
R^2	0.008	0.007	0.009	0.007
AIC	407.187	185.186	266.853	327.319
	Quadratic			
$\mathbb{1}_{A_i \geq 11}$	-0.045	-0.035***	0.004	0.000
	(0.026)	(0.003)	(0.015)	(0.015)
$\mathbb{1}_{A_i<11}(A_i - 11)$	0.016	0.009***	-0.030**	-0.017
	(0.011)	(0.001)	(0.013)	(0.009)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	-0.034***	0.023*	0.005	-0.026*
	(0.011)	(0.011)	(0.010)	(0.014)
$\mathbb{1}_{A_i<11}(A_i - 11)^2$	0.002	0.004***	-0.005*	-0.002
	(0.001)	(0.000)	(0.002)	(0.001)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)^2$	0.006***	-0.011**	-0.005*	0.004
	(0.002)	(0.003)	(0.002)	(0.003)
R^2	0.009	0.007	0.009	0.007
AIC	406.611	188.974	268.719	327.446
N	739	317	413	516

Note: Standard errors in parentheses, clustered by age of the eldest child. ***Statistically significant at the 1% level; **significant at the 5% level; *significant at the 10% level. Regressions are performed without any control variable. The first column corresponds to the whole sample. Column 2 reports estimates obtained using households whose eldest child is between 7 and 14 years old (bandwidth of 4). Respectively, columns 3 and 4 report the results for households whose eldest child is between 6 and 15 (bandwidth of 5) years old or between 5 and 16 years old (bandwidth of 6).

Source: Health Barometer 1995.

Table A16: Continuity in the characteristics: Sharp Regression Discontinuity for y=one child in the household

	All	Bandwidth=4	Bandwidth=5	Bandwidth=6
	(1)	(2)	(3)	(4)
	Dependent variable: one child in the household			
	b/se	b/se	b/se	b/se
	Linear			
$\mathbb{1}_{A_i\geq 11}$	0.231*	-0.057	-0.033	0.023
	(0.110)	(0.034)	(0.053)	(0.057)
$\mathbb{1}_{A_i<11}(A_i-11)$	-0.074***	0.032***	0.009	-0.008
	(0.018)	(0.008)	(0.017)	(0.014)
$\mathbb{1}_{A_i\geq 11}(A_i-11)$	0.025***	0.015**	0.039***	0.025**
	(0.004)	(0.004)	(0.009)	(0.009)
R^2	0.106	0.006	0.016	0.011
AIC	976.789	404.784	543.138	687.707
	Linear Spline			
$\mathbb{1}_{A_i\geq 11}$	-0.153***	-0.058	-0.074*	-0.087**
	(0.046)	(0.037)	(0.039)	(0.038)
U1	0.029*	0.015**	0.015***	0.030*
	(0.014)	(0.004)	(0.004)	(0.015)
U2	0.020	0.000	0.122***	0.017
	(0.012)	(.)	(0.007)	(0.024)
U3	0.101**	0.032*	0.044*	0.049*
	(0.035)	(0.016)	(0.022)	(0.023)
U4	-0.106***	0.031	-0.031	-0.043**
	(0.016)	(0.027)	(0.027)	(0.015)
R^2	0.126	0.006	0.020	0.014
AIC	964.581	404.784	543.391	690.172
	Quadratic			
$\mathbb{1}_{A_i\geq 11}$	-0.141***	-0.116*	-0.154***	-0.149***
	(0.024)	(0.060)	(0.044)	(0.031)
$\mathbb{1}_{A_i<11}(A_i-11)$	0.110***	0.085	0.139***	0.115***
	(0.009)	(0.070)	(0.043)	(0.025)
$\mathbb{1}_{A_i\geq 11}(A_i-11)$	0.036	0.037	-0.020	0.046
	(0.024)	(0.027)	(0.024)	(0.030)
$\mathbb{1}_{A_i<11}(A_i-11)^2$	0.017***	0.011	0.022**	0.018***
	(0.001)	(0.014)	(0.007)	(0.004)
$\mathbb{1}_{A_i\geq 11}(A_i-11)^2$	-0.002	-0.007	0.015**	-0.004
	(0.004)	(0.009)	(0.006)	(0.006)
R^2	0.136	0.007	0.020	0.015
AIC	955.843	408.659	545.389	689.602
N	739	317	413	516

Note: Standard errors in parentheses, clustered by age of the eldest child. ***Statistically significant at the 1% level; **significant at the 5% level; *significant at the 10% level. Regressions are performed without any control variable. The first column corresponds to the whole sample. Column 2 reports estimates obtained using households whose eldest child is between 7 and 14 years old (bandwidth of 4). Respectively, columns 3 and 4 report the results for households whose eldest child is between 6 and 15 (bandwidth of 5) years old or between 5 and 16 years old (bandwidth of 6).

Source: Health Barometer 1995.

Table A17: Sharp design : parental vaccination against HB

	All	Bandwidth=4	Bandwidth=5	Bandwidth=6
	(1)	(2)	(3)	(4)
	Dependent variable: Parental vaccination against HB			
	b/se	b/se	b/se	b/se
		Linear		
$\mathbb{1}_{A_i \geq 11}$	-0.08	0.04	-0.00	-0.07
	(0.07)	(0.06)	(0.08)	(0.09)
$\mathbb{1}_{A_i < 11}(A_i - 11)$	0.00	-0.06***	-0.03	-0.01
	(0.01)	(0.02)	(0.02)	(0.02)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	0.00	0.01	0.00	0.01
	(0.01)	(0.01)	(0.01)	(0.01)
R^2	0.00	0.02	0.01	0.01
AIC	972.41	423.43	545.05	684.11
		Linear Spline		
$\mathbb{1}_{A_i \geq 11}$	0.06	0.07	0.08	0.09
	(0.06)	(0.06)	(0.06)	(0.06)
U1	0.01	0.01	0.01	0.00
	(0.01)	(0.01)	(0.01)	(0.01)
U2	-0.00	0.00	-0.02	0.02
	(0.01)	(.)	(0.04)	(0.02)
U3	-0.07**	-0.07**	-0.08**	-0.09***
	(0.02)	(0.02)	(0.03)	(0.03)
U4	0.02	-0.02	0.03	0.04**
	(0.01)	(0.04)	(0.03)	(0.02)
R^2	0.01	0.02	0.01	0.01
AIC	973.84	423.31	545.80	684.97
		Quadratic		
$\mathbb{1}_{A_i \geq 11}$	-0.04	0.16*	0.17***	0.16***
	(0.10)	(0.08)	(0.05)	(0.04)
$\mathbb{1}_{A_i < 11}(A_i - 11)$	-0.02	-0.20*	-0.21***	-0.18***
	(0.04)	(0.09)	(0.05)	(0.02)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	0.02	0.11***	0.05	0.01
	(0.02)	(0.03)	(0.03)	(0.03)
$\mathbb{1}_{A_i < 11}(A_i - 11)^2$	-0.00	-0.03	-0.03***	-0.03***
	(0.00)	(0.02)	(0.01)	(0.00)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)^2$	-0.00	-0.03***	-0.01	0.00
	(0.00)	(0.01)	(0.01)	(0.01)
R^2	0.00	0.02	0.02	0.01
AIC	975.61	425.98	546.66	684.23
N	732	316	409	512

Note: Standard errors in parentheses, clustered by age of the eldest child. ***Statistically significant at the 1% level; **significant at the 5% level; *significant at the 10% level. Regressions are performed without any control variable. The first column corresponds to the whole sample. Column 2 reports estimates obtained using households whose eldest child is between 7 and 14 years old (bandwidth of 4). Respectively, columns 3 and 4 report the results for households whose eldest child is between 6 and 15 (bandwidth of 5) years old or between 5 and 16 years old (bandwidth of 6). For the linear spline specification, the variables are defined as follows: $U1 = \mathbb{1}_{A_i \geq 11}[(A_i - 11)((A_i - 11) < 3) + 3((A_i - 11) \geq 3)]$; $U2 = ((A_i - 11) \geq 0)(A_i - 11 - 3)$; $U3 = (A_i - 11)(A_i - 11 \geq -3) - 3((A_i - 11) < -3)$; $U4 = ((A_i - 11) < -3)(A_i - 11 + 3)$.

Source: Health Barometer 1995.

Table A18: Sharp design : correct answers about contamination modes of HB

	All	Bandwidth=4	Bandwidth=5	Bandwidth=6
	(1)	(2)	(3)	(4)
	Dependent variable: HB contamination knowledge			
	b/se	b/se	b/se	b/se
	Linear			
$\mathbb{1}_{A_i \geq 11}$	-0.029	-0.189***	-0.153***	-0.134***
	(0.057)	(0.021)	(0.040)	(0.039)
$\mathbb{1}_{A_i<11}(A_i-11)$	-0.002	0.047***	0.046***	0.033***
	(0.007)	(0.005)	(0.003)	(0.008)
$\mathbb{1}_{A_i \geq 11}(A_i-11)$	0.012*	0.046***	0.008	0.015
	(0.006)	(0.006)	(0.018)	(0.010)
R^2	0.002	0.016	0.010	0.010
AIC	867.48	371.11	464.02	586.74
	Linear Spline			
$\mathbb{1}_{A_i \geq 11}$	-0.227***	-0.212***	-0.207***	-0.207***
	(0.030)	(0.016)	(0.016)	(0.024)
U1	0.028	0.046***	0.046***	0.029
	(0.018)	(0.006)	(0.006)	(0.017)
U2	-0.003	0.000	-0.129***	-0.008
	(0.013)	(.)	(0.008)	(0.025)
U3	0.080***	0.061***	0.057***	0.064***
	(0.013)	(0.001)	(0.003)	(0.004)
U4	-0.017***	0.015***	0.032***	0.014*
	(0.004)	(0.002)	(0.005)	(0.007)
R^2	0.008	0.017	0.019	0.012
AIC	866.84	370.99	462.23	589.75
	Quadratic			
$\mathbb{1}_{A_i \geq 11}$	-0.183***	-0.261***	-0.237***	-0.235***
	(0.045)	(0.008)	(0.016)	(0.027)
$\mathbb{1}_{A_i<11}(A_i-11)$	0.066***	0.109***	0.073***	0.097***
	(0.021)	(0.008)	(0.013)	(0.010)
$\mathbb{1}_{A_i \geq 11}(A_i-11)$	0.036	0.086***	0.131***	0.044
	(0.032)	(0.018)	(0.022)	(0.036)
$\mathbb{1}_{A_i<11}(A_i-11)^2$	0.006***	0.013***	0.005*	0.009***
	(0.002)	(0.002)	(0.002)	(0.001)
$\mathbb{1}_{A_i \geq 11}(A_i-11)^2$	-0.004	-0.013*	-0.030***	-0.006
	(0.005)	(0.006)	(0.005)	(0.007)
R^2	0.008	0.017	0.019	0.012
AIC	867.18	374.83	464.46	589.74
N	739	317	413	516

Note: Standard errors in parentheses, clustered by age of the eldest child. ***Statistically significant at the 1% level; **significant at the 5% level; *significant at the 10% level. Regressions are performed without any control variable. The first column corresponds to the whole sample. Column 2 reports estimates obtained using households whose eldest child is between 7 and 14 years old (bandwidth of 4). Respectively, columns 3 and 4 report the results for households whose eldest child is between 6 and 15 (bandwidth of 5) years old or between 5 and 16 years old (bandwidth of 6). For the linear spline specification, the variables are defined as follows: $U1 = \mathbb{1}_{A_i \geq 11}[(A_i-11)((A_i-11)<3)+3((A_i-11)\geq 3)]$; $U2 = ((A_i-11)\geq 0)(A_i-11-3)$; $U3 = (A_i-11)(A_i-11 \geq -3) - 3((A_i-11)<-3)$; $U4 = ((A_i-11)<-3)(A_i-11+3)$.

Source: Health Barometer 1995.

Table A19: Sharp design : HB is transmissible by saliva

	All	Bandwidth=4	Bandwidth=5	Bandwidth=6
	(1)	(2)	(3)	(4)
	Dependent variable: HB is transmissible by saliva			
	b/se	b/se	b/se	b/se
	Linear			
$\mathbb{1}_{A_i \geq 11}$	0.14**	0.07***	0.05*	0.06**
	(0.05)	(0.01)	(0.03)	(0.02)
$\mathbb{1}_{A_i<11}(A_i - 11)$	-0.01	-0.00	-0.00	0.00
	(0.01)	(0.00)	(0.00)	(0.00)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	0.01	0.01***	0.04***	0.03**
	(0.01)	(0.00)	(0.01)	(0.01)
R^2	0.01	0.01	0.03	0.03
AIC	1040.76	442.91	578.65	724.13
	Linear Spline			
$\mathbb{1}_{A_i \geq 11}$	0.05	0.09***	0.09***	0.08***
	(0.03)	(0.01)	(0.01)	(0.01)
U1	0.05*	0.01***	0.01***	0.03*
	(0.02)	(0.00)	(0.00)	(0.02)
U2	-0.03	0.00	0.14***	0.02
	(0.03)	(.)	(0.01)	(0.03)
U3	0.01	-0.01***	-0.01***	-0.01***
	(0.02)	(0.00)	(0.00)	(0.00)
U4	-0.02	0.02***	0.01**	0.01***
	(0.02)	(0.00)	(0.00)	(0.00)
R^2	0.02	0.01	0.03	0.03
AIC	1041.92	442.85	579.07	728.02
	Quadratic			
$\mathbb{1}_{A_i \geq 11}$	-0.00	0.13***	0.11***	0.08***
	(0.06)	(0.00)	(0.02)	(0.02)
$\mathbb{1}_{A_i<11}(A_i - 11)$	0.03	-0.06***	-0.03**	-0.02**
	(0.03)	(0.00)	(0.01)	(0.01)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	0.09**	-0.00	-0.04**	0.04
	(0.04)	(0.02)	(0.02)	(0.03)
$\mathbb{1}_{A_i<11}(A_i - 11)^2$	0.00	-0.01***	-0.00**	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)^2$	-0.01**	0.00	0.02***	-0.00
	(0.01)	(0.01)	(0.00)	(0.01)
R^2	0.02	0.01	0.03	0.03
AIC	1040.07	446.82	581.31	727.97
N	739	317	413	516

Note: Standard errors in parentheses, clustered by age of the eldest child. ***Statistically significant at the 1% level; **significant at the 5% level; *significant at the 10% level. Regressions are performed without any control variable. The first column corresponds to the whole sample. Column 2 reports estimates obtained using households whose eldest child is between 7 and 14 years old (bandwidth of 4). Respectively, columns 3 and 4 report the results for households whose eldest child is between 6 and 15 (bandwidth of 5) years old or between 5 and 16 years old (bandwidth of 6). For the linear spline specification, the variables are defined as follows: $U1 = \mathbb{1}_{A_i \geq 11}[(A_i - 11)((A_i - 11) < 3) + 3((A_i - 11) \geq 3)]$; $U2 = ((A_i - 11) \geq 0)(A_i - 11 - 3)$; $U3 = (A_i - 11)(A_i - 11 \geq -3) - 3((A_i - 11) < -3)$; $U4 = ((A_i - 11) < -3)(A_i - 11 + 3)$.

Source: Health Barometer 1995.

Table A20: Sharp design : Don't know how HB is transmitted

	All	Bandwidth=4	Bandwidth=5	Bandwidth=6
	(1)	(2)	(3)	(4)
	Dependent variable: Don't know how HB is transmitted			
	b/se	b/se	b/se	b/se
			Linear	
$\mathbb{1}_{A_i \geq 11}$	-0.06	0.09	0.03	0.02
	(0.08)	(0.09)	(0.11)	(0.09)
$\mathbb{1}_{A_i < 11}(A_i - 11)$	0.00	-0.04	-0.02	-0.02
	(0.01)	(0.02)	(0.03)	(0.02)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	-0.02*	-0.06***	-0.04**	-0.03**
	(0.01)	(0.01)	(0.01)	(0.01)
R^2	0.02	0.03	0.02	0.03
AIC	998.42	439.67	563.18	695.37
			Linear Spline	
$\mathbb{1}_{A_i \geq 11}$	0.12	0.13	0.14	0.12
	(0.09)	(0.09)	(0.09)	(0.09)
U1	-0.06***	-0.06***	-0.06***	-0.06***
	(0.01)	(0.01)	(0.01)	(0.01)
U2	0.02**	0.00	0.03	0.01
	(0.01)	(.)	(0.02)	(0.01)
U3	-0.05*	-0.06	-0.07*	-0.06*
	(0.03)	(0.04)	(0.04)	(0.03)
U4	0.02	0.01	0.04	0.00
	(0.01)	(0.06)	(0.04)	(0.02)
R^2	0.02	0.03	0.03	0.03
AIC	997.96	439.39	563.25	697.56
			Quadratic	
$\mathbb{1}_{A_i \geq 11}$	0.06	0.32**	0.27***	0.15
	(0.11)	(0.13)	(0.07)	(0.09)
$\mathbb{1}_{A_i < 11}(A_i - 11)$	-0.03	-0.26	-0.20**	-0.09*
	(0.04)	(0.15)	(0.07)	(0.05)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	-0.09***	-0.09	-0.11**	-0.09***
	(0.02)	(0.08)	(0.05)	(0.02)
$\mathbb{1}_{A_i < 11}(A_i - 11)^2$	-0.00	-0.04	-0.03**	-0.01
	(0.00)	(0.03)	(0.01)	(0.01)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)^2$	0.01***	0.01	0.02	0.01**
	(0.00)	(0.03)	(0.01)	(0.01)
R^2	0.02	0.03	0.03	0.03
AIC	998.83	442.36	564.28	697.56
N	739	317	413	516

Note: Standard errors in parentheses, clustered by age of the eldest child. ***Statistically significant at the 1% level; **significant at the 5% level; *significant at the 10% level. Regressions are performed without any control variable. The first column corresponds to the whole sample. Column 2 reports estimates obtained using households whose eldest child is between 7 and 14 years old (bandwidth of 4). Respectively, columns 3 and 4 report the results for households whose eldest child is between 6 and 15 (bandwidth of 5) years old or between 5 and 16 years old (bandwidth of 6). For the linear spline specification, the variables are defined as follows: $U1 = \mathbb{1}_{A_i \geq 11}[(A_i - 11)((A_i - 11) < 3) + 3((A_i - 11) \geq 3)]$; $U2 = ((A_i - 11) \geq 0)(A_i - 11 - 3)$; $U3 = (A_i - 11)(A_i - 11 \geq -3) - 3((A_i - 11) < -3)$; $U4 = ((A_i - 11) < -3)(A_i - 11 + 3)$.

Source: Health Barometer 1995.

Table A21: Sharp design : HB is a serious disease

	All	Bandwidth=4	Bandwidth=5	Bandwidth=6
	(1)	(2)	(3)	(4)
	Dependent variable: HB is a serious illness			
	b/se	b/se	b/se	b/se
	Linear			
$\mathbb{1}_{A_i \geq 11}$	0.04	-0.01	0.02	0.04
	(0.06)	(0.05)	(0.05)	(0.05)
$\mathbb{1}_{A_i<11}(A_i - 11)$	-0.00	0.01	-0.00	-0.01
	(0.01)	(0.01)	(0.01)	(0.00)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	0.01	0.03	0.03*	0.02
	(0.01)	(0.02)	(0.01)	(0.01)
R^2	0.01	0.01	0.01	0.01
AIC	796.22	362.16	447.17	545.38
	Linear Spline			
$\mathbb{1}_{A_i \geq 11}$	-0.02	-0.04	-0.04	-0.04
	(0.05)	(0.05)	(0.05)	(0.05)
U1	0.04*	0.03	0.03	0.03*
	(0.02)	(0.02)	(0.02)	(0.02)
U2	-0.02	0.00	0.02	-0.00
	(0.01)	(.)	(0.02)	(0.01)
U3	0.01	0.03*	0.03**	0.03**
	(0.02)	(0.01)	(0.01)	(0.01)
U4	-0.01	-0.03	-0.04***	-0.03***
	(0.01)	(0.02)	(0.01)	(0.01)
R^2	0.01	0.01	0.01	0.01
AIC	798.43	361.99	448.53	548.29
	Quadratic			
$\mathbb{1}_{A_i \geq 11}$	-0.01	-0.07	-0.09*	-0.06
	(0.05)	(0.06)	(0.05)	(0.04)
$\mathbb{1}_{A_i<11}(A_i - 11)$	-0.00	0.04	0.07*	0.04**
	(0.02)	(0.07)	(0.03)	(0.02)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	0.07***	0.14*	0.07	0.06**
	(0.02)	(0.07)	(0.04)	(0.02)
$\mathbb{1}_{A_i<11}(A_i - 11)^2$	0.00	0.01	0.01*	0.01**
	(0.00)	(0.01)	(0.01)	(0.00)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)^2$	-0.01***	-0.04	-0.01	-0.01*
	(0.00)	(0.02)	(0.01)	(0.00)
R^2	0.01	0.01	0.01	0.01
AIC	797.69	364.73	450.24	547.96
N	737	316	411	514

Note: Standard errors in parentheses, clustered by age of the eldest child. ***Statistically significant at the 1% level; **significant at the 5% level; *significant at the 10% level. Regressions are performed without any control variable. The first column corresponds to the whole sample. Column 2 reports estimates obtained using households whose eldest child is between 7 and 14 years old (bandwidth of 4). Respectively, columns 3 and 4 report the results for households whose eldest child is between 6 and 15 (bandwidth of 5) years old or between 5 and 16 years old (bandwidth of 6). For the linear spline specification, the variables are defined as follows: $U1 = \mathbb{1}_{A_i \geq 11}[(A_i - 11)((A_i - 11) < 3) + 3((A_i - 11) \geq 3)]$; $U2 = ((A_i - 11) \geq 0)(A_i - 11 - 3)$; $U3 = (A_i - 11)(A_i - 11 \geq -3) - 3((A_i - 11) < -3)$; $U4 = ((A_i - 11) < -3)(A_i - 11 + 3)$.

Source: Health Barometer 1995.

Table A22: Sharp design : vaccination for newborns

	All	Bandwidth=4	Bandwidth=5	Bandwidth=6
	(1)	(2)	(3)	(4)
	Dependent variable: vaccination for newborn babies			
	b/se	b/se	b/se	b/se
	Linear			
$\mathbb{1}_{A_i \geq 11}$	-0.188***	-0.233***	-0.277***	-0.228***
	(0.062)	(0.054)	(0.049)	(0.051)
$\mathbb{1}_{A_i < 11}(A_i - 11)$	0.011	0.004	0.029	0.017
	(0.008)	(0.030)	(0.022)	(0.012)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	0.031***	0.069***	0.065***	0.048***
	(0.010)	(0.014)	(0.005)	(0.008)
R^2	0.011	0.030	0.029	0.021
AIC	965.94	412.08	527.79	663.15
	Linear Spline			
$\mathbb{1}_{A_i \geq 11}$	-0.309***	-0.369***	-0.321***	-0.328***
	(0.064)	(0.062)	(0.078)	(0.074)
U1	0.081***	0.069***	0.069***	0.075***
	(0.011)	(0.014)	(0.014)	(0.011)
U2	-0.016	0.000	0.050	0.006
	(0.011)	(.)	(0.033)	(0.015)
U3	0.038	0.090**	0.052	0.056
	(0.041)	(0.027)	(0.054)	(0.049)
U4	0.006	-0.194***	0.002	-0.008
	(0.015)	(0.047)	(0.070)	(0.032)
R^2	0.016	0.041	0.029	0.024
AIC	966.15	408.82	529.54	665.52
	Quadratic			
$\mathbb{1}_{A_i \geq 11}$	-0.231***	-0.467**	-0.240	-0.309**
	(0.062)	(0.180)	(0.144)	(0.102)
$\mathbb{1}_{A_i < 11}(A_i - 11)$	-0.001	0.273	0.004	0.058
	(0.027)	(0.212)	(0.153)	(0.097)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	0.113***	-0.027	0.043	0.094**
	(0.022)	(0.029)	(0.035)	(0.031)
$\mathbb{1}_{A_i < 11}(A_i - 11)^2$	-0.001	0.054	-0.004	0.006
	(0.002)	(0.043)	(0.026)	(0.014)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)^2$	-0.013***	0.032**	0.005	-0.009
	(0.003)	(0.010)	(0.008)	(0.006)
R^2	0.016	0.037	0.029	0.022
AIC	966.66	413.91	531.69	666.37
N	669	285	367	461

Note: Standard errors in parentheses, clustered by age of the eldest child. ***Statistically significant at the 1% level; **significant at the 5% level; *significant at the 10% level. Regressions are performed without any control variable. The first column corresponds to the whole sample. Column 2 reports estimates obtained using households whose eldest child is between 7 and 14 years old (bandwidth of 4). Respectively, columns 3 and 4 report the results for households whose eldest child is between 6 and 15 (bandwidth of 5) years old or between 5 and 16 years old (bandwidth of 6). For the linear spline specification, the variables are defined as follows: $U1 = \mathbb{1}_{A_i \geq 11}[(A_i - 11)((A_i - 11) < 3) + 3((A_i - 11) \geq 3)]$; $U2 = ((A_i - 11) \geq 0)(A_i - 11 - 3)$; $U3 = (A_i - 11)(A_i - 11 \geq -3) - 3((A_i - 11) < -3)$; $U4 = ((A_i - 11) < -3)(A_i - 11 + 3)$.

Source: Health Barometer 1995.

Table A23: Sharp design : middle school pupils vaccination

	All	Bandwidth=4	Bandwidth=5	Bandwidth=6
	(1)	(2)	(3)	(4)
	Dependent variable: Middle school pupils vaccination			
	b/se	b/se	b/se	b/se
		Linear		
$\mathbb{1}_{A_i \geq 11}$	-0.010	-0.021	-0.022	-0.044
	(0.033)	(0.040)	(0.032)	(0.045)
$\mathbb{1}_{A_i < 11}(A_i - 11)$	0.009**	0.007	0.008	0.021*
	(0.004)	(0.020)	(0.009)	(0.010)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	0.003	0.009	0.009*	0.003
	(0.002)	(0.011)	(0.005)	(0.004)
R^2	0.010	0.002	0.003	0.010
AIC	310.24	102.38	118.99	188.03
		Linear Spline		
$\mathbb{1}_{A_i \geq 11}$	0.015	0.070**	0.050	0.048
	(0.036)	(0.030)	(0.036)	(0.035)
U1	0.010	0.009	0.009	0.011
	(0.008)	(0.011)	(0.011)	(0.009)
U2	-0.003	0.000	0.008	-0.010
	(0.008)	(.)	(0.026)	(0.011)
U3	-0.007	-0.050***	-0.034	-0.034
	(0.024)	(0.011)	(0.022)	(0.021)
U4	0.011	0.138***	0.056*	0.056***
	(0.008)	(0.019)	(0.029)	(0.013)
R^2	0.011	0.016	0.009	0.018
AIC	313.77	97.74	118.65	188.06
		Quadratic		
$\mathbb{1}_{A_i \geq 11}$	-0.024	0.195*	0.073	0.061
	(0.039)	(0.091)	(0.071)	(0.051)
$\mathbb{1}_{A_i < 11}(A_i - 11)$	0.014	-0.192	-0.067	-0.064
	(0.017)	(0.106)	(0.075)	(0.050)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	0.007	-0.069***	-0.017	0.010
	(0.013)	(0.015)	(0.024)	(0.020)
$\mathbb{1}_{A_i < 11}(A_i - 11)^2$	0.000	-0.040	-0.013	-0.012
	(0.002)	(0.021)	(0.013)	(0.007)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)^2$	-0.001	0.026***	0.006	-0.001
	(0.002)	(0.005)	(0.006)	(0.004)
R^2	0.010	0.015	0.007	0.015
AIC	314.17	102.14	121.67	189.59
N	720	310	402	504

Note: Standard errors in parentheses, clustered by age of the eldest child. ***Statistically significant at the 1% level; **significant at the 5% level; *significant at the 10% level. Regressions are performed without any control variable. The first column corresponds to the whole sample. Column 2 reports estimates obtained using households whose eldest child is between 7 and 14 years old (bandwidth of 4). Respectively, columns 3 and 4 report the results for households whose eldest child is between 6 and 15 (bandwidth of 5) years old or between 5 and 16 years old (bandwidth of 6). For the linear spline specification, the variables are defined as follows: $U1 = \mathbb{1}_{A_i \geq 11}[(A_i - 11)((A_i - 11) < 3) + 3((A_i - 11) \geq 3)]$; $U2 = ((A_i - 11) \geq 0)(A_i - 11 - 3)$; $U3 = (A_i - 11)(A_i - 11 \geq -3) - 3((A_i - 11) < -3)$; $U4 = ((A_i - 11) < -3)(A_i - 11 + 3)$. $AIC = N \ln(\widehat{\sigma}^2_\epsilon) + 2p$

Source: Health Barometer 1995.

Table A24: Sharp design : population vaccination

	All	Bandwidth=4	Bandwidth=5	Bandwidth=6
	(1)	(2)	(3)	(4)
	Dependent variable: population vaccination			
	b/se	b/se	b/se	b/se
	Linear			
$\mathbb{1}_{A_i \geq 11}$	-0.129***	-0.159***	-0.157***	-0.167***
	(0.035)	(0.022)	(0.015)	(0.023)
$\mathbb{1}_{A_i<11}(A_i - 11)$	0.007	0.012	0.005	0.014**
	(0.008)	(0.009)	(0.006)	(0.006)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	0.031***	0.031***	0.045***	0.037***
	(0.005)	(0.007)	(0.006)	(0.006)
R^2	0.015	0.015	0.021	0.020
AIC	672.96	325.71	386.32	473.69
	Linear Spline			
$\mathbb{1}_{A_i \geq 11}$	-0.156***	-0.117***	-0.132***	-0.130***
	(0.026)	(0.020)	(0.025)	(0.021)
U1	0.044***	0.031***	0.031***	0.040***
	(0.013)	(0.007)	(0.007)	(0.012)
U2	0.019	0.000	0.092***	0.033*
	(0.012)	(.)	(0.014)	(0.017)
U3	0.011	-0.014*	-0.003	-0.007
	(0.018)	(0.006)	(0.015)	(0.011)
U4	0.006	0.071***	0.014	0.028***
	(0.012)	(0.011)	(0.020)	(0.009)
R^2	0.016	0.017	0.023	0.020
AIC	676.52	325.25	387.77	477.34
	Quadratic			
$\mathbb{1}_{A_i \geq 11}$	-0.205***	-0.089*	-0.151***	-0.130***
	(0.038)	(0.046)	(0.043)	(0.030)
$\mathbb{1}_{A_i<11}(A_i - 11)$	0.033	-0.074	0.008	-0.023
	(0.021)	(0.053)	(0.042)	(0.027)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	0.061***	0.085***	0.025	0.054**
	(0.017)	(0.004)	(0.024)	(0.020)
$\mathbb{1}_{A_i<11}(A_i - 11)^2$	0.002	-0.017	0.000	-0.005
	(0.002)	(0.011)	(0.007)	(0.004)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)^2$	-0.005*	-0.018***	0.005	-0.003
	(0.003)	(0.001)	(0.005)	(0.004)
R^2	0.017	0.017	0.022	0.021
AIC	675.44	329.13	390.22	477.27
N	720	310	402	504

Note: Standard errors in parentheses, clustered by age of the eldest child. ***Statistically significant at the 1% level; **significant at the 5% level; *significant at the 10% level. Regressions are performed without any control variable. The first column corresponds to the whole sample. Column 2 reports estimates obtained using households whose eldest child is between 7 and 14 years old (bandwidth of 4). Respectively, columns 3 and 4 report the results for households whose eldest child is between 6 and 15 (bandwidth of 5) years old or between 5 and 16 years old (bandwidth of 6). For the linear spline specification, the variables are defined as follows: $U1 = \mathbb{1}_{A_i \geq 11}[(A_i - 11)((A_i - 11) < 3) + 3((A_i - 11) \geq 3)]$; $U2 = ((A_i - 11) \geq 0)(A_i - 11 - 3)$; $U3 = (A_i - 11)(A_i - 11 \geq -3) - 3((A_i - 11) < -3)$; $U4 = ((A_i - 11) < -3)(A_i - 11 + 3)$.

Source: Health Barometer 1995.

Table A25: Sharp design : Children MMR vaccination

	All	Bandwidth=4	Bandwidth=5	Bandwidth=6
	(1)	(2)	(3)	(4)
	Dependent variable: children MMR vaccination			
	b/se	b/se	b/se	b/se
	Linear			
$\mathbb{1}_{A_i \geq 11}$	-0.251***	-0.140***	-0.134***	-0.136***
	(0.078)	(0.036)	(0.035)	(0.034)
$\mathbb{1}_{A_i<11}(A_i - 11)$	0.023	-0.012*	-0.012**	-0.012**
	(0.017)	(0.006)	(0.005)	(0.004)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	0.019**	0.024	0.019**	0.019**
	(0.008)	(0.015)	(0.008)	(0.008)
R^2	0.037	0.041	0.039	0.045
AIC	426.71	228.00	286.49	284.69
	Linear Spline			
$\mathbb{1}_{A_i \geq 11}$	-0.087	-0.147***	-0.146***	-0.144***
	(0.050)	(0.039)	(0.039)	(0.038)
U1	0.024	0.024	0.024	0.024
	(0.014)	(0.015)	(0.014)	(0.014)
U2	-0.000	0.000	-0.000	-0.000
	(0.029)	(.)	(0.029)	(0.029)
U3	-0.055	-0.007	-0.008	-0.010
	(0.033)	(0.013)	(0.012)	(0.011)
U4	0.037	-0.022	-0.017	-0.013
	(0.023)	(0.022)	(0.013)	(0.008)
R^2	0.047	0.041	0.039	0.045
AIC	422.93	227.98	288.37	286.58
	Quadratic			
$\mathbb{1}_{A_i \geq 11}$	-0.039	-0.144**	-0.150***	-0.151***
	(0.059)	(0.055)	(0.033)	(0.026)
$\mathbb{1}_{A_i<11}(A_i - 11)$	-0.096***	-0.037	-0.018	-0.017
	(0.032)	(0.065)	(0.032)	(0.016)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	0.070***	0.127***	0.070**	0.070**
	(0.023)	(0.003)	(0.024)	(0.023)
$\mathbb{1}_{A_i<11}(A_i - 11)^2$	-0.011**	-0.005	-0.001	-0.001
	(0.004)	(0.013)	(0.006)	(0.002)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)^2$	-0.012**	-0.034***	-0.012**	-0.012**
	(0.005)	(0.001)	(0.005)	(0.005)
R^2	0.068	0.046	0.041	0.047
AIC	411.66	230.33	289.62	287.77
N	576	309	400	431

Note: Standard errors in parentheses, clustered by age of the eldest child. ***Statistically significant at the 1% level; **significant at the 5% level; *significant at the 10% level. Regressions are performed without any control variable. The first column corresponds to the whole sample. Column 2 reports estimates obtained using households whose eldest child is between 7 and 14 years old (bandwidth of 4). Respectively, columns 3 and 4 report the results for households whose eldest child is between 6 and 15 (bandwidth of 5) years old or between 5 and 16 years old (bandwidth of 6). For the linear spline specification, the variables are defined as follows: $U1 = \mathbb{1}_{A_i \geq 11}[(A_i - 11)((A_i - 11) < 3) + 3((A_i - 11) \geq 3)]$; $U2 = ((A_i - 11) \geq 0)(A_i - 11 - 3)$; $U3 = (A_i - 11)(A_i - 11 \geq -3) - 3((A_i - 11) < -3)$; $U4 = ((A_i - 11) < -3)(A_i - 11 + 3)$. $AIC = N \ln(\widehat{\sigma}^2_\epsilon) + 2p$

Source: Health Barometer 1995.

Table A26: Sharp design : MMR is benign

	All	Bandwidth=4	Bandwidth=5	Bandwidth=6
	(1)	(2)	(3)	(4)
	Dependent variable: MMR benign			
	b/se	b/se	b/se	b/se
	Linear			
$\mathbb{1}_{A_i \geq 11}$	0.14	0.16	0.20*	0.16
	(0.09)	(0.12)	(0.10)	(0.10)
$\mathbb{1}_{A_i<11}(A_i - 11)$	-0.01	-0.02	-0.03	-0.02
	(0.01)	(0.03)	(0.02)	(0.01)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	-0.01	-0.00	-0.03	-0.02
	(0.01)	(0.04)	(0.02)	(0.02)
R^2	0.01	0.01	0.01	0.01
AIC	995.21	425.65	549.82	687.55
	Linear Spline			
$\mathbb{1}_{A_i \geq 11}$	0.26**	0.30**	0.27**	0.27**
	(0.10)	(0.10)	(0.11)	(0.10)
U1	-0.02	-0.00	-0.00	-0.02
	(0.04)	(0.04)	(0.04)	(0.04)
U2	-0.01	0.00	-0.11*	-0.02
	(0.02)	(.)	(0.05)	(0.04)
U3	-0.07*	-0.11***	-0.08**	-0.08**
	(0.03)	(0.00)	(0.03)	(0.03)
U4	-0.00	0.18***	0.03	0.02
	(0.01)	(0.00)	(0.05)	(0.02)
R^2	0.01	0.03	0.02	0.01
AIC	997.81	421.64	549.71	689.79
	Quadratic			
$\mathbb{1}_{A_i \geq 11}$	0.23**	0.59***	0.31**	0.30**
	(0.09)	(0.08)	(0.13)	(0.11)
$\mathbb{1}_{A_i<11}(A_i - 11)$	-0.05	-0.39***	-0.11	-0.11
	(0.03)	(0.09)	(0.11)	(0.08)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	-0.04	-0.28**	-0.06	-0.06
	(0.04)	(0.10)	(0.09)	(0.06)
$\mathbb{1}_{A_i<11}(A_i - 11)^2$	-0.00	-0.07***	-0.01	-0.01
	(0.00)	(0.02)	(0.02)	(0.01)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)^2$	0.00	0.09**	0.01	0.01
	(0.01)	(0.03)	(0.02)	(0.01)
R^2	0.01	0.04	0.01	0.01
AIC	998.01	419.91	553.22	689.94
N	733	312	407	510

Note: Standard errors in parentheses, clustered by age of the eldest child. ***Statistically significant at the 1% level; **significant at the 5% level; *significant at the 10% level. Regressions are performed without any control variable. The first column corresponds to the whole sample. Column 2 reports estimates obtained using households whose eldest child is between 7 and 14 years old (bandwidth of 4). Respectively, columns 3 and 4 report the results for households whose eldest child is between 6 and 15 (bandwidth of 5) years old or between 5 and 16 years old (bandwidth of 6). For the linear spline specification, the variables are defined as follows: $U1 = \mathbb{1}_{A_i \geq 11}[(A_i - 11)((A_i - 11) < 3) + 3((A_i - 11) \geq 3)]$; $U2 = ((A_i - 11) \geq 0)(A_i - 11 - 3)$; $U3 = (A_i - 11)(A_i - 11 \geq -3) - 3((A_i - 11) < -3)$; $U4 = ((A_i - 11) < -3)(A_i - 11 + 3)$.
Source: Health Barometer 1995.

Table A27: Sharp design : MMR non-vaccination is risky

	All	Bandwidth=4	Bandwidth=5	Bandwidth=6
	(1)	(2)	(3)	(4)
	Dependent variable: MMR non-vaccination is risky			
	b/se	b/se	b/se	b/se
	Linear			
$\mathbb{1}_{A_i \geq 11}$	-0.087	-0.111	-0.164**	-0.142**
	(0.061)	(0.067)	(0.067)	(0.062)
$\mathbb{1}_{A_i < 11}(A_i - 11)$	0.006	0.037*	0.031**	0.025**
	(0.008)	(0.016)	(0.013)	(0.011)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	0.004	-0.062***	0.011	0.004
	(0.005)	(0.017)	(0.029)	(0.012)
R^2	0.003	0.029	0.007	0.005
AIC	1000.02	432.75	559.44	702.07
	Linear Spline			
$\mathbb{1}_{A_i \geq 11}$	-0.160**	-0.135*	-0.133*	-0.148**
	(0.058)	(0.064)	(0.063)	(0.059)
U1	-0.024	-0.062***	-0.062***	-0.033
	(0.038)	(0.017)	(0.017)	(0.036)
U2	0.030	0.000	0.271***	0.064
	(0.036)	(.)	(0.034)	(0.055)
U3	0.056**	0.052*	0.050**	0.050**
	(0.020)	(0.025)	(0.022)	(0.020)
U4	-0.003	0.002	0.009	0.009
	(0.009)	(0.043)	(0.022)	(0.012)
R^2	0.006	0.029	0.033	0.011
AIC	1001.45	432.64	550.55	703.34
	Quadratic			
$\mathbb{1}_{A_i \geq 11}$	-0.129	-0.288**	-0.183**	-0.187***
	(0.076)	(0.084)	(0.071)	(0.057)
$\mathbb{1}_{A_i < 11}(A_i - 11)$	0.036	0.184	0.111*	0.082**
	(0.028)	(0.099)	(0.049)	(0.028)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	-0.018	0.061***	-0.154	-0.044
	(0.062)	(0.001)	(0.087)	(0.076)
$\mathbb{1}_{A_i < 11}(A_i - 11)^2$	0.003	0.029	0.014	0.008*
	(0.003)	(0.020)	(0.009)	(0.004)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)^2$	0.004	-0.042***	0.041*	0.010
	(0.010)	(0.000)	(0.020)	(0.014)
R^2	0.004	0.035	0.020	0.008
AIC	1003.08	434.90	558.00	704.85
N	739	317	413	516

Note: Standard errors in parentheses, clustered by age of the eldest child. ***Statistically significant at the 1% level; **significant at the 5% level; *significant at the 10% level. Regressions are performed without any control variable. The first column corresponds to the whole sample. Column 2 reports estimates obtained using households whose eldest child is between 7 and 14 years old (bandwidth of 4). Respectively, columns 3 and 4 report the results for households whose eldest child is between 6 and 15 (bandwidth of 5) years old or between 5 and 16 years old (bandwidth of 6). For the linear spline specification, the variables are defined as follows: $U1 = \mathbb{1}_{A_i \geq 11}[(A_i - 11)((A_i - 11) < 3) + 3((A_i - 11) \geq 3)]$; $U2 = ((A_i - 11) \geq 0)(A_i - 11 - 3)$; $U3 = (A_i - 11)(A_i - 11 \geq -3) - 3((A_i - 11) < -3)$; $U4 = ((A_i - 11) < -3)(A_i - 11 + 3)$.

Source: Health Barometer 1995.

Table A28: Sharp Regression Discontinuity using Health Barometer 1992 with a threshold at 11 years old

	All	Bandwidth=4	Bandwidth=5	Bandwidth=6
	(1)	(2)	(3)	(4)
	Dependent variable: MMR vaccination for the eldest child in 1992			
	b/se	b/se	b/se	b/se
	Linear			
$\mathbb{1}_{A_i \geq 11}$	-0.03	0.27***	0.19*	0.06
	(0.13)	(0.06)	(0.09)	(0.12)
$\mathbb{1}_{A_i<11}(A_i - 11)$	0.01	-0.10***	-0.04	-0.01
	(0.02)	(0.02)	(0.03)	(0.02)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	-0.06*	-0.06***	-0.09***	-0.04
	(0.03)	(0.01)	(0.02)	(0.04)
R^2	0.04	0.06	0.07	0.02
AIC	391.56	142.20	194.36	244.54
	Linear Spline			
$\mathbb{1}_{A_i \geq 11}$	0.35***	0.32***	0.33***	0.36***
	(0.06)	(0.05)	(0.05)	(0.04)
U1	-0.06**	-0.06***	-0.06***	-0.09**
	(0.02)	(0.01)	(0.01)	(0.03)
U2	-0.07	0.00	-0.23***	0.06
	(0.09)	(.)	(0.02)	(0.09)
U3	-0.15***	-0.12***	-0.13***	-0.14***
	(0.03)	(0.01)	(0.02)	(0.02)
U4	0.04	-0.04**	0.03	0.05**
	(0.03)	(0.02)	(0.02)	(0.02)
R^2	0.06	0.06	0.09	0.06
AIC	384.03	141.83	191.84	240.31
	Quadratic			
$\mathbb{1}_{A_i \geq 11}$	0.31***	0.45***	0.47***	0.48***
	(0.09)	(0.03)	(0.04)	(0.03)
$\mathbb{1}_{A_i<11}(A_i - 11)$	-0.14***	-0.25***	-0.29***	-0.26***
	(0.05)	(0.03)	(0.02)	(0.02)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	-0.06	-0.14***	-0.03	-0.17**
	(0.06)	(0.03)	(0.05)	(0.06)
$\mathbb{1}_{A_i<11}(A_i - 11)^2$	-0.01**	-0.03***	-0.04***	-0.03***
	(0.00)	(0.01)	(0.00)	(0.00)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)^2$	-0.00	0.03**	-0.01	0.03*
	(0.02)	(0.01)	(0.01)	(0.01)
R^2	0.08	0.07	0.09	0.06
AIC	377.93	145.23	194.05	238.60
N	384	155	204	244

Note: Standard errors in parentheses, clustered by age of the eldest child. ***Statistically significant at the 1% level; **significant at the 5% level; *significant at the 10% level. Regressions are performed without any control variable. The first column corresponds to the whole sample. Column 2 reports estimates obtained using households whose eldest child is between 7 and 14 years old (bandwidth of 4). Respectively, columns 3 and 4 report the results for households whose eldest child is between 6 and 15 (bandwidth of 5) years old or between 5 and 16 years old (bandwidth of 6). For the linear spline specification, the variables are defined as follows: $U1 = \mathbb{1}_{A_i \geq 11}[(A_i - 11)((A_i - 11) < 3) + 3((A_i - 11) \geq 3)]$; $U2 = ((A_i - 11) \geq 0)(A_i - 11 - 3)$; $U3 = (A_i - 11)(A_i - 11 \geq -3) - 3((A_i - 11) < -3)$; $U4 = ((A_i - 11) < -3)(A_i - 11 + 3)$.

Source: Health Barometer 1995.

Table A29: Sharp Regression Discontinuity using Health Barometer 1992 with a threshold at 8 years old

	All	Bandwidth=4	Bandwidth=5	Bandwidth=6
	(1)	(2)	(3)	(4)
	Dependent variable: MMR vaccination for the eldest child in 1992			
	b/se	b/se	b/se	b/se
	Linear			
$\mathbb{1}_{A_i \geq 8}$	-0.18	-0.03	-0.01	0.01
	(0.15)	(0.10)	(0.09)	(0.08)
$\mathbb{1}_{A_i<8}(A_i - 8)$	0.03	-0.00	-0.01	-0.01
	(0.03)	(0.02)	(0.02)	(0.01)
$\mathbb{1}_{A_i \geq 8}(A_i - 8)$	-0.07*	0.00	-0.05	-0.03
	(0.03)	(.)	(0.06)	(0.04)
R^2	0.05	0.00	0.01	0.02
AIC	387.26	171.75	211.47	236.05
	Linear Spline			
$\mathbb{1}_{A_i \geq 8}$	-0.14	-0.06	-0.01	0.02
	(0.10)	(0.07)	(0.07)	(0.07)
U1	-0.03	0.00	-0.02	-0.02
	(0.04)	(.)	(0.11)	(0.06)
U2	-0.08	0.00	0.00	0.00
	(0.09)	(.)	(.)	(.)
U3	-0.03	-0.03	-0.03	-0.03
	(0.03)	(0.04)	(0.04)	(0.04)
U4	0.04	0.02	0.00	-0.01
	(0.03)	(0.03)	(0.02)	(0.01)
R^2	0.06	0.01	0.01	0.02
AIC	387.67	172.53	212.95	237.80
	Quadratic			
$\mathbb{1}_{A_i \geq 8}$	-0.02	-0.03	-0.01	-0.00
	(0.08)	(0.09)	(0.09)	(0.10)
$\mathbb{1}_{A_i<8}(A_i - 8)$	-0.07	-0.02	-0.01	-0.00
	(0.05)	(0.05)	(0.05)	(0.04)
$\mathbb{1}_{A_i \geq 8}(A_i - 8)$	0.02	0.00	-0.05	-0.08
	(0.09)	(.)	(0.10)	(0.14)
$\mathbb{1}_{A_i<8}(A_i - 8)^2$	-0.01	-0.00	-0.00	0.00
	(0.00)	(0.01)	(0.00)	(0.00)
$\mathbb{1}_{A_i \geq 8}(A_i - 8)^2$	-0.01	0.00	0.00	0.02
	(0.02)	(.)	(.)	(0.05)
R^2	0.06	0.00	0.01	0.02
AIC	384.03	173.44	213.46	235.96
N	384	209	262	307

Note: Standard errors in parentheses, clustered by age of the eldest child. ***Statistically significant at the 1% level; **significant at the 5% level; *significant at the 10% level. Regressions are performed without any control variable. The first column corresponds to the whole sample. Column 2 reports estimates obtained using households whose eldest child is between 7 and 14 years old (bandwidth of 4). Respectively, columns 3 and 4 report the results for households whose eldest child is between 6 and 15 (bandwidth of 5) years old or between 5 and 16 years old (bandwidth of 6). For the linear spline specification, the variables are defined as follows: $U1 = \mathbb{1}_{A_i \geq 8}[(A_i - 8)((A_i - 8) < 3) + 3((A_i - 8) \geq 3)]$; $U2 = ((A_i - 8) \geq 0)(A_i - 8 - 3)$; $U3 = (A_i - 8)(A_i - 8 \geq -3) - 3((A_i - 8) < -3)$; $U4 = ((A_i - 8) < -3)(A_i - 8 + 3)$.

Source: Health Barometer 1995.

Table A30: Sharp Regression Discontinuity using Health Barometer 2000 with a threshold at 11 years old

	All	Bandwidth=4	Bandwidth=5	Bandwidth=6
	(1)	(2)	(3)	(4)
	Dependent variable: MMR vaccination for the eldest child in 1992			
	b/se	b/se	b/se	b/se
	Linear			
$\mathbb{1}_{A_i \geq 11}$	0.06	0.00	0.01	0.15
	(0.10)	(0.00)	(0.02)	(0.12)
$\mathbb{1}_{A_i < 11}(A_i - 11)$	0.01*	-0.01**	-0.00	-0.00
	(0.01)	(0.00)	(0.00)	(0.00)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	-0.14***	-0.00	-0.02*	-0.15*
	(0.02)	(0.00)	(0.01)	(0.07)
R^2	0.64	0.00	0.01	0.35
AIC	899.50	-241.76	9.08	713.43
	Linear Spline			
$\mathbb{1}_{A_i \geq 11}$	0.07	-0.01	-0.00	-0.02
	(0.05)	(0.00)	(0.01)	(0.03)
U1	-0.08	-0.00	-0.00	0.04
	(0.07)	(0.00)	(0.00)	(0.04)
U2	-0.16***	0.00	-0.12***	-0.46***
	(0.04)	(.)	(0.01)	(0.06)
U3	-0.03*	-0.00	-0.00	-0.00
	(0.01)	(0.00)	(0.00)	(0.00)
U4	0.02**	-0.01***	0.00	-0.00
	(0.01)	(0.00)	(0.00)	(0.00)
R^2	0.65	0.00	0.02	0.52
AIC	824.76	-241.98	-3.96	-14.87
	Quadratic			
$\mathbb{1}_{A_i \geq 11}$	0.20	-0.01	0.00	-0.06
	(0.12)	(0.01)	(0.01)	(0.07)
$\mathbb{1}_{A_i < 11}(A_i - 11)$	-0.05***	0.01	-0.01	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)$	-0.16*	-0.02	0.03	0.25**
	(0.09)	(0.02)	(0.02)	(0.09)
$\mathbb{1}_{A_i < 11}(A_i - 11)^2$	-0.01***	0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)
$\mathbb{1}_{A_i \geq 11}(A_i - 11)^2$	0.00	0.01	-0.01**	-0.08***
	(0.01)	(0.01)	(0.01)	(0.02)
R^2	0.65	0.00	0.02	0.51
AIC	845.54	-238.35	4.26	30.56
N	4008.00	1669.00	2066.00	2481.00

Note: Standard errors in parentheses, clustered by age of the eldest child. ***Statistically significant at the 1% level; **significant at the 5% level; *significant at the 10% level. Regressions are performed without any control variable. The first column corresponds to the whole sample. Column 2 reports estimates obtained using households whose eldest child is between 7 and 14 years old (bandwidth of 4). Respectively, columns 3 and 4 report the results for households whose eldest child is between 6 and 15 (bandwidth of 5) years old or between 5 and 16 years old (bandwidth of 6). For the linear spline specification, the variables are defined as follows: $U1 = \mathbb{1}_{A_i \geq 11}[(A_i - 11)((A_i - 11) < 3) + 3((A_i - 11) \geq 3)]$; $U2 = ((A_i - 11) \geq 0)(A_i - 11 - 3)$; $U3 = (A_i - 11)(A_i - 11 \geq -3) - 3((A_i - 11) < -3)$; $U4 = ((A_i - 11) < -3)(A_i - 11 + 3)$.

Source: Health Barometer 1995.