The Impact of Media Campaigns on Tax Filing: Quasi-Experimental Evidence from Pakistan.

Antonios M. Koumpias [1,*] and Jorge Martinez-Vazquez [2]

Abstract

This paper examines the effect of mass media campaigns on income tax filing using survey data from Pakistan. We use information collected before and after a communication campaign shortly after the 2013-2014 tax filing deadline by Pakistan's Federal Board of Revenue. Employing coarsened exact matching, we create comparable treatment and control groups in terms of demographic and behavioral predictors of income tax filing. We find that in response to exposure to newspaper advertisements with neutral information provision, respondents' likelihood of income tax filing significantly increased, whereas the TV advertisements that relied on moral suasion improved tax filing but not in a statistically significant way. This highlights the importance of both the choice of medium as well the content of the message itself employed by a tax administration to enhance income tax filing.

Keywords: Personal income tax, income tax filing, tax compliance, tax morale, nudging, Pakistan

JEL classification: H26, K42

* Corresponding Author

[1] Koumpias: Department of Social Sciences, University of Michigan-Dearborn, 4901 Evergreen Road, Dearborn, MI 48128, USA; koumpias@umich.edu

[2] Martinez-Vazquez: International Center for Public Policy, Department of Economics, Andrew Young School of Policy Studies, Georgia State University, 14 Marietta Street, Atlanta, GA 30303, USA; jorgemartinez@gsu.edu

Acknowledgements: The authors would like to thank Musharraf R. Cyan, Adam Smith, UK's Department for International Development and the Federal Board of Revenue for making the data available for analysis. No financial disclosure is required. All errors remain our own.

1. Introduction

Could policymakers influence economic behavior to promote higher economic and societal outcomes through relatively costless interventions that are not limiting individuals' freedom of choice (Thaler and Sunstein, 2003)? In the context of tax compliance can mass media information campaigns by the tax administration authorities actually induce taxpayers to file their income tax returns in developing countries? Will neutral information provision or moral suasion be more effective? Nudging taxpayers has emerged as an effective strategy in enhancing tax compliance in developed economies. However, it remains unclear whether similar behavioral strategies can improve fiscal outcomes in economies that exhibit low voluntary tax compliance rates and weak tax enforcement. Moreover, the approach that tax administrations should follow in carrying out a behavioral strategy is not obvious. Could taxpayer behavior be altered only through carefully planned randomized field experiments? Or can simpler interventions with a wider scope-- that could be out-sourced such as a mass media campaign-- yield behavioral change? This is an important question given the relatively limited capacity of tax administrations in developing economies to carry out randomized field experiments and scarce resources to implement extensive enforcement campaigns.

This paper uses survey data to examine the impact of a tax compliance campaign by the Federal Board of Revenue (FBR) of Pakistan on income tax filing in 2014. We assess whether neutral information provision or moral appeals by the FBR delivered through newspaper and TV ads, respectively, are more effective in increasing personal income tax filing rates. From a policy perspective, given its perennial low rate of tax effort it is vital for Pakistan's development to generate more tax revenues. This goal will be more likely met by bringing more individuals into the tax net and ensuring they become active income tax filers. In Pakistan, personal income taxpayers registered with the FBR increased from 0.75 million in 2000 to 3.6 million in 2014, while the labor force includes 56.5 million individuals of whom 5.7 million are estimated to earn income above the filing exemption threshold. Still, only a small minority of 0.98 million taxpayers actively file a personal income tax return.

In recent years, there has been a rise in the number of tax administrations around the world employing behavioral strategies to enhance tax compliance. These include information media campaigns about the tax revenues' usage such as the one implemented by the Estonian Tax and Customs Board in 2010 and 2011, moral suasion media campaigns as the one carried out by the

Italian government in 2011 (Eurofound, 2013; Povoledo, 2011). Experimental evidence has highlighted that increased tax information may improve how taxpayers view the tax system and that tax-focused media campaigns can alter voluntary tax compliance (Eriksen and Fallan, 1996; Kasper et al, 2015). In addition, Alm et al., (2010) provide evidence from lab experiments that agency-provided information can have a positive and significant impact on the likelihood of filing a tax return as well as accurate income tax reporting by individuals. Since 2012 the FBR has introduced non-media information campaigns with a nationwide scope that include public disclosure programs focusing on tax remittance and a top 100 taxpayers honors-and-rewards program. Slemrod et al. (2018) find that the public disclosure campaign led to an increase in tax remittance while the social recognition campaign was even more effective in inducing higher tax remittance.

The purpose of this paper is to examine the effectiveness of tax administration nudges communicated via mass media in enhancing income tax filing in Pakistan. We use individual-level surveys of randomly selected Pakistani income tax filers shortly after the implementation of pro-tax filing mass media campaigns and the 2013-2014 tax filing deadline. These mass media campaigns reached only a fraction of the survey participants, thereby introducing a natural experiment setting. In our analysis we match respondents using propensity score matching, which allow us to mimic treatment assignment through the ex-post construction of a control group. We use this source of cross-sectional variation to identify both the causal treatment effect of neutral information messages in newspaper ads and of moral suasion messages in TV ads on income tax filing.

The contribution of this paper is twofold. First, it offers the first quasi-experimental evaluation of the efficacy of a tax agency's behavioral intervention executed through mass media campaigns on enhancing survey-recored income tax filing, a subjective measure of tax compliance. Second, it expands our limited understanding of how different message content can influence tax compliance in a developing economy characterized by low voluntary tax compliance and weak tax enforcement. From a policy perspective, our results illustrate whether low-cost, wide-scope behavioral strategies may be added to the tax administration's toolkit of affecting taxpayer behavior to increase overall tax compliance.

Our findings indicate that mass media campaigns did indeed improve personal income tax filing in Pakistan. First, we show that the moral suasion TV ad had a large positive but statistically insignificant effect on filing. Second, we provide evidence that the neutral information provision newspaper ad had a smaller, positive but more precisely estimated treatment effect on income tax filing.

The rest of the paper is organized as follows. Section 2 discusses the novel dataset we use in the empirical analysis and provides background information on the mass media communication campaign. Section 3 describes the methodology employed, Section 4 presents the results and Section 6 concludes.

2. Data

We employ survey information collected after the mass media communication campaign and the 2013-14 tax return submission deadline in Pakistan. After the conclusion of the campaign, a follow-up perception survey took place. Along with demographic and socio-economic characteristics, the available information includes 2013-2-14 tax filing status, voluntary attitudes towards tax compliance (tax morale) and perceptions about the effectiveness of the different communication devices used by the FBR.

The follow-up perception survey took place in ten major metropolitan areas across all four provinces of the country. Multiple localities of major industrial and economic activity within each metropolitan area were chosen to ensure a large number of eligible tax filers and respondents from a wide range of economic sectors. Since tax filing eligibility was unobservable, it was determined from individuals' responses. As a result of visits to multiple localities within a metropolitan area, individuals from a mix of economic sectors were surveyed. Table 1 below provides summary statistics of the variables assessed as predictors of income tax filing based on the full, pre-matching sample of the baseline survey.

Table 1: Summary Statistics of Survey Data on Income Tax Return Filing Determinants

	N[a]	Mean[b]	Std Dev[c]	Min[d]	Max[e]
Income Tax Return Filed	1,008	.753	.430	0	1
Female	1,008	.206	.404	0	1
Age	998	38.090	7.624	18	70

School ≤ 9 Years	1,008	0.248	.155	0	1
High School	1,008	.079	.270	0	1
Bachelor's	1,008	.361	.480	0	1
Graduate Degree	1,008	.506	.500	0	1
Unemployed	1,008	0.001	0.031	0	1
Salaried Worker	1,008	.898	.300	0	1
Self-employed	1,008	0.083	.276	0	1
Pensioner	1,008	.015	.125	0	1
Years Work Experience	983	12.258	7.110	1	40
Very Small Firm (1-9)	945	.193	.395	0	1
Small Firm (10-19)	945	.369	.482	0	1
Medium Firm (30-100)	945	.225	.418	0	1
Large Firm (100+)	945	.211	.408	0	1
Tax Morale	988	.273	.445	0	1
Tax Deducted at Source	990	.723	.447	0	1

Notes: Age and work experience are the only two continuous variables.
[a] Number of Observations.
[b] Sample Mean.
[c] Standard Deviation.
[d] Minimal Value.
[e] Maximal Value.
[f] Variable Count.
[g] Proportion Within Sample.

2.1 Description of Mass Media FBR Communication Campaigns

The mass media FBR communication campaigns took place between September and October 2014, with higher frequency shortly before the 2013-2014 tax filing deadline on October 31st. Four mass media were utilized to communicate the pro-tax filing message of the FBR through advertisements (ads); television, newspaper, radio and short messaging service (SMS) mobile phone text messaging. Approximately one-third (36 per cent) of all survey participants were exposed to the campaign, generating a large control group. The majority of survey respondents were exposed to TV ads (386 or roughly 68 per cent) and newspaper ads (199 or about 40 per cent). Very few (3 per cent) came across radio (17 respondents) and SMS ads (11 respondents) despite 3.5 million texts sent in 5 metropolitan areas. There seems to be a policy lesson here from the drastically different penetration rates of each medium across metropolitan areas (see Table C.1 in Appendix C). TV and newspapers exhibit an undisputed superiority over radio and SMS in terms of reach. This suggests that the former two mediums should be the primary communication platforms of tax authorities in a developing country. over Radio appears to be a substitute to TV and only modestly effective where TV's reach is not as dominant such as in Quetta, in the

insurgency-prone province of Balochistan. SMS may have some reach only in large urban metropolitan areas such as Islamabad/Rawalpindi, the capital, and Karachi. As a result, we only examine the impact of the TV and newspaper ads on income tax filing and suppress any further discussion of the radio and SMS ads.

It should be noted that the survey information captures only the extensive margin of treatment status. We do not have data on the intensive margin of exposure to the treatment; in particular, length of exposure to each ad is unobservable. We can only contend that exposure to treatment was comparable across ads.

2.2 Design and Content of Moral Suasion TV Advertisements

Three different TV ads each lasting 30 seconds were broadcasted daily during prime time (from 6pm to 9pm on weekdays) from October 16th through October 30th. They were placed on premiere news channels (Samaa News, Express News, Dunya News, Dawn News and Capital TV) that cover a wide range of political ideology in Pakistan. TV ads were frequently aired with at least one and at most two inserts per hour per news channel.

The TV ads represented the moral suasion nudge by the FBR. Its goal was to increase the non-pecuniary moral gain from filing through suasion. The TV ads displayed tax compliant professionals attesting to the simplicity and the importance of the tax filing process. Specifically, a wholesaler (see Link A.1 in Appendix A), a fashion designer (see Link A.2 in Appendix A) and a lawyer (see Link A.3 in Appendix A) argue that income tax filing taxes contributed to Pakistan's development while examples of man-made national landmarks were momentarily shown and the national flag of Pakistan was displayed on the background to appeal to viewers' national identity. Surveys and lab experiments in Austria show that the appearance of the national flag can indirectly improve tax morale and trust in the tax authorities whereas national landscapes may only enhance voluntary tax compliance (Gangl et al., 2016). Each TV ad ended with a closing pro-filing statement by each professional, resembling the use of a slogan in the successful tax amnesty mass media campaign in India in 1997. However, the FBR was not identified as the institution behind the TV ads throughout their entirety. As a result, survey respondents misperceived the source of the message content as discussion groups with a limited number of respondents revealed.

2.3 Design and Content of Informational Newspaper Advertisements

The newspaper ads were placed on the back page of leading national, daily newspapers with high readership, published in both Urdu and English and ran with color. The ads first appeared on a business outlet on September 14th and September 21st and later on all newspapers on October 14th, October 19th, October 26th, October 28th, October 29th and October 30th.

The newspaper ads contained the neutral information nudge of the FBR comprised of two sub-treatments. The newspaper ads aimed to encourage income tax filing by reducing non-pecuniary filing search costs surrounding eligibility or underscoring pecuniary filing benefits. It should be noted though that these benefits do not represent additional income in the form of tax deductions but lower tax rates exclusively available to compliant taxpayers relative to the great tax rates faced by delinquent taxpayers. First, the newspaper ads contained a neutral information nudge specifying eligibility criteria for filing an income tax return but also when the tax-filing deadline is as a side-note (see Image B.1 in Appendix B). Second, a reversed information nudge was used that highlighted the tax filing deadline while relegating tax eligibility criteria to the bottom of the ad and printed in small font (see Image B.2 in Appendix B). Third, a markedly different nudge was finally employed which focused on the benefits of income tax filing such as the avoidance of penalties in the form of higher tax rates on dividend income, bank profits and other economic transactions (see Image B.3 in Appendix B). The tax filing eligibility nudge was headlined by the motto "who is to submit income tax return" and the income tax filing benefits' one by "do you know the benefits of filing your income tax return". Similar to the TV ads, the national flag of Pakistan was superimposed on the background in all newspaper ads. However, this time it was obvious that the FBR was behind the newspaper ads through the inclusion of its logo and designation of the government branch responsible for the ad.

3. Empirical Analysis

This section first motivates our identification strategy. Then, we discuss our inverse probability weighting regression adjustment (IPWRA) estimator which has the doubly robust property (Wooldridge, 2010). Inverse-probability weighting has been extensively used in order to estimate causal treatment effects in observational studies in the medical literature (Austin and Stuart, 2015).

Regression-adjustment can be used to account for residual differences across treatment levels for the estimators to be consistent (Imbens, 2004). We present both the logit regression model specified to estimate the propensity score of survey respondent exposure to the media campaigns and the linear regression model specified to calculate the average treatment effects of the media campaigns on tax filing.

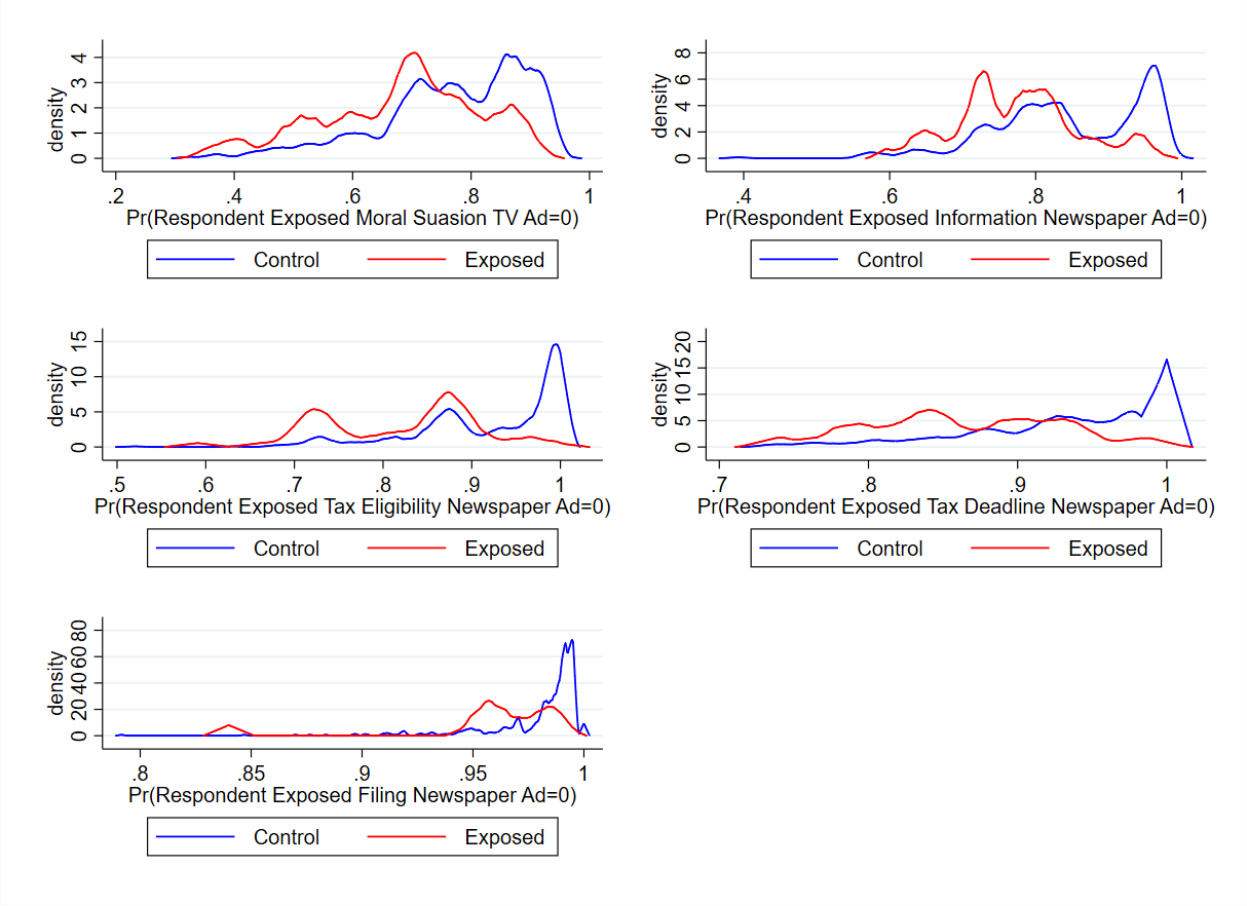
3.1 Identification

Given the observational nature of our study, we are subject to the fundamental problem of causal inference since each survey respondent was exposed to only one of the potential outcomes; exposure or non-exposure to the media campaign represents a "missing-data" problem. To account for the "missing-data" problem we use a prediction model of tax filing weighted by inverse probability weights coming from a model of media exposure propensity.

For a causal interpretation of the estimated treatment effects, it is required that the common support or overlap and the unconfoundeness and assumptions are satisfied (Rosenbaum and Rubin, 1983).

Common support holds as long as the probability of assignment to treatment is greater than zero but less than one. This is a plausible assumption given that exposure to treatment was open to all survey respondents as long as they had access to mass media outlets such as newspapers and TVs. Figure 1 below graphs the estimated density of the predicted probabilities that a respondent who was not exposed to a treatment arm (blue line) of the media campaign (moral suasion TV ad, information newspaper ad, tax eligibility information newspaper ad, tax deadline information newspaper ad, or tax filing benefits information newspaper ad) was not exposed to the respective treatment arm and the estimated density of the predicted probability that a respondent who was exposed to a treatment arm (red line) of the campaign was not exposed to it.

Figure 1: Predictive Probabilities of Treatment Assignment – Common Support Plots



Naturally, greater probabilities are predicted for respondents who were not exposed to a treatment arm. In 8 out of 10 predicted probability plots there are no observations with no probability of receiving treatment while some probability mass has near-certain treatment probability. However, the plots of the predicted probability of survey respondents not exposed to the tax deadline and tax filing benefits treatment arm have a non-negligible and very large density mass close to one. The common support assumption also requires overlap of the mass of the estimated densities across treatment levels which holds for all but the tax filing benefits information newspaper ad treatment arm. In sum, there is no overwhelming evidence suggesting that the common support assumption is violated in the assignment of all treatment arms but arguably the tax filing benefits one. In light of this finding and to ensure we are not inferring using respondents with very low media exposure likelihood, we set a tolerance rate of the minimum accepted propensity score at 1e-5.

Unconfoundedness requires that assignment to treatment is independent of the potential outcomes conditional on observable characteristics (selection on observables). However, despite

the random sample of survey participants, exposure to treatment (TV or newspaper ad) is non-random. Individuals self-select themselves into treatment when coming across a media campaign via a TV or a newspaper ad. Therefore, to identify the causal effect of the media campaigns on tax filing, one should also remove bias from selection into treatment (exposure to any pro-tax filing ad) and between treatment (exposure to either TV ad or newspaper ad). We achieve this by estimating the probability of media exposure on the basis of individual-level observable characteristics to account for selection into treatment such as age, gender, educational attainment and metropolitan area. We additionally include information such survey respondents' preferred news source and estimate different propensity scores for exposure to either the newspaper or the TV ad to adjust for selection between treatment. We posit that our approach satisfies unconfoundedness because we select on observables that have been previously identified in the tax compliance literature on Pakistan (Cyan et al, 2016; Cyan et al., 2017).

3.2 Estimation

We follow a three-step estimation approach. First, we estimate the probability of media exposure to a newspaper or a TV ad given individual-level observable characteristics such as age, gender, educational attainment and metropolitan area, preferred news source. Using these propensity scores as inverse probability weights, we regress tax filing on an indicator of newspaper or TV ad exposure and a set of covariates likely to influence tax filing for the treated and control subpopulations separately. A comparison of the resulting average treatment-specific predicted outcomes yields the average treatment effects. We focus on the average treatment effect on the treated (ATT).

It should be noted that despite the use of propensity scores of media exposure, the IPWRA estimator differs from the propensity score matching estimator. The IPWRA estimator derives probability weights used in tax filing regression models estimated at each treatment-level separately. The average treatment effects are computed as the difference between averages of treatment-level predicted outcomes. In contrast, the propensity score matching (PSM) estimator imputes potential outcomes for each respondent via comparison to a set of other respondents who have similar propensity of exposure to a media campaign ad. In this case, the average treatment

effects are calculated as the average of the difference between the observed and potential outcomes for each respondent (Wooldridge, 2010). We choose IPWRA as our baseline estimation method because it exhibits the doubly-robust property. Specifically, either the media exposure prediction model or the tax filing prediction model is required to be correctly specified for the IPWRA estimator to be consistent (Wooldridge, 2007). For robustness, we report the ATTs of the media campaigns on tax filing based on PSM estimators. The estimates are qualitatively similar and quantitatively less conservative to the IPWRA ones.

3.2.1 Treatment Model: Determinants of Media Campaign Exposure

The logit model we use to calculate the propensity score of media exposure is given by:

$$Media\ Campaign_i = \beta_0 + \boldsymbol{\beta X_i} + \boldsymbol{\gamma MediaSource}_i + \varepsilon_i \quad (1)$$

where our dependent variable $Media\ Campaign_i$ indicates which pro-tax filing ad respondent *i* was exposed to before the end of the 2013-2014 tax season. The key variable we used to estimate individual treatment probabilities is individuals' preferred media source of news using dummy variables for newspaper and TV as individuals' preferred media source for news. We additionally include a vector of covariates $\boldsymbol{X_i}$ such as respondent *i's* age, age squared, gender, metropolitan area of residence and educational attainment, as these are measures also likely to influence individual likelihood of media exposure.

3.2.2 Outcome Model: Average Treatment Effect on the Treated

We use the following linear regression to estimate the average treatment effect of the media campaigns on income tax filing:

$$Tax\ Filer_i = \beta_0 + \rho Media\ Campaign_i + \boldsymbol{\delta \Pi_i} + \gamma Province_i + \varepsilon_i \quad (2)$$

where the dependent variable $Tax\ Filer_i$ indicates whether respondent *i* filed her personal income tax return by the end of the 2013-2014 tax season. We control for a number of covariates, collected in vector $\boldsymbol{\Pi_i}$, likely to influence tax filing such as, work experience, firm size, participation at a tax deduction program at work, and tax morale, an umbrella term used to capture

willingness to voluntarily comply with taxes.[1] A potential shortcoming of tax morale is that individuals' responses may not correlate with actual tax behavior.[2] Some individuals may want to make up for past behavior by asserting high tax morale in survey responses. However, Halla (2012) does demonstrate a causal link between tax morale and a measure of tax compliance, namely the size of underground economy. In the context of developing economies, Cummings et al. (2009) conduct an artefactual field experiment and use survey information to show that tax morale increases tax compliance conditional on the enforcement level. Time-invariant, province-specific variation is captured by dummy variables at the provincial level j.[3] The parameters in (2) are estimated for the treatment and control groups separately and then used to obtain predicted outcomes for each respondent. The key parameter of interest is ρ which denotes the estimated ATT and represents as the difference between the average predicted outcomes of the respondents exposed to the newspaper or the TV ad.

4. Results

Table 2 below shows the estimates of the logit regression model specified in equation (1). We focus on the sign and statistical significance of the estimated coefficients given the non-linear model. For an interpretation of the magnitudes, the estimation of marginal effects is required.

Table 2: Determinants of Media Exposure [a]

VARIABLES	(1) Moral Suasion - Control Sample [b]	(2) Information - Control Sample [b]	Tax Eligibility - Control Sample [b]	Tax Deadline - Control Sample [b]

[1] Luttmer and Singhal (2014) distinguish among five classes of mechanisms affecting tax morale: intrinsic motivation, reciprocity, peer and social effects, culture, information imperfections and deviations from utility maximization. The variable is constructed from survey responses to the statement "Cheating on taxes in Pakistan is never justifiable". The phrasing points to outright illegal tax evasion such that the variable does not capture similar phenomena such as tax avoidance or tax flight that are known to be viewed differently (Kirchler et al., 2003). The answers were recorded on a scale from 1 to 5 but we collapse the ordinal information to an indicator variable which takes the value of one if respondent i strongly agreed, or agreed to the previous statement and zero if respondent i neither agreed nor disagreed, disagreed, or strongly disagreed to the previous statement.

[2] Although the direct relationship between Tax Morale and actual compliance behavior has yet to be developed in detail, average levels of Tax Morale in a country appear to be correlated with the country's size of the underground economy which has been interpreted as the impact of Tax Morale on tax evasion (Torgler and Schneider 2007; Alm and Torgler, 2006). The same problem affects the neoclassical model of tax evasion; intentions are assumed to be known from observed non-compliant behavior, but observed non-compliance may be also due to misinterpretation of tax laws or lack of resources when filling out one's taxes (Braithwaite, Reinhart, and Smar, 2010).

[3] We choose to specify a provincial fixed effect which represents a more aggregate geographical level to the metropolitan area fixed effect specified in the propensity score logit regression in (1) because tax policy in conducted at the national and provincial level and, thus, regional-induced variation in tax filing should be vary across provinces and be common across all metropolitan areas within a province.

Female	0.800*** [c]	-0.609***	-1.026***	-0.555**
	(0.196) [d]	(0.135)	(0.100)	(0.272)
Age	-0.177***	-0.208***	-0.279*	-0.135*
	(0.030)	(0.048)	(0.157)	(0.072)
Age squared	0.002***	0.002***	0.003*	0.001
	(0.0002)	(0.0006)	(0.002)	(0.0008)
School ⩽ 9 Years	-0.433	0.300	1.086	-17.372***
	(0.551)	(0.838)	(0.523)	(0.752)
High School Diploma	-0.620**	0.322	1.010	-0.519
	(0.245)	(0.342)	(0.516)	(0.691)
Graduate Degree	-0.176	0.021	0.058	0.149***
	(0.236)	(0.061)	(0.157)	(0.051)
TV News Source Preference	0.321			
	(0.204)			
Newspaper News Source Preference		1.831***	3.832***	0.073
		(0.012)	(0.199)	(0.325)
Constant	1.834**	1.305*	-1.334	1.490
	(0.966)	(0.861)	(2.795)	(1.465)
Observations	665	598	546	535

Notes:

[a] Logit treatment model regression output results. Education dummy variables in reference to bachelor's degree holders. Media preference dummy variables in reference to other media sources such as the radio, online, social media, and mobile phones.

[c] Geographical dummy variables and perfectly colinear newspaper media source preference indicator omitted from treatment assignment model for GMM estimation convergence.

[b] Outcome is equal to one if the respondent was exposed to a treatment arm of the media campaign and zero, otherwise.

[d] *** p<0.01, ** p<0.05, * p<0.1

[e] Standard errors clustered at the provincial level in parentheses.

The results indicate that the strongest predictors of exposure to a treatment arm of the media campaign income tax filing are gender and age. Females are significantly more and less likely to be exposed to the moral suasion TV ad and any of the information newspaper ads relative to males, respectively. The probability of exposure to any of the media campaigns treatment arms is decreasing in respondent age at an increasing rate. Respondents with a high school diploma have a lower exposure likelihood to the moral suasion TV ad relative to bachelor's degree holders. Similarly, those with less than nine years of formal education are less likely to be exposed to the tax deadline information and tax filing benefits information newspaper ad to the baseline. On the contrary, respondents with graduate school education are more likely to be exposed to the tax deadline information newspaper ad. The TV and newspaper preferred news media source indicators have the expected positive relationship with exposure to the moral suasion TV ad and

information newspaper ads, albeit significant only for some of the information newspaper treatment arms.

Table 3 presents the estimates of the media campaign's treatment arms average treatment effect on the treated (ATT) on tax filing from the linear probability outcome model of the IPWRA estimator.[4] Column (1) shows the ATT of the moral suasion message watched on a TV ad whereas column (2) the aggregate ATT of all three information nudges read on a newspaper ad. In columns (3)-(5) we decompose the information nudge into the three sub-treatments it is comprised of and analyze each separately; namely, the tax eligibility nudge specifying who is to submit an income tax return, the tax deadline nudge specifying the tax filing deadline, and the filing benefits nudge specifying the benefits from filing a tax return.

Table 3: Effect of Media Campaign on Income Tax Return Filing[a]

	(1) [b]	(2)	(3)	(4)	(5)
TREATMENTS					
Moral Suasion	0.058 [c]				
	(0.054) [d]				
Information		0.086**			
		(0.040)			
			Information Sub-treatment Ads		
Tax Eligibility			0.176***		
			(0.009)		
Tax Deadline				-0.005	
				(0.066)	
Filing Benefits					-0.066
					(0.103)
Observations	665	558	546	535	552

Notes:
[a] Second-stage IPWRA estimation results.
[b] Outcome is equal to one if the respondent filed an income tax return and zero, otherwise.
[c] *** p<0.01, ** p<0.05, * p<0.1
[d] Robust standard errors in parentheses.

[4] Table D1 shows the effect of the media campaigns on income tax filing using propensity score matching. With the exception of the tax filing deadline newspaper ad, our findings are generally robust to the quasi-experimental method employed. The propensity score matching results are qualitatively similar to the IPWRA ones with the estimated magnitudes being relatively smaller.

We find that both the moral suasion TV and information newspaper ads had a positive effect on the probability of personal income tax filing. Specifically, moral suasion increased tax filing rates by 5.8 percentage points but not at conventional levels of statistical significance. However, the magnitude of the estimated coefficient is sizable. Therefore, the estimated ATT of the moral suasion treatment arm should not be immediately discarded in the face of the lack of statistical significance; it is meaningful from a policy standpoint and as shown in section 4.2. The information nudges through newspapers had a more positive and precisely estimated impact on tax filing rates at 8.6 percentage points. When decomposing the aggregate ATT of the information newspaper ads, we find that the tax eligibility information ad was solely responsible for the previously estimated positive effect. The latter produced a large and statistically significant increase in tax filing probability by 19.4 percentage points. The tax deadline information ad had a null effect on tax filing – we estimate a very small negative effect centered around zero. The estimated ATT of the tax filing benefits information ad is negative and insignificant. Contrary to the tax deadline information ad, the estimate cannot be interpreted as a true zero and warrants further investigation. We analyze the heterogeneity of our baseline estimates of the impact of the media campaigns on tax filing by employment status; namely, salaried or self-employed in subsection 4.2. We defer full discussion of the estimated ATTSs to subsection 4.3 in conjunction with the heterogeneity analysis results. In sum, our findings are in line with prior evidence indicating that cast doubt on the effectiveness of moral suasion nudges in increasing income tax filing while favoring pure information provision (Blumenthal et al., 2001; Hallsworth et al., 2017; Meiselman, 2018; Perez-Truglia and Troiano, 2018).

4.2 Heterogeneous Treatment Effects

In this section, we split the sample by employment group to explore differential tax filing responses to the media campaign between salaried and self-employed survey respondents. There is reason to believe that self-employed may be less likely to file their tax return on time relative to salaried individuals. Obviously, a larger fraction of the salaried subpopulation is subject to tax withholding at work through PAYE programs, a factor we controlled for in equation (2). There is

an extensive and well-established literature documenting lower tax compliance rates for self-employed taxpayers due to income underreporting (Pissarides and Weber, 1989; Feldman and Slemrod, 2007; Artavanis et al., 2016). Moreover, the self-employed are considered "hard to tax" and, especially so, in developing economies such as Pakistan (Alm et al., 2005). This exercise also allows us to distinguish whether a particular employment group is driving the aggregate results in 4.1 or the latter are generalizable to taxpayer behavior throughout the workforce.

Table 4: Effect of Media Campaign on Income Tax Return Filing[a]

TREATMENTS	(1) [c]	(2)	(3)	(4)	(5)
Salaried-Pensioners					
Moral Suasion	0.065 [d]				
N= [b]	(0.056) [e]				
Information		0.075**			
N=555		(0.030)			
Self-Employed					
Moral Suasion [f]	0.202***				
N=	(0.060)				
Information [g]		-0.045			
N=38		(0.276)			
			Information Sub-treatment Ads		
Salaried-Pensioners					
Tax Eligibility			0.149***		
N=506			(0.021)		
Tax Deadline [i]				0.073	
N=496				(0.105)	
Filing Benefits [k]					-0.041
N=514					(0.132)
Self-Employed					
Tax Eligibility [h]			0.186***		
N=50			(0.067)		
Tax Deadline [j]					
N=50				-0.514***	
Filing Benefits [l]				(0.142)	
					-

Notes:

[a] Second-stage IPWRA estimation results.

[b] Number of observations per treatment arm.

[c] Outcome is equal to one if the respondent filed an income tax return and zero, otherwise.

[d] *** p<0.01, ** p<0.05, * p<0.1

[e] Robust standard errors in parentheses.

[f] Provincial as opposed to of metro area dummy variables used to satisfy overlap assumption. Newspaper preferred media source indicator omitted due to collinearity. Large firm indicator omitted from outcome model due to lack of variation in treatment level within subsample.

[g] Geographical dummy variables, indicators for female, newspaper media source preference omitted from treatment assignment model to satisfy overlap assumption. Work experience, and indicators for medium and large firm omitted from outcome model due to lack of variation in treatment level within subsample.
[h] Geographical dummy variables, indicators for age squared and newspaper media source preference omitted from treatment assignment model to satisfy overlap assumption. Work experience, and indicators for medium and large firm omitted from outcome model due to lack of variation in treatment level within subsample.
[i] Provincial as opposed to metro area dummy variables used to satisfy overlap assumption.
[j] Geographical dummy variables, indicators for age squared, graduate-level education and newspaper media source preference omitted from treatment assignment model to satisfy overlap assumption. Indicators for firm size and tax deduction at work omitted from outcome model due to lack of variation in treatment level within subsample.
[k] Geographical dummy variables and newspaper media source preference indicator omitted from treatment assignment model for GMM estimation convergence.
[l] ATT cannot be estimated model due to lack of variation in treatment level within subsample.

The moral suasion TV ad had a heterogeneous impact on the magnitude and statistical significance of the estimated probabilities of tax filing across employment groups. It caused an insignificant increase in tax filing rates by 6.5 percentage points and a large and significant increase of 20.2 percentage points for the salaried and self-employed, respectively. The reverse is found for the aggregate effect of the information newspaper ads: a large and significant increase in tax filing rates is reported for the salaried whereas the effect on the self-employed is null. This indicates the tax filing response of the salaried subpopulation was mainly responsible for the positive response estimated for the entire workforce. A comparable effect in magnitude, positive and statistically significant ATT of the tax eligibility information newspaper ad is recovered for both salaried and self-employed indicating no heterogeneity across employment groups. The decomposition of the tax deadline ad's ATT suggests heterogeneity even in the sign of the estimated coefficients. The tax deadline information newspaper ad had a large, negative and significant ATT on the self-employed respondents' tax filing rates and a positive but largely insignificant ATT on the salaried respondents. Thus, it could be argued that the null effect of the tax deadline information newspaper ad previously reported in Table 3 could be attributed to its counteracting impacts across employment groups. Finally, a null ATT is reported for the tax filing benefits information newspaper ad for the salaried subpopulation which resembles the ATT for the entire workforce. However, low power does not permit estimation of the ATT for the self-employed.

4.3 Interpretation of Estimated Effects and Policy Implications

Given the previous literature, the reported effectiveness of the moral suasion TV ad for the self-employed subpopulation might seem surprising. However, this could simply be explained by work proximity of the respondent to the subject in the moral suasion TV ad. Recall that the TV ad featured a self-employed individual; namely, a wholesaler, a lawyer or a fashion designer. It could be argued that the framing of the moral suasion TV ad made it much more relatable to self-employed taxpayer viewers. This has an important policy implication: targeted media campaigns may increase tax filing rates of the specific subpopulation they are designed for; even if these are the harder-to-tax self-employed.

As the heterogeneity analysis in 4.2 demonstrated, the effectiveness of the information newspaper ads as a whole was mainly driven by the substantial effectiveness of the tax eligibility ad. The effectiveness of the latter could be explained by the agency-provided information mechanism proposed by Alm et al., (2010). It could be argued that in a complex tax environment that has many avenues towards tax eligibility (income level, consumption), the newspaper ad provided genuinely useful information and increased tax literacy. In contrast, the other two information newspaper sub-treatment arms did not influence taxpayer filing behavior in as significant manner.

The ineffectiveness of the tax deadline ad as a whole is not surprising given that tax filing deadlines in Pakistan are almost certain to be extended. In fact, the tax deadline ad seemed to have backfired by reducing tax filing rates in the case of the self-employed subpopulation. The low response generated by the tax benefits ad is not surprising either. The benefits elicited in the nudge are essentially the non-filing penalties avoided by filing taxes. However, in an environment of weak tax enforcement and habitual tax amnesties and forgiveness as is the case in Pakistan, those expected benefits are exaggerated. If anything, the tax filing benefits ad serves as a reminder that non-filing is more rational given such low penalties (Allingham and Sandmo, 1972), and which helps explain explaining the negative coefficient we obtain.

Tax eligibility also stands out as the sole treatment arm that can improve tax compliance outcomes across the entire workforce. A combined reading suggests that policymakers should rely more on behavioral strategies conveying useful information as opposed to re-framing the tax code or disseminating non-credible information.

5. Conclusions

This paper examines the effect of mass media campaigns in Pakistan through TV and newspaper ad on income tax filing through survey data. Using a novel dataset of Pakistani income tax filers, we show that both moral suasion TV ads and neutral information newspaper ads can increase tax filing rates but only the latter in a statistically significant way. Moreover, the estimated treatment effects of the information newspaper ads are much larger in magnitude. The discrepancy in effectiveness of the two mass media might be attributed to both the delivery device itself as well as the content of the message by the tax administration itself. It could be argued that newspapers readers are more educated and come from a higher socio-economic status such that their baseline tax filing rates are also higher. However, we are inclined to believe that the effect was mainly driven by the message content as opposed to the delivery device. Otherwise, we would not have found different signed ATT's across the three information sub-treatment that were all delivered via newspaper ads.

A limitation of our study is the reliance on subjective tax compliance information; namely, self-reported tax filing status of pre-identified tax eligible individuals. It could be argued that survey respondents might misreport their true filing status in an attempt to mask non-filing behavior in fear of consequences from the tax administration. Even though this concern could not be entirely dismissed, it should be noted that individuals in Pakistan, and particularly the self-employed, are familiar with communication from and surveying by the FBR. In 2000-2002, a nationwide survey of enterprises was fielded by the FBR which was met with resistance by small size firms and traders as it included numerous enforcement measures. The latter were deemed credible due to the government's heavy backing of the process with inspectors' visits and audits. Therefore, it is reasonable to assume that survey participants did not respond under the belief they operated under a complete veil of ignorance from the FBR's point of view.

Overall, the policy implications of our findings cast doubt about the effectiveness of media campaigns in increasing tax filing. A careful interpretation would still favor the use of moral suasion media campaigns to increase the likelihood of tax filing of specific employment groups (self-employed) when targeted to that group. Moreover, the FBR and tax administrations in developing economies employing neutral information campaigns, should put more emphasis on transmitting tangible information about the tax filing process (tax eligibility, tax filing

deadline) as opposed to re-framing pre-existing information (presenting penalties as compliance benefits) to induce behavioral change in tax filing.

Our results are novel, especially in a developing economy setting. However, we arrive at an interesting difference to previous findings in the literature based on experiments in developed economies with higher voluntary tax compliance and tighter enforcement. For example, Hallsworth et al. (2017) find that a neutral message which solely transmits information about the process and benefits of income tax filing had a smaller impact in terms of magnitude than the warmer nudge of moral suasion. This paper raises the strong possibility that moral suasion tax campaigns may have a smaller degree of effectiveness in environments characterized by weak tax enforcement.

References

Allingham, M.G., and Sandmo, A., 1972. Income tax evasion: A theoretical analysis. *Journal of Public Economics,* 1, 323-338. http://dx.doi.org/10.1016/0047-2727(72)90010-2

Austin, P. C., Stuart, E. A., 2015. Moving towards best practice when using inverse probability of treatment weighting (IPTW) using the propensity score to estimate causal treatment effects in observational studies. *Statistics in Medicine*, 34(28), 3661-3679.

Alm, J., Cherry, T., Jones, M., McKee, M., 2010. Taxpayer information assistance services and tax compliance behavior. *Journal of Economic Psychology*, 31, 577-586.

Alm, J., Martinez-Vazquez, J., Schneider, F., 2005. 'Sizing' the problem of the hard-to-tax. In Taxing the hard-to-tax: Lessons from theory and practice, 11-75. Emerald Group Publishing Limited.

Artavanis, N., Morse, A., Tsoutsoura, M., 2016. Measuring income tax evasion using bank credit: Evidence from Greece. *Quarterly Journal of Economics* 131 (2), 739-798.

Blumenthal, M., Christian, C., Slemrod, J., Smith, M.G., 2001. Do normative appeals affect tax compliance? Evidence from a controlled experiment in Minnesota. *National Tax Journal*, 125-138.

Braithwaite, V., Reinhart, M., Smart, M., 2010. Tax non-compliance among the under-30s: Knowledge, obligation, or skepticism? In Developing alternative frameworks for explaining tax compliance, edited by J. Alm, J. Martinez-Vazquez and B. Torgler: Routledge.

Cyan, M.R., Koumpias, A.M., Martinez-Vazquez, J., 2016. The determinants of tax morale in Pakistan. *Journal of Asian Economics*, 47, 23-34.

Cyan, M.R., Koumpias, A.M., Martinez-Vazquez, J., 2017. The effects of mass media campaigns on individual attitudes towards tax compliance; quasi-experimental evidence from survey data in Pakistan. *Journal of Experimental and Behavioral Economics*, 70, 10-22.

Cummings, R., Martinez-Vazquez, J., McKee, M., Torgler, B., 2009. Tax morale affects tax compliance: Evidence from surveys and an artefactual field experiment. *Journal of Economic Behavior & Organization*, 70(3), 447-457.

Eurofound, 2013. *Information campaign on tax compliance*, Estonia. Brussels: Eurofound.

Eriksen, K., Fallan, L., 1996. Tax knowledge and attitudes towards taxation; A report on a quasi-experiment. *Journal of Economic Psychology*, 17(3), 387-402.

Feldman, N., Slemrod, J., 2007. Estimating tax noncompliance with evidence from unaudited tax returns. *Economic Journal*, 117 (518): 327-352.

Halla, M., 2012. Tax morale and compliance behavior: First evidence on a causal link. *The BE Journal of Economic Analysis & Policy*, 12(1).

Imbens G.W., 2004. Nonparametric estimation of average treatment effects under exogeneity: A review. *The Review of Economics and Statistics*, 86, 4–29

IMF. (2016). PAKISTAN SELECTED ISSUES PAPER. Washington, DC: IMF Country Report No. 16/2.

Hallsworth, M., List, J. A., Metcalfe, R. D., Vlaev, I., 2017. The behavioralist as tax collector: Using natural field experiments to enhance tax compliance. *Journal of Public Economics*, 148, 14-31.

Kasper, M., Kogler, C., and Kirchler, E., 2015. Tax policy and the news: An empirical analysis of taxpayers' perceptions of tax-related media coverage and its impact on tax compliance. *Journal of Behavioral and Experimental Economics* 54C, 58-63.

Kirchler, E., Maciejovsky, B., Schneider, F., 2003. Everyday representations of tax avoidance, tax evasion, and tax flight: Do legal differences matter? *Journal of Economic Psychology*, 535-553.

Luttmer, E., Singhal, M., 2014. Tax morale. Journal of Economic Perspectives, 28 (4), 149-68.

Meiselman, B.S., 2018. Ghostbusting in Detroit: Evidence on nonfilers from a controlled field experiment. *Journal of Public Economics*, 158,180-193.

New York Times, Povoledo, E. August 8 2011. "Italy Tries to Get Tax Cheats to Pay Up.". http://www.nytimes.com/2011/08/09/business/global/italy-tries-to-get-tax-cheats-to-pay-up.html

Pissarides, C. A., Weber, G., 1989. An Expenditure-based estimate of Britain's black economy. *Journal of Public Economics*, 39 (1): 17-32.

Perez-Truglia, R. and Troiano, U., 2018. Shaming tax delinquents. *Journal of Public Economics*, 167, 120-137.

Rosenbaum, P. R., Rubin, D. B., 1983. The central role of the propensity score in observational studies for causal effects. *Biometrika*, 70(1), 41-55.

Waseem, M., 2018. Information, Asymmetric Incentives, or Withholding? Understanding the Self Enforcement of Value-added Tax. Working Paper.

Wooldridge, J. M., 2007. Inverse probability weighted estimation for general missing data problems. *Journal of Econometrics*, 141, 1281–1301.

Wooldridge, J. M., 2010. Econometric Analysis of Cross Section and Panel Data. 2nd ed. Cambridge, MA: MIT Press.

Slemrod, J., Rehman, O., Waseem, M., 2018. Pecuniary and Non-Pecuniary Motivations for Tax Compliance: Evidence from Pakistan. Working Paper.

Thaler, R. H., Sunstein, C. R., 2003. Libertarian paternalism. *American Economic Review*, 93(2), 175-179.

Appendices

Appendix A

Link A.1: Moral Suasion TV Nudge Featuring Wholesaler

Link to Video:
https://www.dropbox.com/s/7ewgwj3buq3r8ey/Psm%2001%20wholesaler.mp4?dl=0

Translation: “My name is XYZ, I am a wholesaler, my earnings capacity is ABC. Whatever I have accomplished is due to Pakistan. That’s why I submit my income tax return every year. Taxes make a contribution to the country’s development. Submission is easy and can be done online.”

Closing Statement: “Tax return easy and on-time”

Link A.2: Moral Suasion TV Nudge Featuring Fashion Designer

Link to Video:
https://www.dropbox.com/s/0ai9248sbxugicw/Psm%2002%20Fashion%20Designer%20.mp4?dl=0

Translation: “My name is XYZ and I am a fashion designer. I dream that I would expand my production line. I want to contribute to Pakistan with my taxes.”

Closing Statement: “Tax return honestly and on-time”

Link A.3: Moral Suasion TV Nudge Featuring Lawyer:

Link to Video: https://www.dropbox.com/s/jlj7qhkr3dyhl2w/PSM%20Lawyer%20.mp4?dl=0

Translation: “My name is XYZ and I am a lawyer. I believe in the rule of law and this why I submit my taxes every year. It is my obligation as a citizen and it contributes to the development of Pakistan.”

Closing Statement: “Tax return responsibly and on-time”

Appendix B

Image B.1: Tax Filing Eligibility Criteria Information Newspaper Nudge

Image B.2: Tax Filing Deadline Information Newspaper Nudge

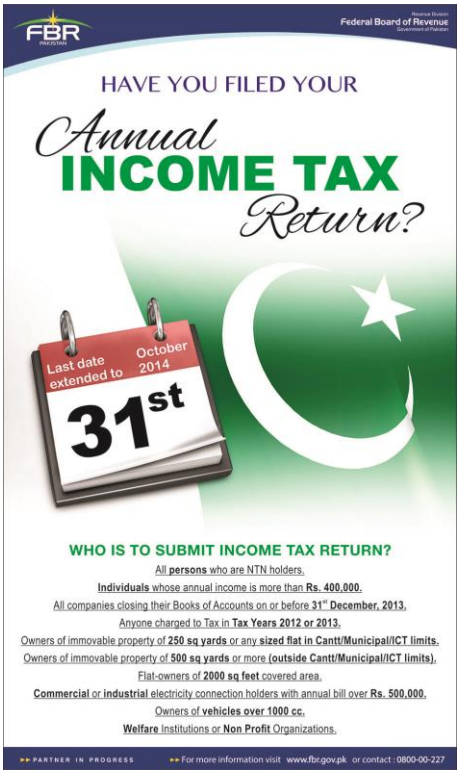
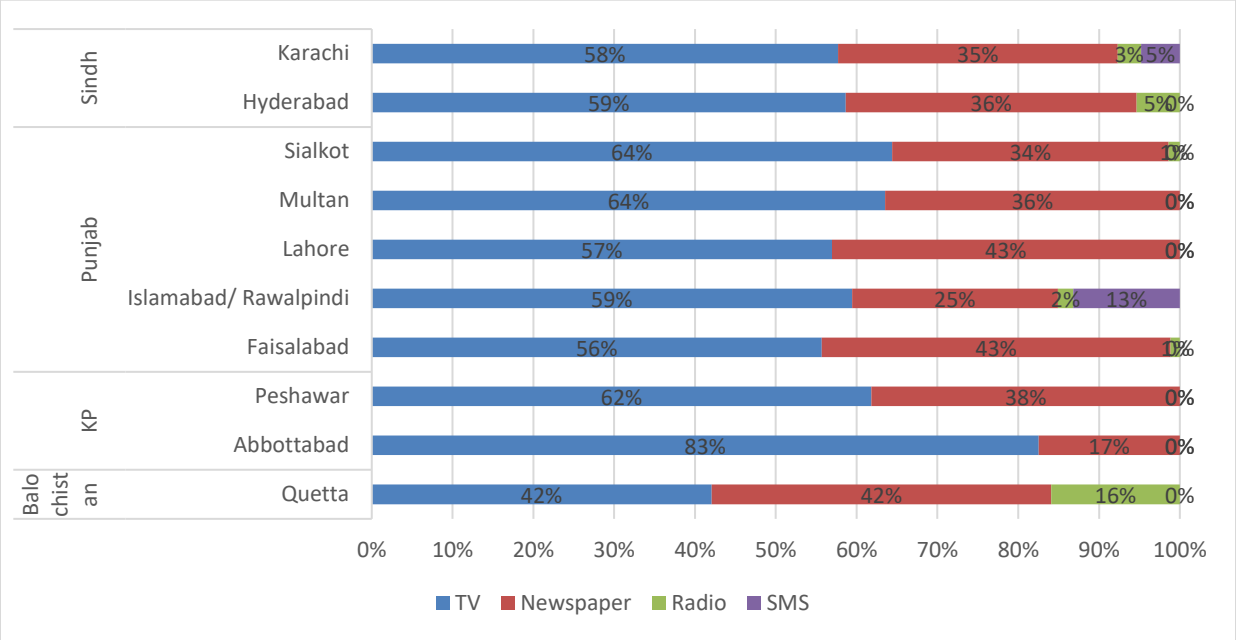


Image B.3: Tax Filing Benefits Information Newspaper Nudge

Appendix C

Table C.1: Survey Respondent Exposure to Ads by Medium and Metropolitan Area:



Appendix D

Table D1: Effect of Media Campaign on Income Tax Filing using Propensity Score Matching[a]

VARIABLES	(1) [b] TV Ad	(2) TV Ad	(3) TV Ad	(4) Newspaper Ad	(5) Newspaper Ad	(6) Newspaper Ad
Moral Suasion	0.028 [d]	0.035	0.043			
N=717	(0.043) [e]	(0.036)	(0.034)			
Information				0.037	0.051	0.088*
N=647				(0.055)	(0.050)	(0.050)
Info Sub-treatments						
Tax Eligibility				0.065	0.107**	0.106**
N=617				(0.061)	(0.053)	(0.047)
Tax Deadline				0.201***	0.216***	0.194***
N=594				(0.076)	(0.058)	(0.057)
Filing Benefits				-0.047	0.027	0.039
N=562				(0.127)	(0.101)	(0.103)
# NN Matches [c]	1	2	3	1	2	3

Notes:

[a] Second-stage propensity-score matching results.

[b] Outcome is equal to one if the respondent filed an income tax return and zero, otherwise.

[c] Number of neighbors (matches with nearest propensity score) used to calculate outcome.

[d] *** p<0.01, ** p<0.05, * p<0.1

[e] Robust standard errors in parentheses.

Table D2: Heterogeneous Effects of Media Campaign on Income Tax Filing by Employment Status using Propensity Score Matching[a]

VARIABLES	(1)[b] TV Ad	(2) TV Ad	(3) TV Ad	(4) Newspaper Ad	(5) Newspaper Ad	(6) Newspaper Ad
Salaried-Pensioners						
Moral Suasion Nudge	0.022 [d]	0.058	0.035			
N=677	(0.045) [e]	(0.042)	(0.040)			
Information Nudge				0.037	0.051	0.088*
N=610				(0.055)	(0.050)	(0.050)
Self-Employed						
Moral Suasion Nudge	0.333*	0.390**	0.222			
N=42	(0.181)	(0.180)	(0.152)			
Information Nudge				-0.400*	-0.300	-0.200
N=38				(0.240)	(0.190)	(0.193)
Info Sub-treatments						
Salaried-Pensioners						
Tax Eligibility Nudge				0.053	0.074	0.074
N=557				(0.092)	(0.081)	(0.071)
Tax Deadline Nudge				0.184**	0.101	0.114*
N=542				(0.085)	(0.074)	(0.066)
Filing Benefits Nudge				0	-0.050	0.002
N=514				(0.2)	(0.165)	(0.176)
Self-Employed						
Tax Eligibility Nudge				0	0.25	-
N=35					(0.177)	
Tax Deadline Nudge				-0.333	-0.556**	-0.556**
N=50				(0.272)	(0.240)	(0.240)
Filing Benefits Nudge				-	-	-
N=-						
# NN Matches [c]	1	2	3	1	2	3

Notes:

[a] Second-stage results. Results are based on the post-matching sample using CEM weights and reported at mean values.

[b] Outcome is equal to one if the respondent filed an income tax return and zero, otherwise.

[c] Number of neighbors (matches with nearest propensity score) used to calculate outcome.

[d] *** p<0.01, ** p<0.05, * p<0.1

[e] Robust standard errors in parentheses clustered at the provincial level.

Table D3: Heterogeneous Effects of Media Campaign on Income Tax Filing by Gender using Propensity Score Matching[a]

VARIABLES	(1)[b] TV Ad	(2) TV Ad	(3) TV Ad	(4) Newspaper Ad	(5) Newspaper Ad	(6) Newspaper Ad
Males						
Moral Suasion Nudge	0.040[d]	0.026	0.021			
N=568	(0.054)[e]	(0.047)	(0.044)			
Information Nudge				0.084	0.079	0.054
N=537				(0.067)	(0.055)	(0.052)
Females						
Moral Suasion Nudge	0.260**	0.213**	0.153*			
N=149	(0.104)	(0.092)	(0.081)			
Information Nudge				-0.090	-0.136	-0.030
N=110				(0.210)	(0.208)	(0.233)
Info Sub-treatments						
Males						
Tax Eligibility Nudge				0.196**	0.203***	0.185**
N=488				(0.095)	(0.076)	(0.072)
Tax Deadline Nudge				0.139	0.139	0.111
N=478				(0.112)	(0.097)	(0.083)
Filing Benefits Nudge				0.375	0.250	0.167
N=450				(0.246)	(0.198)	(0.186)
Females						
Tax Eligibility Nudge				-0.5**	-0.5*	-0.5*
N=103				(0.25)	(0.265)	(0.276)
Tax Deadline Nudge				0.4*	0.3*	0.317*
N=107				(0.219)	(0.179)	(0.164)
Filing Benefits Nudge				-0.333	-0.500**	-0.444**
N=104				(0.272)	(0.236)	(0.181)
# NN Matches[c]	1	2	3	1	2	3

Notes:

[a] Second-stage results. Results are based on the post-matching sample and reported at mean values.

[b] Outcome is equal to one if the respondent filed an income tax return and zero, otherwise.

[c] Number of neighbors (matches with nearest propensity score) used to calculate outcome.

[d] *** p<0.01, ** p<0.05, * p<0.1

[e] Robust standard errors in parentheses clustered at the provincial level.