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## The Effect of Income on Religiousness

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# The Effect of Income on Religiousness

## Abstract

How does income affect religiousness? Using self-collected survey data, we estimate the effects of income on religious behaviour. As a source of exogenous income variation we use a change in the eligibility criteria for a government cash transfer in Ecuador and apply a regression discontinuity strategy to estimate causal effects. We find significant effects of income on religiousness. Households that earn more go to church more often. Households that earn more are also more likely to be members of an evangelical community rather than of the mainstream catholic church.

JEL-Code: Z120.

Keywords: religion, income effects, regression discontinuity.

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# 1 Introduction

A majority of the world's population claim adherence to a religion. But while there is a growing literature on the effects of religiousness on economic behaviour<sup>1</sup>, we know very little about how economic factors affect religiousness. How income affects religious behaviour and affiliation is an especially important question for developing countries experiencing a rise in the average incomes of poor and lower middle class households. Whether these families will become more or less religious (or even change their religion) as they grow richer will have an impact on the way their societies develop.

We make use of a policy change in Ecuador which generates quasi-exogenous variation in unearned income.<sup>2</sup> The Ecuadorian government provides poor households with a monthly transfer of 35 US\$. Eligibility for the transfer depends on a household's score on a wealth index: households just below the 40th percentile receive the transfer while those just above do not. In 2009, all households were resurveyed and the composition and variable weights of the index changed. As a consequence, some households who previously did not receive the transfer suddenly gained it while some previous recipients suddenly lost it, leading to permanent changes in unearned income. We use a regression discontinuity approach to estimate causal effects of the income variation engendered by the cash transfer for families close to the cutoff.

Our data allows us to answer the following three questions. Do people become more or less religious as they become richer? Do people change their religion as they become richer? And do people increase or decrease church attendance as they become richer? To the best of our knowledge, we are the first to provide credible causal estimates of both positive and negative income shocks on church membership and attendance at the household level.

The empirical literature on the subject is mostly correlational. While some studies find that church attendance is weakly negatively correlated with income, the direction of causality is unclear (Iannaccone, 1998). Cross-country studies typically find a negative correlation between per capita GDP and measures of religiousness (McCleary and Barro, 2006). An exception is Chen (2010) who uses differential exposure to the Indonesian financial crisis to estimate the causal effects of economic distress on religious intensity. He finds that families who suffer greater distress increase Koran study and are more

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<sup>1</sup>See Iannaccone (1998) and Hoffmann (2013) for surveys.

<sup>2</sup>The data-set used in this study was collected by Buser et al. (2014) who use it to estimate the effects of income changes on child health.

likely to send their children to Islamic schools. He also demonstrates that religious participation serves as an ex-post social insurance mechanism.

The Latin American context is especially interesting as the region has recently experienced a dramatic shift away from catholicism towards evangelical denominations (Levine, 2009). These new churches specifically target poor and lower middle class households, through, for example, the use of indigenous languages and by establishing themselves in poor neighbourhoods.<sup>3</sup> While these evangelical communities are very diverse, they have in common that they are smaller, more tightly integrated and more participative than the official catholic church. They also ask a higher commitment both in terms of time and of financial contributions.

Studying evangelicals in Mexico, Bowen (1996) finds that congregations typically have less than 150 members and the majority of members lives within walking distance of the church. Most members attend at least two weekly services and even poor believers give substantial amounts to their church (traditionally, evangelicals are supposed to give a tithe, or one-tenth, of their income to the church). A much lower member to preacher ratio than the catholic church further increases personal attention and social control.

Churches are ultimately social clubs.<sup>4</sup> An increase in unearned income could both free up time for church attendance and increase the utility of attendance by increasing the status of the recipient, possibly through increased donations to the church. This is especially true for evangelical churches where communities are much smaller and where members are expected to donate part of their income. We would therefore expect a positive effect of income on church attendance and on membership in evangelical churches. On the other hand, as Chen (2010) demonstrates, religious participation can serve as an ex-post insurance mechanism and it is therefore possible that families which lose part of their income increase participation in return for assistance.

For the households in our sample, the income shock amounts to around 12 percent of expenditures, which is sizeable but hardly dramatic. A significant effect of this comparatively modest income shock would indicate that religious participation and church membership are quite elastic with respect to income.

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<sup>3</sup>For examples of the media coverage of the rise of the evangelical churches in Latin America, see <http://www.time.com/time/magazine/article/0,9171,156277,00.html>, <http://www.aljazeera.com/indepth/features/2012/03/201232593459332334.html>, <http://www.economist.com/node/9116934> and [http://www.economist.com/node/18063674?story\\_id=18063674&fsrc=rss](http://www.economist.com/node/18063674?story_id=18063674&fsrc=rss).

<sup>4</sup>See Iannaccone (1992), Berman (2000) and Berman and Laitin (2008) on the club-good model of religious participation.

## 2 Context and cash transfer program

Ecuador is a lower middle income country which has high poverty levels and high inequality. 72 percent of its population of around 14 million live in urban areas. The Ecuadorian government runs a cash transfer program called Bono Desarrollo Humano (BDH) which was launched in 2003 and is aimed at the poorest 40 percent of households. Initially, these families received a transfer of 15 US\$ per month which was increased to 30 US\$ in 2007 and then to 35 US\$ in 2009. The transfers are collected by the mother through local banks. Contrary to most other government-run cash transfer programs in Latin America, the BDH is not conditional on certain desirable behaviours by the recipients.<sup>5</sup>

Eligibility for the BDH is determined by a households' percentile on a wealth index (called SELBEN<sup>6</sup>). This index is based on a range of variables including household assets and housing characteristics (e.g. access to water, toilet, and shower), characteristics of the head of household (e.g. schooling and employment), children's characteristics and household size. It is calculated using nonlinear principal components analysis. The variables were collected through a census of all households living in poor areas. In 2010, all households in these areas were resurveyed and the definition of the index was changed (SELBEN II). The index is now composed of 59 variables covering the same areas (see Fabara, 2009, for the complete list of variables). For many households close to the cutoff 40th percentile, this led to changes in eligibility. Some households who had received the transfer for over seven years suddenly lost it while others suddenly gained it.

## 3 Empirical strategy

### 3.1 Regression discontinuity design

Not all families who are eligible collect their transfer and we therefore apply a fuzzy regression discontinuity design, using official eligibility as an instrument for winning or losing the transfer. The regression discontinuity design is essentially an instrumental variables approach in which a binary indicator  $Z$  for having a SELBEN II score below

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<sup>5</sup>In theory, recipients should send their children to school and to half-yearly health checks, but these conditionalities were neither effectively communicated nor controlled or enforced. In 2012, the government eventually started random checks which still only cover a small proportion of recipients.

<sup>6</sup>SELBEN stands for Selection of Beneficiaries.

the cutoff is used as an instrument for receiving the monthly cash transfer. Additionally, we condition on a polynomial in the SELBEN II score ( $s$ ), which is the forcing variable, and, in some specifications, on a set of controls  $X$ :

$$Y_i = \alpha + \delta T_i + f(s) + X_i\beta + \lambda E_i + \varepsilon_i$$

where  $Y$  is the outcome variable,  $T$  is a binary indicator for receiving the transfer and  $E$  is a binary indicator for having received the transfer before the change.  $T$  is instrumented by  $Z$ .  $\delta$  gives the effect of receiving the cash transfer on the outcome measure. The group of non-receivers consists of households which lost the transfer and households which never received it whereas the group of receivers consists of households who newly gained the transfer and those who already received it before the change. In estimating this equation, we therefore assume symmetry of the effects of income variation caused by winning and losing the transfer, i.e. of positive and negative income shocks.  $\delta$  can then be interpreted as the effect of an extra 35\$ of income. We also conduct the regression discontinuity estimation separately on the subsample of those who did not receive the transfer before the change (therefore comparing those who newly gained the transfer to those who never received it) and the subsample of those who did receive the transfer before the change (therefore comparing those who lost the transfer to those who kept receiving it). For all our estimations, we will present results for various specifications of  $f(s)$ .

### 3.2 Sampling and data collection

For our data collection, we randomly sampled 2800 households from poor neighborhoods in three urban centers (Guayaquil, Quito and Santo Domingo).<sup>7</sup> The sample frame consisted of households who scored within 0.3 standard deviations of the cutoff on SELBEN II. The households were randomly sampled within each city while always picking one of each group from the same parish so that the groups are balanced by parish. We used administrative data to ensure that all households in our sample complied with their eligibility status before the change. Furthermore, we only picked single-core households so that our sample only contains households which, if eligible, receive the transfer exactly once.

Figure 1 shows the timing of the SELBEN surveys and our own data collection.

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<sup>7</sup>See also Buser et al. (2014).

The SELBEN II survey was executed in 2007-2008 and the change in eligibility was implemented between August and October 2009. Our survey took place approximately two years after the change. The households in our sample were visited by professional enumerators who were instructed to only conduct the interview with the mother of the house. In case of her absence, the enumerators were to revisit the household several times. In case of repeated absence, a random replacement was drawn from within the same parish. In the end, we received data from 2645 households.

### 3.3 Validity of regression discontinuity approach

For our estimation strategy to be valid, households must not be able to precisely manipulate the assignment variable (Lee and Lemieux, 2009). While it is easy to imagine how a respondent could make herself look poorer than she actually is, all that is required for the RD approach to be valid is that she is not able to precisely determine her position on the SELBEN II index, so that near the cutoff every household has the same chance to have a score just above and just below the cutoff. In our case, this assumption is not a strong one as neither the weights of the variables nor the cutoff score were public information at the time the households were visited. Furthermore, the cutoff was determined ex-post such that exactly 40 percent of households receive the cash transfer. As we can see from Figure 2, which shows the distribution of SELBEN II scores, there is indeed no indication of bunching near the threshold.

Our sampling frame ensures that all households in our sample complied with their status of recipient or non-recipient before the change. Having access to administrative data, we can determine exactly which families collected a transfer at their local bank after the change. Figure 3 shows collection rates left and right of the cutoff. Compliance rates are high: 97 percent of ineligible households do not collect the transfer while 86 percent of eligible households collect their transfer. Non-collection of transfers can easily be explained with imperfect information. While the eligibility change was announced through the media, there was no personal communication with eligible households.

Table 1 shows F-statistics for the first stage (i.e. regressions of a binary indicator of transfer collection on the assignment variable) controlling for first, second, and third degree polynomials in the SELBEN II score. The F-statistics are in all cases very high and well above the rule-of-thumb threshold of around 10 (Angrist and Pischke, 2008).

## 4 Data

Our survey data contains answers to the following three religion-related questions. Which religion does your family have? How religious is your family (on a scale from 0 to 10)? And how often do you attend a religious service? Table 2 describes the answers. Roughly 75 percent of the households in our sample are catholic, 17 percent are non-catholic (evangelical) christians, 6 percent adhere to another religion and 2 percent describe themselves as atheists. 44 percent of households go to church at least once a week while 19 percent go only for special occasions or never. Finally, the average respondent judges her family’s religiousness as roughly a 7 out of 10.

We connect this data to the households’ SELBEN II scores and administrative transfer collection records to implement our regression discontinuity strategy. The average household in our sample has monthly expenditures of 297 US Dollars which means that an income change of 35 Dollars amounts to 11.8 percent of household expenditure.

## 5 Results

Figure 4 shows the relationship between the SELBEN II score and the three outcome measures: church attendance (measured in the categories described in Table 2), the likelihood of membership in an evangelical church, and self-rated religiousness. The observations are divided into bins with a width of 0.4. Each dot represents the average outcome for the households in each bin. The solid lines are the best linear fits through the dots. Below the graph, we report an estimate of the discontinuity at the cutoff and its p-value (from OLS regressions of the outcome variable on transfer eligibility including no control variables apart from the SELBEN II score). Table 3 shows IV regression results for different orders of the polynomial in the forcing variable.

We first take a look at church attendance. The first panel of Figure 4 shows that there is a clear and significant discontinuity at the threshold. Two years after the change in eligibility, transfer recipients attend more religious services than non-recipients. The IV results in Table 3 show that this effect is robust to the order of the polynomial and to the inclusion of controls. The effect is equal to roughly 0.5 which translates to around 1.7 additional monthly church visits.<sup>8</sup>

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<sup>8</sup>Attendance is measured in the categories described in Table 2. We translate this into monthly visits by taking the midpoint of every category and then applying the regression discontinuity estimation to



Next, we look at whether income has an impact on which kind of church people attend. The second panel of Figure 4 shows the relationship between the SELBEN II score and the likelihood of being evangelical. Again, there is a discontinuity at the threshold with transfer recipients being more likely to be evangelical. Using IV regressions, Table 3 shows that recipients are around 6.5 percentage points more likely to be evangelical. This effect is significant at the 10-percent level and is robust to using a second order polynomial and to the inclusion of controls, but not to using a third order polynomial.

Finally, there is no effect of income on self-rated religiousness. The third panel of Figure 4 shows that there is no gap at the threshold and the coefficients reported in Table 3 are small (equal to around 10 percent of a standard deviation) and insignificant.

It seems intuitive that more religious people would be more attracted to the intense worshipping practiced at evangelical churches. Given that the income shock has no impact on self-rated religiousness, we can split the sample into below and above average religious families and apply our regression discontinuity strategy to each subsample. The results of this exercise are reported in Figure 5 and Table 4. For the likelihood of being evangelical, we can see that the income effect indeed stems exclusively from above average religious families, who are around 14 percentage points more likely to be evangelical if they receive the cash transfer. The effect is close to zero for the below average religious families (the effects obtained from the two subsamples are significantly different from each other;  $p=0.020$ ).<sup>9</sup> However, both above and below average religious households attend church more often if they receive the cash transfer and the effect is very similar in magnitude for both subgroups ( $p=0.956$ ).

In our analysis, we have so far assumed symmetry. That is, we have assumed that the effect of losing income is the exact opposite of the effect of gaining income. We are now going to relax this assumption by splitting the sample into those who received the transfer before the change (i.e. comparing those who kept receiving it to those who lost it) and those who did not receive the transfer before the change (i.e. comparing those who newly gained it to those who continued without the transfer). Figure 6 shows regressions discontinuity graphs for these subsamples. For the positive shock, those to the left of the cutoff newly gained the transfer while those on the right never received it. For the negative shock, those to the left of the cutoff kept receiving the transfer after

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this measure.

<sup>9</sup>The test statistic was obtained by running OLS regressions (controlling for the SELBEN II score and earlier eligibility) and then applying Stata's seemingly unrelated estimation (suest) command.

the change while those to the right of the cutoff lost it. Table 5 reports IV regression results.

We can see that the effect of income on church attendance stems exclusively from positive income shocks. The effect translates to approximately three additional church visits per month for those who newly gained the transfer while the effect for those who lost the transfer is close to zero and insignificant. The difference between the magnitudes of the effects of positive and negative income shocks is significant ( $p=0.07$ ). The effects of negative and positive income shocks on the likelihood of being evangelical, on the other hand, are virtually symmetric ( $p=0.96$ ). This indicates that as people get richer, they tend to switch to evangelical denominations and as they become poorer they switch back to the catholic church. As the effect of income on church membership stems exclusively from above average religious families, Table 5 also reports regression results for this subsample. The picture is similar, the effects of gaining and losing the transfer are similar in magnitude and not significantly different ( $p=0.49$ ). As indicated by the absence of an income effect for the combined sample, neither positive nor negative income shocks have an impact on self-rated religiousness.

These results are consistent with churches, and in particular evangelical churches, being social clubs where participation is costly. Some household use their new-found wealth to gain access to these churches and increase their participation in church services. The results are also consistent with the catholic church providing a coping mechanism for those who experience negative economic shocks. Households who are negatively affected switch from evangelical churches to the catholic church but do not decrease church attendance. The social-club explanation gains further support from the fact that religious participation, but not self-rated religiousness, is affected by income changes.

## 6 Concluding remarks

Not much is known about how income affects religiousness. We use a change in the eligibility for a government cash transfer in Ecuador as a source of exogenous income shocks. We find that a moderate difference in income has sizeable and significant effects on the frequency with which people attend religious services and on the kind of church they attend. Both above and below average religious people attend church more often if they have more money. Above average religious people are also more likely to be

members of an evangelical community rather than the mainstream catholic church. On the other hand, income has no effect on how religious people rate themselves to be.

Higher income may increase the utility of participating in church activities by increasing status within the community, possibly through donations. Evangelical churches offer a more intense worshipping experience in smaller groups. Apart from a higher commitment in terms of time, members are also encouraged to give part of their income to the church. For religious people attracted by these churches, the cash transfer may therefore lift resource constraints for membership.

Sociologists have long adhered to the so-called secularisation theory which posits that societies become less religious as they develop. This theory has come up for criticism, not least because of the continuing importance of religion in the US (Berger, 2001). Our results show that it is far from clear that higher income leads to lower religious participation. We should therefore not automatically expect other societies to follow the European example and become more secular as they grow richer. Rather, church membership and attendance seem to be similar to membership and participation in social clubs. They are costly in terms of time and money and, for the households in our sample, have a positive income elasticity.

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## Appendix: Tables

Table 1: First-stage F-statistics

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Linear	1187
Second-order polynomial	1292
Third order polynomial	589

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Note: The F-Statistics are from regressions of actual transfer collection on an eligibility dummy controlling for a polynomial in the assignment variable (the SELBEN II score).

Table 2: Descriptive statistics

	N	%
Recipients	1,344	
Non-recipients	1,301	
Total observations	2,645	
Religion:		
catholic	1,971	74.52
non-catholic christian	452	17.09
jewish	2	0.08
atheist/none	53	2.00
other	167	6.31
Service attendance:		
never	192	7.26
only for special occasions	310	11.72
less than once a month	138	5.22
once a month	324	12.25
2 to 3 times a month	507	19.17
once a week	738	27.90
2 to 3 times a week	257	9.72
4 to 6 times a week	106	4.01
every day	73	2.76
	Mean:	SD:
Religiousness (0 - 10)	6.83	2.38
Household size	4.46	1.97
Age responder	42.7	11.0
Household expenditure	297	151

Table 3: IV regression results: effects of eligibility for cash transfer

	(1)	(2)	(3)	(4)	(5)	(6)	N
Church attendance	0.485** (0.191)	0.478** (0.192)	0.658** (0.268)	0.494*** (0.187)	0.489*** (0.188)	0.679*** (0.262)	2645
Being evangelical	0.066* (0.036)	0.064* (0.036)	0.034 (0.052)	0.067* (0.036)	0.065* (0.036)	0.034 (0.051)	2645
Self-rated religiousness	0.270 (0.228)	0.256 (0.230)	0.313 (0.316)	0.277 (0.226)	0.264 (0.228)	0.333 (0.311)	2645
1st-order polynomial	√			√			
2nd-order polynomial		√			√		
3rd-order polynomial			√			√	
Controls				√	√	√	

Note: Controls in Columns 4 to 6 include household size, age of the responder and marital status of the responder. All columns control for eligibility before the change. Robust standard errors in parentheses; \*, \*\* and \*\*\* denote significance at 10, 5 and 1 percent, respectively.

Table 4: IV regression results: effects of eligibility for cash transfer (sample split by religiousness)

	(1)	(2)	(3)	(4)	(5)	(6)	N
Church attendance:							
Above average religious	0.436* (0.226)	0.447** (0.226)	0.469 (0.314)	0.408* (0.221)	0.421* (0.221)	0.430 (0.308)	1480
Below average religious	0.443 (0.291)	0.409 (0.293)	0.859** (0.419)	0.489* (0.289)	0.456 (0.290)	0.943** (0.418)	1165
Being evangelical:							
Above average religious	0.140*** (0.051)	0.132*** (0.051)	0.054 (0.073)	0.139*** (0.051)	0.131*** (0.051)	0.052 (0.071)	1480
Below average religious	-0.028 (0.051)	-0.023 (0.051)	0.005 (0.071)	-0.023 (0.051)	-0.019 (0.051)	0.011 (0.072)	1165
1st-order polynomial	√			√			
2nd-order polynomial		√			√		
3rd-order polynomial			√			√	
Controls				√	√	√	

Note: Controls in Columns 4 to 6 include household size, age of the responder and marital status of the responder. All columns control for eligibility before the change. Robust standard errors in parentheses; \*, \*\* and \*\*\* denote significance at 10, 5 and 1 percent, respectively.



Table 5: IV regression results: effects of eligibility for cash transfer (positive vs negative income shocks)

	(1)	(2)	(3)	(4)	(5)	(6)	N
Church attendance:							
Gaining transfer	0.885***	0.884***	1.183***	0.944***	0.946***	1.258***	1318
(vs. continuing without)	0.288	0.290	0.420	0.285	0.287	0.415	
Keeping transfer	0.139	0.130	0.243	0.126	0.119	0.227	1327
(vs. losing transfer)	0.254	0.255	0.346	0.247	0.248	0.336	
Being evangelical:							
Gaining transfer	0.069	0.066	0.058	0.078	0.075	0.074	1318
(vs. continuing without)	0.056	0.055	0.083	0.055	0.055	0.082	
Keeping transfer	0.062	0.062	0.014	0.059	0.059	0.005	1327
(vs. losing transfer)	0.048	0.048	0.065	0.047	0.048	0.064	
Being evangelical (above average religious):							
Gaining transfer	0.121	0.107	0.006	0.125	0.113	0.024	744
(vs. continuing without)	0.080	0.080	0.114	0.079	0.079	0.113	
Keeping transfer	0.155**	0.152**	0.091	0.152**	0.149**	0.080	736
(vs. losing transfer)	0.066	0.066	0.094	0.064	0.064	0.091	
Self-rated religiousness							
Gaining transfer	0.308	0.281	0.191	0.356	0.330	0.245	1318
(vs. continuing without)	0.346	0.349	0.495	0.344	0.347	0.488	
Keeping transfer	0.237	0.232	0.413	0.222	0.219	0.400	1327
(vs. losing transfer)	0.303	0.305	0.409	0.299	0.302	0.402	
1st-order polynomial	√			√			
2nd-order polynomial		√			√		
3rd-order polynomial			√			√	
Controls				√	√	√	

Note: Controls in Columns 4 to 6 include household size, age of the responder and marital status of the responder. All columns control for eligibility before the change. Robust standard errors in parentheses; \*, \*\* and \*\*\* denote significance at 10, 5 and 1 percent, respectively.

# Appendix: Figures

Figure 1: Timeline

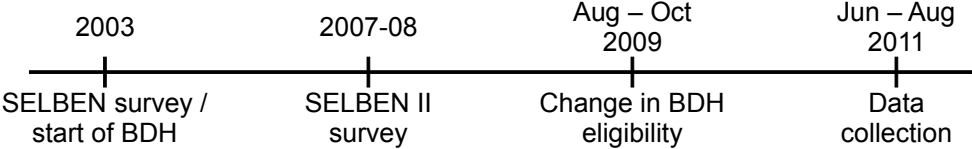
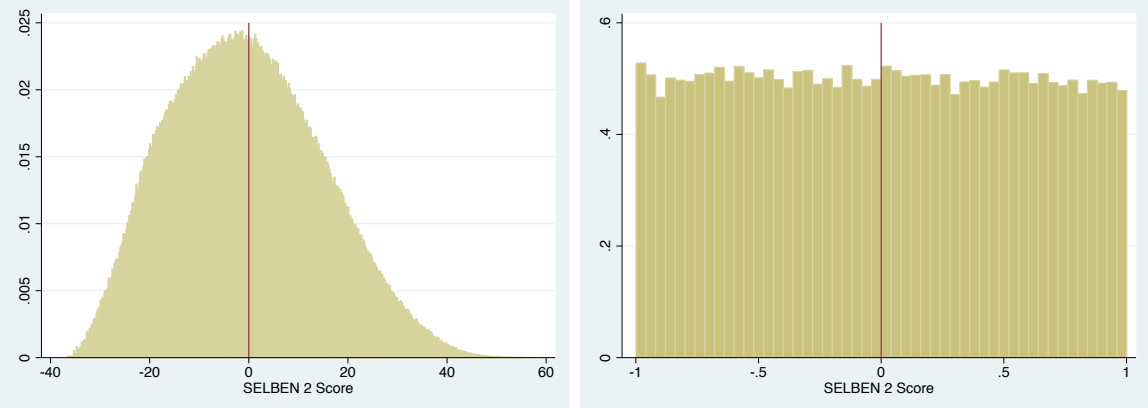
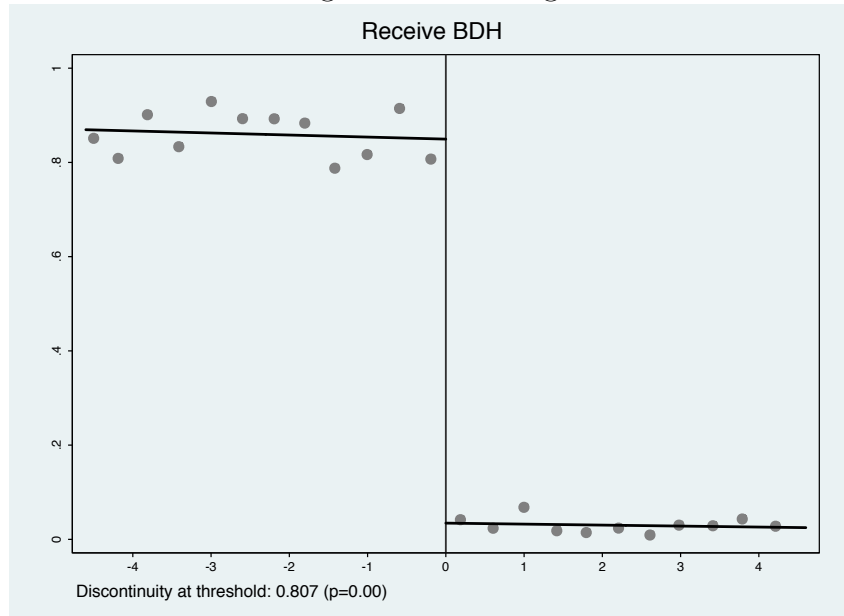


Figure 2: Frequency distribution of SELBEN II (population)



Note: The histograms are generated using the full SELBEN 2 database (2.175.512 households). The cutoff is normalised to zero.

Figure 3: First stage



Note: the figure shows the proportion of households who collect the BDH above and below the cutoff. Observations are divided into bins with a width of 0.4 and the SELBEN II score is normalised to be zero at the cutoff. Households to the left of the cutoff are eligible to receive the transfer while those to the right are not.

Figure 4: Regression discontinuity graphs

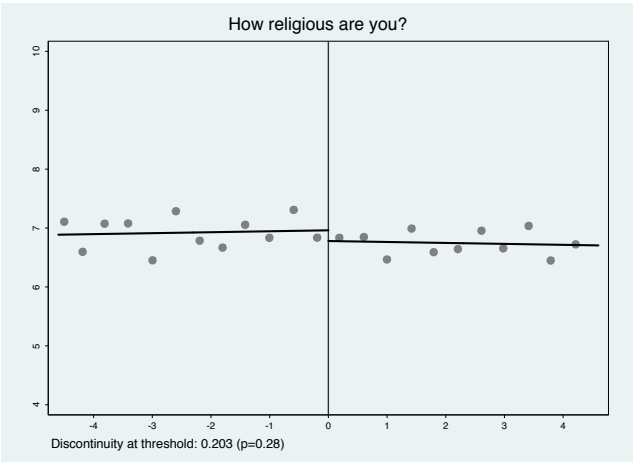
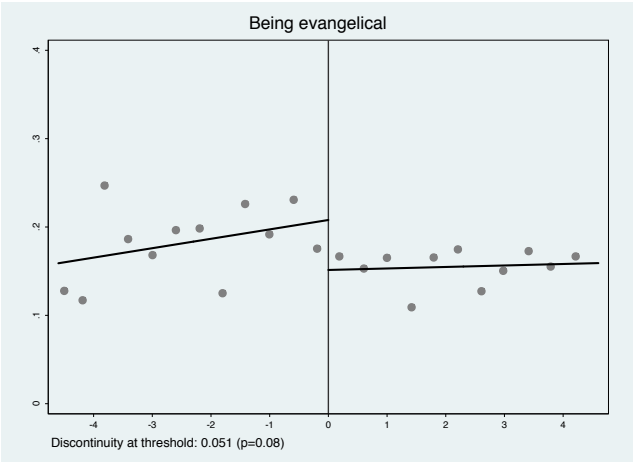
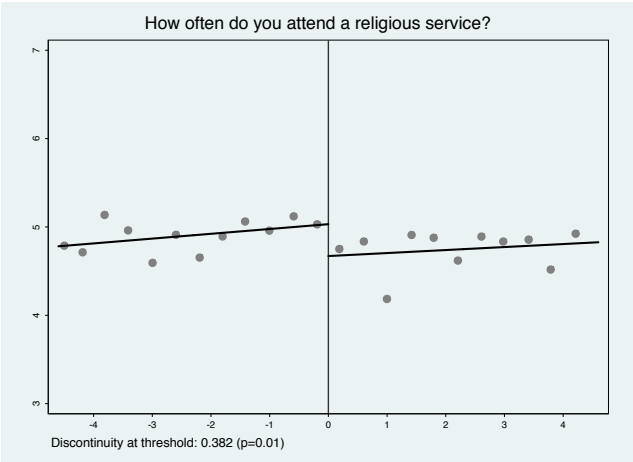


Figure 5: Regression discontinuity graphs (by religiousness)

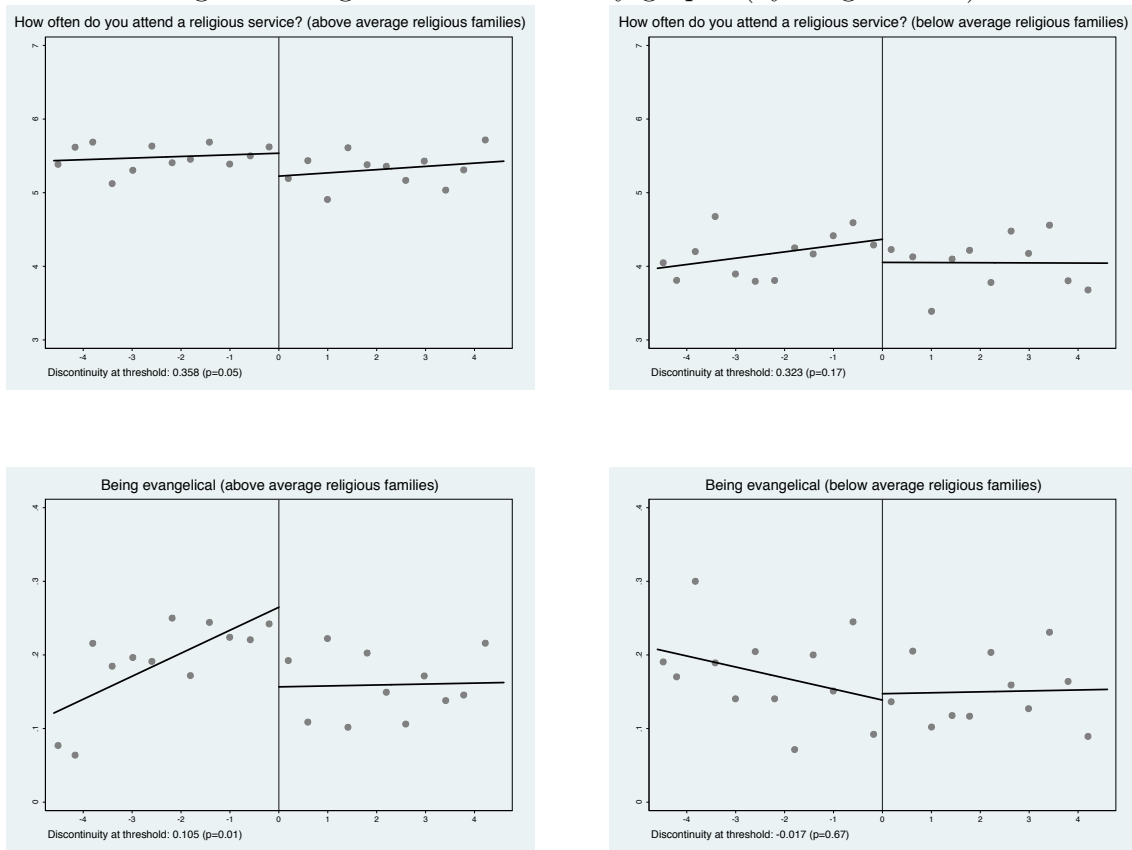


Figure 6: Regression discontinuity graphs (positive vs negative shocks)

