The Effects of Media Campaigns on Individual Attitudes towards Tax Compliance; Quasi-Experimental evidence from survey data in Pakistan

Musharraf R. Cyan
Antonios M. Koumpias
Jorge Martinez-Vazquez

Georgia State University

ANDREW YOUNG SCHOOL
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1

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Abstract

Pakistan has consistently performed low on taxation, with revenue collection hovering around 10 percent of GDP. Tax reforms have been attempted but without significant gains in revenue collection. Due to the recalcitrance of tax revenues, the tax authority attempted to enlist voluntary compliance as one of the avenues for its efforts to increase collections. This paper examines the effectiveness of media campaigns in the TV and national newspapers used by the Federal Board of Revenues of Pakistan to increase awareness, tax filing, and, ultimately, tax morale. We use survey data that were collected in 2014 immediately after a communication campaign by Pakistan's Federal Board of Revenue. Using coarsened exact matching, we construct treatment and control groups that are nearly identical in terms of pre-treatment balance of demographic and behavioral predictors of high tax morale. We find improved perceptions towards tax compliance in Pakistan for respondents exposed to the TV and newspaper advertisements. The choice of the advertisement's delivery device is important since the latter is more effective. Our findings provide empirical evidence that well timed campaigns can enhance voluntary compliance in tax filing.

Keywords: Tax Morale, Tax Compliance, Social Norms, Social Interactions, Pakistan

JEL Classification: H26, K42

*Cyan: cyan@gsu.edu . ** Koumpias, Corresponding Author: akoumpias1@student.gsu.edu .*** Martinez-Vazquez: jorgemartinez@gsu.edu. All authors are affiliated with the International Center for Public Policy, Department of Economics, Andrew Young School of Policy Studies, Georgia State University, 14 Marietta Street, Atlanta, GA 30303, USA.

1.   Introduction

This paper examines the effectiveness of media campaigns in improving attitudes towards tax compliance in Pakistan. Tax administrators in many developing countries grapple with tax morale under tight administrative budgets, while organizational inertia favors routinized media campaigns to improve tax morale and general tax compliance. Perhaps more than any other country, this has been the case in Pakistan where for almost two decades the tax revenue to GDP ratio has stubbornly remained below 11 percent of GDP despite repeated attempts at tax policy reform (Martinez-Vazquez and Cyan, 2015). Other than setting up the usual tax facilitation services, such as a Large Taxpayer Unit, the Federal Board of Revenue (FBR), the nation's premier tax collection agency, has acquired little experience in directly approaching taxpayers to motivate higher voluntary tax compliance. Most public information campaigns have been low cost efforts relying on mass media to lay out information on tax processes and filing deadlines. The motivation behind those initiatives comes from experimental evidence showing that increased tax knowledge improves individual perceptions of the fairness of the tax system (Eriksen and Fallan, 1996). For example, Kasper, Kogler, and Kirchler (2015) using a survey-based experiment in Austria show that tax-related media coverage can affect taxpayers' intentions to comply. Taxpayers' trust of tax authorities may increase when exposed to media content that highlights the trustworthy nature of the tax authority or its power to prevent tax evasion. And 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.

However, in Pakistan after the perennial lukewarm response from taxpayers, as a routine every year, the filing deadlines are often extended several times. After years of attempting to broaden the tax bases of direct taxes, the FBR has not been able to achieve its targets. From 2000 to 2014, the number of individuals registered for personal income tax was raised from 0.75 to 3.6 million but only with 0.98 million active filers in an estimated 56.5 million people that are employed in the country.[1] The estimated number of people above the exemption threshold is 5.7 million. In the case of corporate income tax, out of the 60 thousand companies that are registered on the

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[1] IMF (2016); p 5.

rolls, only around 25 thousand file returns.[2] As Kirchler et al. (2008) argue, when tax authorities follow a "cops and robbers" approach, taxpayers will comply only when obliged to do in their effort to maximize individual expected utility. This is a finding generalizable to other contexts independent of cultural and economic characteristics. Kogler et al. (2013) recover the highest level of intended tax compliance and the lowest level of tax evasion in conditions of high trust and high power. Empirical evidence from Italy indicates that both coercive and legitimate powers were associated with enforced compliance, but, also that enforced compliance leads to increased evasion (Kastlunger et al., 2013). In a formalization of the "slippery-slope" framework, Prinz et al. (2014) show that tax administrators should follow approaches that express both their coercive power as well as their persuasive power to establish tax compliance. Indeed, experimental evidence from Greece indicates that increased trust in the tax authorities as well as a tougher approach on behalf of the tax authority can enhance voluntary compliance (Kaplanoglou and Rapanos, 2015). Torgler and Schaltegger (2005) emphasize the scope of tax morale considerations when conducting fiscal policy for three reasons. First, they offer solutions in raising revenues more efficiently since the interaction between the taxpayer and the tax authority is taken into account. Second, tax morale research allows for a broad assessment of many mechanisms of tax compliance such as deterrence, government regulation, the quality of publicly provided goods, the complexity, progressivity and incidence of the tax system and the heterogeneous population within a society. Empirical evidence suggests that Pakistan's ethnically fractionalized background could pose a challenge in enhancing tax morale, though (Li, 2010).

The case of Pakistan might be salient in its potential taxpayer's resilience at avoiding various types of motivation to improve compliance but, it is by no means unique. Tax administrators aim to maximize revenue collection but this cannot be accomplished by simply raising tax rates.[3] Thus, efforts should be made to also enhance tax morale.[4] To accomplish this goal, tax

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[2] ibid.

[3] Kirchler et al. (2007) review the empirical literature of tax compliance and find overwhelming evidence of a negative relation between tax rates and compliance.

[4] 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.

administrators should consider simplifying the tax code, become more service-oriented and introduce a kinder attitude towards taxpayers (Pickhardt and Prinz, 2014). Increasing voluntary compliance with the tax code leads to eventually establishing a compliance norm (OECD, 2013).

In a growing number of countries, tax administration offices have been using field experiments to test tax compliance responses to behavioral nudges (Torgler, 2011). However, field experiments unfortunately are costlier and much harder to implement relative to simpler media campaigns. Mainly for those reasons, media campaigns remain the staple tool for motivating voluntary tax compliance. This persistence in their use and the low tax compliance levels raise the question of whether these traditional media campaigns are serving any useful purpose or have any identifiable impact. Saeed and Shah (2011) argue that advertising can help in widening the tax net, if properly executed. They warn that advertising can be ineffective when tax policy is undergoing constant changes. In addition, they stress that media campaigns may have differential impact across different age and wealth groups based on each group's medium of choice.

The main contribution of this paper is to offer the first quasi-experimental evaluation of the effectiveness of different media campaigns used by a tax agency to enhance tax morale and increase voluntary compliance. We use a novel, individual-level survey of randomly selected Pakistani income tax filers that was conducted after the media campaigns and elicits attitudes towards tax compliance. However, only a fraction of the survey respondent was exposed to the media campaigns which gives rise to a natural experiment. We use this source of cross-sectional variation to examine the effect of advertisements aired on the TV, printed in the newspapers, or both on tax morale. First, our identification strategy exploits the random sample of survey respondents to overcome self-selection to exposure to a media campaign. Then, it employs a matching procedure that drastically increases the comparability of treated and control respondents. The post-matching sample includes control observations with nearly identical values of respondents' predictors of tax morale and news source selection to the treated ones. To identify the causal effect of media campaigns on tax morale we compare the average tax morale of respondents exposed to the media campaign to the one of respondents not exposed to it using a highly-balanced post-matching sample. From a policy perspective, evidence on the effectiveness of media campaigns can be extremely important because of the simplicity in

5

The Effects of Media Campaigns on Individual Attitudes towards Tax Compliance; Quasi-experimental Evidence from Survey Data in Pakistan

implementation, wide reach, and ease of scalability and scope of coverage of mass media campaigns.

Increasingly, tax administration authorities around the world have recognized the centrality of non-pecuniary factors to voluntary tax compliance. Acting on that recognition, many country tax authorities have enacted a slew of policies in recent years. For example, the Estonian Tax and Customs Board carried out information campaigns in 2010 and 2011 to proactively provide information on the use of taxes by the state (Eurofound, 2013). Similarly, the Italian government resorted to television and print advertising campaigns in 2011 to promote tax compliance (Povoledo, 2011). These administrative initiatives have spurred the recent wave of literature of field experiments about what motivates firms and individuals to pay their taxes voluntarily (Blumenthal, Christian, and Slemrod, 2001; Castro and Scartascini, 2015; Chirico et al., 2014; Del Carpio, 2014; Dwenger et al., 2014; Fellner-Roehling, Sausgruber, and Traxler, 2013; Hallsworth et al., 2014; Kleven et al., 2011; Ortega and Scartascini, 2015); Perez-Truglia and Troiano, 2015; Slemrod, Blumenthal, and Christian, 2001). However, all the existing evidence to this date on the effectiveness of behavioral strategies to enhance tax morale in developing countries comes from Latin America. In the context of Chile, Pomeranz (2015) reports that an increase in the perceived audit probability of randomly chosen Chilean firms increases compliance to the VAT. Castro and Scartascini (2013) found that sanction-based messaging successfully generated more property tax revenues to the Argentine tax authority. However, appeals to tax fairness and tax equity did not effectively increase property tax revenues. In Venezuela, Ortega and Sanguinetti (2013) show that enforcement messaging has the largest effect on compliance. This study also suggests that moral suasion is ineffective in bringing about taxpayer responses. Del Carpio (2014) finds that a combination of a payment reminder and deterrence information enhances tax compliance of a local property tax in Peru because it increases the perception of enforcement. In a rare exception to the use of field experiments, Sanchez (2014) provides evidence from a low-cost tax compliance campaign in Peru targeting firms that misreport their tax obligations. Using a regression-discontinuity approach, he reports very substantial increases in tax reporting which implies a very high return for each notification intervention by the tax agency.

However, in this growing body of literature, the focus of the empirical analysis has almost exclusively been on message content rather than device of delivery. But the mode of communication, and not only the content, might play a crucial role in a campaign's success. The early interventions of behavioral tax compliance relied almost exclusively on physical letters as the device to nudge taxpayers with only two recent exceptions. Ortega and Scartascini (2015) report sizable differences across the effectiveness of a letter, an e-mail, and a personal visit by a tax inspector in a field experiment of the National Tax Agency in Colombia. Koumpias (2016), in a 2013 natural experiment by the Tax Compliance Unit of the Greek Treasury, shows that the impact of payment deadline reminder phone calls on tax payments, relative to e-mails, is markedly different. In a somewhat different domain of citizen behavior, there is substantial empirical evidence of similar nudges given through impersonal methods like robotic phone messages (Ramirez, 2005; Shaw et al., 2012) and emails (Stollwerk, 2006) as being ineffective in changing voting behavior. On the contrary, face-to-face canvassing (Gerber and Green, 2000) and phone calls (Imai, 2005; Arceneaux, 2007; Nickerson, 2006; Arceneaux and Nickerson, 2006) are associated with larger behavioral responses than non-personalized methods such as flyers. Thus, not only the content of the nudge may matter for enhancing tax morale but also the means for its delivery.

2.   Data

We use survey data that were collected in 2014 immediately after a communication campaign by Pakistan's Federal Board of Revenue (FBR).[5] The campaign was financed by the United Kingdom's Department for International Development (DFID) that supports FBR's external communications interventions. In advance of the 2013-14 tax return submission deadline, the DFID assisted the implementation of a short-term FBR External Communications Awareness Raising Pilot Campaign through its service provider, Adam Smith International. In preparation

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[5] There have been earlier attempts to elicit taxpayers' perceptions towards tax compliance in Pakistan. Mughal and Akram (2012) survey taxpayers to determine predictors of tax avoidance and evasion in Pakistan. Awan and Hannan (2014) survey taxpayers and tax officers and Khan and Ahmad (2014) survey students' attitudes about tax compliance to elicit determinants of tax evasion in southern Punjab, Pakistan. However, the studies are mainly descriptive based on small-scaled, primary data collection attempts, not initiated by the FBR, that might not be nationally representative.

7

The Effects of Media Campaigns on Individual Attitudes towards Tax Compliance; Quasi-experimental Evidence from Survey Data in Pakistan

for this campaign, Adam Smith International commissioned Semiotics Consultants Private Limited to undertake a Baseline Taxpayer Perception Survey of eligible individuals across

Pakistan's four provinces to inform FBR of the existing tax return filing dynamics. The FBR used this evidence to understand the underlying perceptions of eligible taxpayers about tax filing and design of the pilot communication campaign. Upon completion of the Pilot Campaign, Semiotics Consultants was selected to conduct a follow-up perception survey. The survey data we use contain information about the extent of shift in taxpayer attitude, tax return filing behavior as well as the reach and efficacy of the communication instruments deployed.

The follow-up perception survey took place in major metropolitan areas across the country in line with the baseline survey. Metropolitan areas were selected based on major industry and economic activity locations, thereby having a higher proportion of eligible tax filers. Thus, ten (10) metropolitan areas were identified in the four (4) provinces. Equal apportioning across the metropolitan areas was adequate to obtain public perceptions regarding tax return filing and the communications campaign given the province-wide metropolitan area/eligible tax-payer spread. Since the number of eligible taxpayers was unknown, a minimum number of individuals was taken at which skewness and kurtosis becomes irrelevant. From each metropolitan area, around 200 tax eligible individuals were selected at random resulting in a total sample of 2,000 across 10 areas. Selection of tax return filers and non-filers took place from the same localities where the baseline perception survey had taken place. Only those individuals who were eligible to pay tax based on their responses were selected for the survey. As a result of visits to multiple localities within a metropolitan area, individuals from a mix of economic sectors were targeted (e.g., salaried and non-salaried individuals deriving incomes from other sources).

Our dependent variable is constructed from survey responses to the statement "Cheating on taxes in Pakistan is never justifiable". The framing hints towards outright illegal tax evasion which ensures that taxpayers do not convey their perceptions about legal practices with similar effects on tax revenue yields such as tax avoidance or tax flight which are known to be evaluated 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, as is customary in the empirical tax

morale literature. Our outcome variable, $TaxMorale_i$, 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. Thus, our measure captures positive attitudes towards tax compliance; i.e., respondents with high tax morale.

3. Methods

3.1 Identification Strategy

To identify the causal effect of the media campaigns in raising tax morale, we need to compare respondents who would have otherwise had identical tax morale, on average, and were randomly exposed to the media campaign with those that were not. To circumvent the endogenous exposure of individuals to the media campaign and its delivery device (e.g. TV, newspapers, social media) we use a sample of randomly selected, eligible tax-filers in Pakistan. We further control for selection of media device by matching on the respondent's selected news source Next, we employ matching techniques to ensure that, in the absence of the media campaign, treated and control respondents would exhibit comparable tax morale. We achieve this by matching on documented predictors of high tax morale. The Baseline Taxpayer Perception Survey provides the "training dataset" which the empirical literature has used to uncover the determinants of tax morale in Pakistan (Cyan, Koumpias and Martinez-Vazquez, 2016). Based on this pre-treatment evidence, we match on tax morale predictors identified as most significant in the previous literature. To identify the effect of the media campaigns, we regress the tax morale outcome variable on a constant and the treatment variable using matching weights.

3.2 Coarsened Exact Matching

The key goal of matching is to prune observations from the data so that the remaining data have better balance between the treated and control respondents; that is, make the empirical distributions of the covariates ($\boldsymbol{X}$) more similar (Iacus, King, and Porro, 2011). Exact matching matches a treated respondent to all of the controls with exactly the same covariate values. Typically, this procedure leads to very small sample sizes for the control group. However, it requires no additional adjusting and a difference in means estimator finds the causal effect. Approximate matching methods find controls that are close to the treated respondent. This is often done on the basis of statistics such as the Mahalanobis distance, the propensity score (the probability of being treated, conditional on

9

The Effects of Media Campaigns on Individual Attitudes towards Tax Compliance; Quasi-experimental Evidence from Survey Data in Pakistan

the covariates), or coarsened exact matches. In this case, controlling for **X** in a typical regression-like form is necessary. The benefits of matching are that estimates suffer from less bias, are less model-dependent, and more efficient (Ho et al., 2007).

Coarsened Exact Matching

CEM separates the observations in strata of identical coarsened values for covariates. Then, the observations coming from strata that do not retain both a treated and a control respondent are removed. Next, CEM assigns weights to matched and unmatched respondents such that all differences across treatment and control groups (imbalances) are eliminated. Specifically, the CEM treats multivariate non-linearities, interactions, moments, quantiles, comoments, and any distributional differences up to the chosen level of coarsening (Iacus, King, amd Porro, 2011).

The inherent trade-off of matching is reflected in CEM too: larger bins (more coarsening) will result in fewer strata. Fewer strata will result in more diverse observations within the same strata and, thus, higher imbalance. It is important to note that CEM prunes both treated and control respondents. This process changes the quantity of interest under study to the treatment effect in the post matching subsample. Specifically, our estimand is the sample average treatment effect on the treated (SATT). That is, we focus on the average treatment effect on tax morale for those exposed to the media campaigns in the post-matching sample.

In Tables A1 and A2 in the Appendix we show that results from a naïve estimation on the unprocessed, the pre-matching sample are fairly comparable in terms of direction (sign) but not statistical significance to the post-matching estimates. This provides internal validity to our main CEM-weighted Estimates as it illustrates that results are not very sensitive to the research design. And more importantly, establishes that the quantity of interest does change substantially despite pruning. Thus, inference can be drawn about the entirety of the nationally representative sample.

CEM makes an explicit statement about the initial level of covariate imbalance between treated respondents and untreated ones. Furthermore, it provides with the margin of covariate balance improvement in percentage terms after matching. This provides a transparent indication of the extent to which the CEM-weighted Estimates have a causal interpretation. The overall imbalance is given by the L_1 statistic, introduced in Iacus, King and Porro (2008) as a comprehensive measure

of global imbalance. It is based on the L_1 difference between the multidimensional histogram of all pretreatment covariates in the treated group and that in the control group. This measure includes imbalance with respect to the full joint distribution, including all interactions, of the covariates. Thus, L_1 works for imbalance as R^2 works for model fit: the absolute values mean less than comparisons between matching solutions. Perfect global balance (up to coarsening) is indicated by $L_1 = 0$, and larger values indicate larger imbalance between the groups, with a maximum of $L_1 = 1$, which indicates complete separation.

4.   Results

4.1   TV Ad Campaign

Next, we compute the L_1 statistic, as well as several unidimensional measures of imbalance between the distributions of the predictors of tax morale for respondents who were exposed to the TV ad and the control group.

Table 1: Covariate Imbalance between Respondents Exposed to TV Ad and Controls

Multivariate L_1 Distance = 0.58842155

Univariate Imbalance Indicators:

	L_1 [a]	Mean [b]	Min [c]	25% [c]	50% [e]	75% [c]	Max [c]
Female	0.105	0.105	0	0	0	1	0
Self-employed	0.01322	0.01322	0	0	0	0	0
Pensioner	0.00353	-0.00353	0	0	0	0	0
High-school	0.03662	-0.03662	0	0	0	0	0
Master's	0.04287	0.04287	0	0	0	0	0
Vocational	0.00211	-0.00211	0	0	0	0	0
News Source	0.05795	-0.04789	0	0	0	0	0
Balochistan	0.05073	-0.05073	0	0	0	0	0
Kpk	0.03097	0.03097	0	0	0	0	0
Punjab	0.01064	0.01064	0	0	0	0	0
Sindh	0.00912	0.00912	0	0	0	0	0
Good Use of Tax	0.03486	0.03486	0	0	0	0	0
Tax doesn't Affect Investment	0.01051	0.01051	0	0	0	0	0
Recurring Government Spending	0.00671	0.00671	0	0	0	0	0
FBR will not Audit	0.01428	0.01428	0	0	0	0	0
Filing Tax a Social Responsibility	0.00217	-0.00217	0	0	0	0	0
Richer Pay More Taxes	0.00403	0.00403	0	0	0	0	0
Tax System is Fair	0.01871	-0.01871	0	0	0	0	0

Notes:

[a] Univariate distance.

[b] Difference in means.

[c] Difference in empirical quintile at 0, 25th, 50th, 75th, 100th percentile.

11

The Effects of Media Campaigns on Individual Attitudes towards Tax Compliance; Quasi-experimental Evidence from Survey Data in Pakistan

The first column, labeled L_1, reports the L_{j1} measure, which is L_1 computed for the jth variable separately (which of course does not include interactions). The second column of Table 1, labeled mean, reports the difference in means. The remaining columns in the table report the difference in the empirical quintiles of the distributions of the two groups for the 0th (min), 25th, 50th, 75th, and 100th (max) percentiles for each variable.

For instance, the first row of the table suggests that the indicator variable of female sex is somewhat balanced in the raw data in means but completely separated in the 75% quintile of the two distributions. This table also illustrates the point that balancing only the means between the treated and control groups does not necessarily guarantee balance in the rest of the distribution. The age variable (continuous) is imbalanced in different directions, denoted by positive and negative signs, across different quintiles of its overall distribution.

Still, the most important metric of covariate balance is the overall L_1 measure. Even if the marginal distribution of every variable is perfectly balanced, the joint distribution can still be highly imbalanced. The multivariate L_1 distance of 0.58842155 indicates that predictor values of tax morale determinants in Pakistan between those exposed to the TV ad and those who did not come across any FBR communication campaign are fairly non-comparable.

Effect of TV Ad Campaign on Tax Morale
The output contains useful information about the match, including a (small) table about the number of observations in total, matched, and unmatched by treatment group. Since CEM bounds the imbalance ex ante, the most important information is the number of observations matched. But the results also give the imbalance in the matched data using the same measures as that in the original data.

First, we apply the CEM algorithm for a set of demographic matching criteria that has been found to be significant determinants of tax morale in Pakistan. We stratify the sample in 132 strata and match on 56 of them. This yields a total of 1,444 observations comprised of 365 respondents exposed to the TV ad and 1079 as controls. That is, 21 treated and 145 untreated observations were discarded because they take outlier values for significant determinants of tax morale. This produces a very substantial reduction in imbalance, not only in the means, but also

in the marginal and joint distributions of the data. The post matching multivariate L_1 distance of $3.619e^{-15} \approx 0$ indicates almost perfect global balance.

Next, we introduce more matching criteria based on behavioral factors of tax morale. The stratification gives rise to 555 distinct strata and we are able to match 131 of them. This produces a total of 959 observations comprised of 290 respondents exposed to the TV ad and 669 as controls. This process prunes 96 treated and 555 untreated observations from the sample. Again, the reduction in imbalance is very large but the introduction of more matching variables, even, led to a slight improvement; multivariate L_1 distance of $1.208e^{-15} \approx 0$.

Both matching exercises, lead to almost identical treated and control groups in terms of pre-treatment covariate balance. Recall that in exact matching, conditional on covariates, the potential outcomes are independent of actual treatment. In other words, selection bias disappears after conditioning on covariates. Since L_1 is approximately equal to zero, CEM effectively achieves nearly exact matching. Then, the estimated difference in mean tax morale provides an estimate of the treatment effect that may have a causal interpretation; that is, assuming we did not omit important predictors of tax morale.

Table 2: CEM-weighted Estimates: Effect of TV Ad Campaign on Tax Morale[a]

VARIABLES	(1) High Tax Morale Indicator[b]	(2) Ordinal Tax Morale[c]	(3) High Tax Morale Indicator[b]	(4) Ordinal Tax Morale[c]
TV Ad	0.381*[d]	0.175	0.297	0.178
	(0.213)[e]	(0.111)	(0.252)	(0.117)
Constant	-0.886***		-0.851***	
	(0.260)		(0.321)	
Observations	1,444	1,444	959	959

Notes:
[a] Results are based on the post-matching sample using CEM weights and reported at mean values.
[b] Outcome is an indicator taking the value of one if the respondent agrees or strongly agrees that "cheating on taxes in Pakistan is never justifiable" and zero, otherwise.
[c] Outcome is an ordinal measure of whether "cheating on taxes in Pakistan is never justifiable".
[d] *** p<0.01, ** p<0.05, * p<0.1
[e] Robust standard errors in parentheses clustered at the locality level.

In columns (1) and (3) of Table 2, we estimate probit regressions of whether the respondent has high tax morale. In columns (2) and (4), we estimate ordered probit regressions of the respondent attitudes towards tax morale, respectively, matching only on demographic, then both demographic and behavioral factors of tax morale.

We find that the TV ad had a positive and significant effect on positive attitudes towards tax

compliance when we match on significant demographic determinants of tax morale. However, when we introduce more stringent matching criteria, and, subsequently, reduce power, the effect becomes smaller and is not significant at conventional levels anymore.

Also, we show that the TV ad did shift attitudes towards tax morale when exploring its ordinal measures. The overall effect is positive but smaller and not significant. We also provide estimates for the ancillary parameters which are used to differentiate the adjacent levels of the response variable. Interpretation of the ordered probit estimates is independent of the ancillary parameters.

4.2   Newspaper Ad Campaign

Next, we explore the impact of the newspaper ad campaign on perceptions about tax compliance. Table 3 below displays the distributional differences of variables that determine attitudes towards tax compliance between respondents who read the newspaper ad only and the controls group.

Table 3: Covariate Imbalance between Respondents Exposed to Newspaper Ad and Controls

Multivariate L_1 Distance = 0.65162413
Univariate Imbalance Indicators:

	L_1 [a]	Mean[b]	Min[c]	25%[c]	50%[c]	75%[c]	Max[c]
Female	0.04508	-0.04508	0	0	0	0	0
Self-employed	0.05036	-0.05036	0	0	0	0	0
Pensioner	0.00621	0.00621	0	0	0	0	0
High-school	0.01477	-0.01477	0	0	0	0	0
Master's	0.04882	0.04882	0	0	0	0	0
Vocational	0.00135	0.00135	0	0	0	0	0
News Source	0.19594	-0.27191	0	0	0	0	-1
Balochistan	0.00432	-0.00432	0	0	0	0	0
Kpk	0.02404	-0.02404	0	0	0	0	0
Punjab	0.02776	0.02776	0	0	0	0	0
Sindh	0.0006	0.0006	0	0	0	0	0
Good Use of Tax	0.0293	0.0293	0	0	0	0	0
Tax doesn't Affect Investment	0.00189	0.00189	0	0	0	0	0
Recurring Government Spending	0.02808	0.02808	0	0	0	0	0
FBR will not Audit	0.0353	0.0353	0	0	0	0	0
Filing Tax a Social Responsibility	0.02874	0.02874	0	0	0	0	0
Richer Pay More Taxes	0.0148	0.0148	0	0	0	0	0
Tax System is Fair	0.04571	-0.04571	0	0	0	0	0

Notes:
[a] Univariate distance.
[b] Difference in means.
[c] Difference in empirical quintile at 0, 25th, 50th, 75th, 100th percentile.

The multivariate L_1 distance of 0.65162413 in Table 3 indicates that the pre-treatment predictor values of tax morale determinants in Pakistan between those exposed to the newspaper ad and those who did not come across any FBR communication campaign are fairly distinct. In fact, the separation of covariates values of those exposed to the newspaper ad relative to the control respondents is more acute than of those exposed to the TV ad. Note that for all predictors, but the "News Source" variable, the univariate imbalance is equivalent to the absolute value of the mean pre-treatment predictor difference between those exposed to the newspaper ad and the control.[6]

Effect of Newspaper Ad Campaign on Tax Morale

Similarly to the TV ad campaign, we, initially, match on statistically significant demographic determinants of tax morale in Pakistan. We stratify the sample in 123 strata and match on 44 of them. This leaves us with a total of 1,153 observations comprised of 194 respondents exposed to the newspaper ad and 959 as controls. Alternatively, CEM prunes 5 treated and 265 untreated observations away from the sample on the basis on non-comparability. Again, this leads to an extremely balanced post-matching sample with a multivariate L_1 distance of $2.443e^{-15} \approx 0$.

To ensure our estimates of the effect of the newspaper ad campaign on tax morale are not subject to omitted variables bias from the exclusion of characteristics that have been found to determine tax morale in Pakistan, we match on additional behavioral factors. This increases the dimensionality of matching substantially as it produces 518 strata where we match on 76 of them. This generates a post-matching sample of 631 observations comprised of 154 respondents exposed to the newspaper ad and 477 as controls or, equivalently, discarding 45 treated and 747 untreated observations. Pre-processing the observations leads to a very balanced sample again (multivariate L_1 distance of $2.672e^{-15}$). However, the reduction in imbalance is negligible which, in turn, casts doubt over the necessity of matching on behavioral factors.

Since the multivariate L_1 distance in both post-matching samples is infinitesimally low the coefficient of the newspaper variable reveals the SATT of exposure to the newspaper ad campaign on tax morale. In columns (1) and (3) of Table 4, we estimate probit regressions of whether the respondent has high tax morale, respectively. In columns (2) and (4), we estimate ordered probit regressions of the respondent attitude towards tax morale matching on

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[6] A similar pattern can be deduced from the Covariate Imbalance table with regards to the TV campaign as well. This is, generally, the case when the predictor variable is an indicator.

15

The Effects of Media Campaigns on Individual Attitudes towards Tax Compliance; Quasi-experimental Evidence from Survey Data in Pakistan

demographic only, and demographic and behavioral factors of tax morale, respectively.

Table 4: CEM-weighted Estimates: Effect of Newspaper Ad Campaign on Tax Morale[a]

VARIABLES	(1) High Tax Morale Indicator[b]	(2) Ordinal Tax Morale[c]	(3) Ordinal Tax Morale[b]	(4) Ordinal Tax Morale[c]
Newspaper Ad	0.418*[d]	0.268*	0.528**	0.368**
	(0.224)[e]	(0.160)	(0.264)	(0.167)
Constant	-0.802***		-0.877***	
	(0.242)		(0.264)	
Observations	1,153	1,153	631	631

Notes:
[a] Results are based on the post-matching sample using CEM weights and reported at mean values.
[b] Outcome is an indicator taking the value of one if the respondent agrees or strongly agrees that "cheating on taxes in Pakistan is never justifiable" and zero, otherwise.
[c] Outcome is an ordinal measure of whether "cheating on taxes in Pakistan is never justifiable".
[d] *** p<0.01, ** p<0.05, * p<0.1
[e] Robust standard errors in parentheses clustered at the locality level.

Our findings suggest that the newspaper ad campaign had a positive and significant effect on positive attitudes towards tax compliance over both sets of matching criteria. As a matter of fact, when we introduce more stringent matching criteria, the effect is not attenuated but becomes larger and more significant. These results provide convincing evidence that newspaper ad campaigns can causally enhance tax morale in Pakistan. Contrary to the TV ad, the results based on ordinal measures of tax morale indicate that the newspaper ad campaign had a positive and significant effect on attitudes towards tax compliance. The fact that this result is detectable even from a relative underpowered test based on a smaller sample to what is available for the test of TV ad effectiveness, highlights that newspapers were substantially more effectively as a nudging device.

4.3 Combined TV and Newspaper Advertisement Campaigns

In this section, we investigate the cumulative impact of exposure to the TV ad and the newspaper ad campaigns, an underpowered test as only 84 respondents were exposed to both ads.

Table 5: Covariate Imbalance between Respondents Exposed to both Ads and Controls

Multivariate L_1 Distance = 0.77077498
Univariate Imbalance Indicators:

	L_1[a]	Mean[b]	Min[c]	25%[c]	50%[e]	75%[c]	Max[c]
Female	0.12745	0.12745	0	0	0	1	0
Self-employed	0.03606	-0.03606	0	0	0	0	0
Pensioner	0.01389	-0.01389	0	0	0	0	-1

High-school	0.0859	-0.0859	0	0	0	0	0
Master's	0.12115	0.12115	0	0	0	0	0
Vocational	0.0056	0.0056	0	0	0	0	0
News Source	0.24195	-0.39461	0	0	0	-1	0
Balochistan	0.13142	0.13142	0	0	0	0	0
Kpk	0.16235	-0.16235	0	0	0	0	0
Punjab	0.02871	-0.02871	0	0	-1	0	0
Sindh	0.05964	0.05964	0	0	0	0	0
Good Use of Tax	0.00525	0.00525	0	0	0	0	0
Tax doesn't Affect Investment	0.04914	-0.04914	0	0	0	0	0
Recurring Government Spending	0.02521	0.02521	0	0	0	0	0
FBR will not Audit	0.22351	0.22351	0	0	1	0	0
Filing Tax a Social Responsibility	0.02288	0.02288	0	0	0	0	0
Richer Pay More Taxes	0.01984	-0.01984	0	0	0	0	0
Tax System is Fair	0.05707	-0.05707	0	0	0	0	0

Notes:
[a] Univariate distance.
[b] Difference in means.
[c] Difference in empirical quintile at 0, 25th, 50th, 75th, 100th percentile.

Table 5 above that the multivariate L_1 distance of 0.77077498 suggests that the pre-treatment predictor values of tax morale determinants in Pakistan between those exposed to both the TV ad and the newspaper ad relative to the control group are very different. This is the largest covariate imbalance in any treatment group we examine which merits matching even more important.

Cumulative Effect of TV Ad and Newspaper Ad Campaign on Tax Morale

Matching on demographics only disaggregates the sample to 118 strata where we match on 28. The post-matching sample is comprised of 84 treated respondents and 624 controls, a total of 708 observations. The matching algorithm excludes 600, untreated only, observations from the post-matching sample. The multivariate L_1 distance is equal to $1.026e^{-15}(\approx 0)$ which translates to an approximately fully balanced sample.

Introducing behavioral factors in the matching process appears to have a substantial effect on the estimand as CEM prunes 16 treated observations and 923 untreated ones. The resulting post-matching sample contains 301 untreated and 68 treated units over 43 matched strata (out of a total of 489 strata). Given this set of predictors, the multivariate L_1 distance is equal to $1.562e^{-15}(\approx 0)$.

In columns (1) and (3), we estimate probit regressions of whether the respondent has high tax morale, respectively. In columns (2) and (4), we estimate ordered probit regressions of the

respondent attitude towards tax morale matching on demographic only, and demographic and

behavioral factors of tax morale, respectively.

Table 6: CEM-weighted Estimates: Effect of Double Nudge on Tax Morale[a]

VARIABLES	(1) High Tax Morale Indicator[b]	(2) Ordinal Tax Morale[c]	(3) High Tax Morale[b]	(4) Ordinal Tax Morale[c]
TV & Newspaper Ads	-0.0822[d]	-0.154	-0.0199	-0.145
	(0.532)[e]	(0.319)	(0.619)	(0.347)
Constant	-0.592**		-0.609*	
	(0.242)		(0.312)	
Observations	708	708	369	369

Notes:

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

[b] Outcome is an indicator taking the value of one if the respondent agrees or strongly agrees that "cheating on taxes in Pakistan is never justifiable" and zero, otherwise.

[c] Outcome is an ordinal measure of whether "cheating on taxes in Pakistan is never justifiable".

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

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

The analysis lacks power to identify any statistically significant effects of exposure to both ads. The table above shows that the overall cumulative effect of both the TV and the newspaper ad campaigns was zero independent of matching criteria. Interestingly, these findings point towards the potential of tax morale fatigue following repeated behavioral nudging on behalf of the tax agency. But, as aforementioned, these estimates should be taken with a grain of salt; the sample size is not sufficiently large to engage in truly meaningful inference.

5. Robustness Checks

Finally, we assess the robustness of our findings based on the high tax morale indicator outcome to the choice of matching method. Table 7 below presents results from two popular alternative matching procedures to CEM; namely, propensity score matching and matching based on the Mahalanobis distance. The latter is based on the assumption that the controls follow a normal (or elliptic distribution) whereas the former holds if the model of the propensity score is not misspecified. However, we dismiss both of those concerns on the following grounds. First, random sampling of the survey respondents guarantees that the controls are normally distributed. Second, the availability of a pre-intervention as a training sample allows us to identify the statistically significant determinants of tax morale in Pakistan and prevent misspecification. The resulting covariate balance between treatment and control confirms that the propensity score was correctly specified.

Table 7: Effect of Media Campaigns on Tax Morale: Robustness across Matching Methods[a]

Treatment	(1) PSM	(2) Mahalanobis Distance	(3) PSM	(4) `Mahalanobis Distance
Exposed to TV Ad	0.085*[b]	0.172*	0.135***	0.141**
	(0.059)[c]	(0.096)	(0.033)	(0.054)
Exposed to Paper Ad	0.217**	0.139***	0.145**	0.149*
	(0.076)	(0.032)	(0.046)	(0.082)
Exposed to both TV and Paper Ad	0.055	-0.083	0.010	0.058
	(0.088)	(0.140)	(0.063)	(0.099)
Matching on Demographic Controls	Yes	Yes	Yes	Yes
Matching on Behavioral Controls	No	No	Yes	Yes

Notes:
[a] Results are based on the post-matching samples using propensity score weights and reported at mean values. Outcome is an indicator taking the value of one if the respondent agrees or strongly agrees that "cheating on taxes in Pakistan is never justifiable" and zero, otherwise.
[b] *** $p<0.01$, ** $p<0.05$, * $p<0.1$
[c] Robust standard errors in parentheses clustered at the locality level.

Relative to CEM, the results are fairly robust with respect to the sign of the coefficient but not the magnitudes. Specifically, the estimated effects from PSM and from matching on the Mahalanobis distance suggest that the behavioral response is smaller. Nevertheless, the main takeaways remain the same independent of matching procedure. PSM findings suggest that the paper ad brings about a stronger behavioral change in respondents' attitudes towards tax compliance relative to the TV ad. Results from matching on the Mahalanobis distance implies the same for the full model that includes behavioral covariates as well. In confirmation of the CEM findings, exposure to both a TV and a newspaper ad has null effects on tax compliance. This evidence does not dismiss the possibility that multiple behavioral nudging on behalf of the tax agency can lead to tax morale fatigue.

However, it should be noted that the balance achieved with CEM is superior. PSM and matching on Mahalanobis distance do not discard as many observations as CEM does. This leads to post-matching estimated effects which are generally not very different to the ones from the raw, pre-processed sample. Moreover, PSM and Mahalanobis matching lead to net improvements in terms of overall bias reduction but perform worse for some variables. On the other hand, CEM leads to improvements across the board at the expense of power by discarding more non-comparable observations. Therefore, we interpret the results of the robustness checks as a general

19

The Effects of Media Campaigns on Individual Attitudes towards Tax Compliance; Quasi-experimental Evidence from Survey Data in Pakistan

confirmation of the main analysis. The discrepancy could be attributed to the inferior balance achieved with the alternative matching methods.

6. Concluding Remarks

This paper examines the effect of different media campaigns in Pakistan on the underlying tax morale of tax filing-eligible individuals who were exposed to them. Using a novel survey data of Pakistani income tax filers, we show via CEM that both TV and newspaper ads can improve individual perceptions towards tax compliance in Pakistan. Moreover, we find that the effect of the newspaper ad is stronger than the effect of the TV ad. This result underlines the importance of the delivery device for the efficacy of the media campaign. It could be explained by the underlying selection of exposure into the two media. It is reasonable to assume that the newspapers readers are more educated, more senior and at a better socio-economic status than those who saw the TV ad, on average. Recall that CEM equalizes the differences in characteristics between those exposed to the TV ad and the newspaper ad relative to the control group but not with respect to each other. Thus, the larger magnitude of the newspaper ad might be simply due to the fact the respondent exposed to it exhibit characteristics that are known to lead to superior tax compliance outcomes.

Kleven and Waseem (2013) show that Pakistani taxpayers' earnings do respond to pecuniary incentives presented by the distortionary nature of notched incentive schemes of the tax code. We illustrate the potential for behavioral shifting of attitudes towards tax compliance using non-pecuniary, moral suassion incentives presented by the FBR in the form of ads in media campaigns. We provide empirical evidence that well timed campaigns can enhance voluntary compliance. Even if such campaigns may not shift norms permanently, they could produce marginal effects on filing making them worthwhile to tax administration.

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23

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25

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APPENDIX:

Within the limited timeframe, a
strategic sampling strategy was
used to ensure significance and
efficiency to allow for adequate
analysis to take place.

From each metropolitan area,
around 200 tax eligible individuals
were selected at random resulting
in a total sample of 2,000 across
10 areas.

Naïve OLS Estimates: Effect of Different Nudging Devices on Tax Morale

Table A.1: Unadjusted OLS Estimates of Effect of Media Campaigns on Tax Morale[a]

VARIABLES	(1) TV	(2) Newspapers	(3) TV & Newspaper Ads	(4) Third Devices
TV	0.175[b]			
	(0.148)[c]			
Newspapers		0.308*		
		(0.167)		
TV & Newspaper Ads			-0.0209	
			(0.492)	
Third Devices				1.038**
				(0.461)
Constant	-0.691***	-0.688***	-0.654***	-0.684***
	(0.228)	(0.222)	(0.231)	(0.222)
Observations	1,954	1,954	1,954	1,954

Notes:

[a] Results are based on the raw sample using no weights and reported at mean values. Outcome is an indicator taking the value of one if the respondent agrees or strongly agrees that "cheating on taxes in Pakistan is never justifiable" and zero, otherwise. Explanatory variables include the treatment indicator and a constant.

[b] *** $p<0.01$, ** $p<0.05$, * $p<0.1$

[c] Robust standard errors in parentheses clustered at the locality level.

The Effects of Media Campaigns on Individual Attitudes towards Tax Compliance; Quasi-experimental Evidence from Survey Data in Pakistan

Table A.2: Unadjusted OLS Estimates of Effect of Media Campaigns on Tax Morale[a]

| VARIABLES	(1) TV	(2) Newspapers	(3) TV & Newspaper Ads	(4) Third Devices
TV	0.0386[b]			
	(0.0985)[c]			
Newspaper		0.177		
		(0.116)		
TV & Newspaper Ads			-0.131	
			(0.290)	
Third Devices				0.901*
				(0.500)
Constant	-0.871***	-0.861***	-0.884***	-0.864***
	(0.196)	(0.203)	(0.211)	(0.204)
Observations	1,954	1,954	1,954	1,954

Notes:
[a] Results are based on the raw sample using no weights and reported at mean values. Outcome is an ordinal measure of whether "cheating on taxes in Pakistan is never justifiable". [a] Explanatory variables include the treatment indicator and a constant.
[b] *** $p<0.01$, ** $p<0.05$, * $p<0.1$
[c] Robust standard errors in parentheses clustered at the locality level.

Authors Vitae

<u>Cyan:</u>
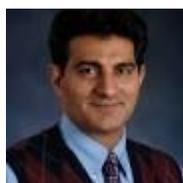
Musharraf Cyan is a Senior Research Associate at the International Center for Public Policy in the Department of Economics at Georgia State University. He has worked over twenty years in the areas of public services, fiscal decentralization, tax reform and development planning. He has consulted for organizations including the World Bank, Asian Development Bank and United Nations and has worked as a local administrator and chief economist in Pakistan. Cyan holds a degree in medicine from King Edward Medical University, Pakistan, and a Master's degree from University College, London.

Koumpias:
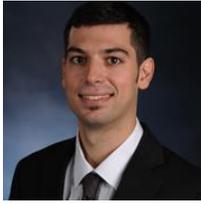
Antonios Koumpias is an Economics Ph.D. candidate at Georgia State University and Graduate Research Assistant at the International Center for Public Policy. His primary research interests include public and health economics. In his dissertation, he examines the impact of government policies on firms and individuals in the fields of tax policy, healthcare and corruption in public administration. Koumpias holds a Master's in Economics from Duke University and a Bachelor's in Economics from the University of Macedonia in Thessaloniki, Greece.

Martinez-Vazquez:

Jorge Martinez-Vazquez is Regents Professor of Economics at Georgia State University and Director of the International Center for Public Policy. He has published over 20 books and numerous articles in academic journals, such as Econometrica and Journal of Political Economy. He has consulted with federal agencies and state governments in the United States and over 80 countries including Russia, China, Pakistan, Indonesia, and Mexico with World Bank, IMF, USAID, ADB and IDB programs. He has directed numerous projects including the $20 million USAID Fiscal Reform Project in the Russian Federation (1997-2000). He is the recipient of numerous prizes and awards.