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Taxes, Informality, and Income Shifting

Evidence from a Recent Pakistani Tax Reform

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Taxes, Informality and Income Shifting: Evidence from a Recent Pakistani Tax Reform*

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Abstract

Using a tax reform implemented in Pakistan in 2009, I investigate intensive and extensive margin behavioral responses to taxes. The reform creates large tax rate variations between very similar taxpayers and thus generates compelling quasi-experimental variation, which is used to identify structural parameters important for tax policy. Relying on administrative records for universe of income tax filers for the years 2006-2010, I characterize a host of responses triggered by the reform, which include reduction in earnings, shifting of income across bases, switching of business organization and movements in and out of the formal economy. Structural elasticities governing these responses are large, and reflect the considerable welfare costs the reform imposes on the treated taxpayers. I also find evidence that the reform had significant negative spillover effects on VAT.

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I Introduction

There is very rich and vast literature that studies behavioral responses to taxes using tax return data. As till recently such data was available only for the advanced economies, almost whole of such literature is set in the OECD countries, particularly in the US.[1] For at least three reasons it is important to extend this analysis to the developing economies. First, taxation structures of the developing countries are different in the sense that they have large informal sectors, weak enforcement and low third-party reporting. Investigation of responses in such settings is important to broaden our theoretical understanding of how these environmental factors affect behavior to taxation. Second, expansion of fiscal capacity of developing countries depends to a large extent on their ability to raise taxes efficiently. Anecdotal evidence, however, suggests (which this paper will confirm) that still a significant proportion of government revenues are collected through very costly tax policies. More work on welfare and efficiency costs of alternative tax policies is needed before more expensive of such policies are phased out. Third, taxation bases of developing countries are extremely narrow as only a fraction of total population file tax returns and pay taxes.[2] To broaden theses bases and to spread the burden of taxation more equitably, policy makers need to encourage entry of new taxpayers. Despite importance of the issue, however, there is virtually no evidence on how responsive participation choices of taxpayers, particularly movements in and out of informality, are to the tax rates and other variables of the tax system.[3]

In this paper, I use an income tax reform introduced in Pakistan in 2009[4] as a natural policy experiment to estimate intensive and extensive responses to taxes. Before the reform, unincorporated businesses – sole proprietorships and partnerships, which comprise about 50% of all tax filers, were treated symmetrically for the purposes of personal income taxation in Pakistan. Their earnings were taxed through a graduated tax schedule comprising fourteen brackets with tax rates varying progressively from 0% to 25 %. In 2009, symmetric taxation

[1] For a detailed survey of this literature, please see Giertz, Saez and Slemrod (2012).

[2] According to press reports and author's own calculations, less than 1% of total population of Pakistan file their income tax returns. Out of these filers, only 260,000 pay tax for three consecutive tax years. These figures are broadly in line with the general trends in other developing countries. For example in Bangladesh about 1.3% and in India about 4.7% of the population file their returns.

[3] Kleven and Waseem (2012) is one study that analyzes behavioral responses to taxation in a developing country settings. Their empirical analysis, however, does not cover extensive margin responses.

[4] Pakistani tax year runs from July to June; year t in this paper refers to the tax year from July t to June $t+1$.

within the self-employed sector was abolished, and a flat rate tax scheme, involving a tax rate of 25% with no exemption threshold, was introduced for partnership earnings. Tax rates on other forms of self-employment income were maintained for the year 2009 and were generally reduced for the year 2010 onwards.

For a number of reasons, the reform generates almost ideal conditions for studying the effects of taxation on participation, earnings, and business organization choices of individuals. First, it creates tax rate variation between essentially very similar taxpayers, and thus enables construction of treatment and control groups which have similar initial earnings and tax rates but face drastically different taxation after the reform. Reported earnings trends are completely parallel for the two groups of taxpayers for pre-reform years and diverge sharply for the treatment group at the time of reform. Closeness of the two groups is further borne out by their identical bunching responses to the notches – cutoffs where average tax rate changes discontinuously – in the pre-reform tax schedule.[5] Second, as assignment to higher tax rates is based on business form and is not correlated with reported earnings, identification will not be confounded by issues – created specifically by income-based control groups – such as mean reversion and secular changes in income distribution, which dogged similar studies in other settings.[6] Third, variation in rates created by the reform is large, particularly at the bottom of the earnings distribution where some of the taxpayers experience a tax rate hike of more than 50 times. Past work has shown that responses produced by small tax rate changes are severely muted, as utility gains from reoptimizing are not large enough to overcome frictions such as adjustment cost, inattention, or misperception (Chetty et al. 2009, Chetty et al. 2011, Chetty 2012). Structural parameters estimated from such attenuated responses can seriously underestimate long-run costs of taxation unless the frictions are explicitly taken into account. Pakistani tax reform, however, is expected to produce responses free of attenuating frictions because of the strong and salient incentives it creates for such responses. And finally, for the study I have gained access to administrative tax records for the universe of tax filers in Pakistan for the years 2006-10. Availability of rich tax return data for years before and after the reform not only facilitates validation of identification strategy, but also allows consideration of *fiscal externalities*. These externalities arise because price changes lead agents to change behavior not only in the tax base price changes have been

[5]In a working paper version of Kleven and Waseem (2012), authors consider these bunching responses and find them to be indistinguishable for the two group of taxpayers.

[6]For a detailed exposition of these identification issues, please see Slemrod (1998), Saez (2004), and Giertz, Saez, and Slemrod (2012).

applied to but also in other bases. Central attraction of the notion of elasticity of taxable income that it is a sufficient statistic for estimating welfare costs of taxation[7] is seriously diminished if such spillovers are important and are not considered explicitly. The tax return data allows taking into account of these externalities including income shifting from partnership tax base to tax-favored sole proprietorship tax base, switching of business organization from unincorporated partnership firms to incorporated firms, and spillover effects on VAT base.

Following are the main results of my analysis. I find substantial extensive response to tax rate increase on partnership income. By the second year after the reform, almost 57% of the partnership firms, which report positive taxable income before the reform, leave the formal sector. If increasing pre-reform trend is taken into consideration, decrease in number of such taxpayers amounts to 70%. This response is particularly stronger at the lower end of the income distribution, where firms experience the largest tax rate increases. For two reasons, such a large response is not entirely unexpected. First, optimization frictions play little part in participation decision of agents, because utility costs of ignoring tax changes are first-order on the extensive margin as compared to second-order costs on the intensive margin.[8] Second, participation choices of small-sized, low-profit firms are especially sensitive to tax shocks. Such firms experience little productivity gains from operating in the formal sector and thus are always on the margins of participation and non-participation. The 2009 tax reform creates the largest tax increases on this part of the distribution and thus triggers large-scale exit of such firms.

For the firms which do not exit, I find evidence of strong intensive response. Compared to control group, reported earnings of treated taxpayers reduce substantially after the reform (intensive margin elasticity of more than 2). The response is cleanly identified, as both treatment and control group have identical pre-reform trends which separate exactly at the time of reform. Taking advantage of the fact that the reform creates variation across most of the earnings distribution, I explore heterogeneity by income groups, and find that intensive elasticities are weakly declining with reported earnings.

Since partnership firms are pass-through entities,[9] their taxable income responses should be mirrored at the individual level. When a partnership firm leaves the formal sector, or reduces

[7] Feldstein (1995 and 1999).

[8] As tax liability enters directly in the participation constraint of agents, failure to reoptimize on the extensive margin results in first-order utility losses. Compared to this, at the intensive margin reoptimization offers only the second-order advantage of being able to choose the right consumption bundle (Chetty 2012).

[9] Pass-through entity is a legal structure where earnings flow through to the owners/investors.

its earnings, partners also leave, reduce earnings, or switch business organization. Indeed, one advantage of Pakistani context is that it allows identification of responses at both firm and individual level. Individuals report different components of their earnings including share from partnership firms in their personal tax returns. This makes it possible to study changes in individual-level behavior not only for the treated base but for other bases as well. The reform does not increase tax rates on other forms of income, and, thus, creates incentives to shift earnings to these tax-favored bases. I find strong evidence that such income shifting takes place (a cross-price elasticity of -0.89). The income shifting alone, however, is not sufficient to explain the large response of partnership income at the firm level. I find broad income elasticity of 0.48 at the intensive margin and almost 1 at the extensive margin, which capture the significant net effects of the reform on the treated individuals.

Purpose of the 2009 reform was to promote corporatization of Pakistani economy. Before the reform, incorporated firms paid a tax of 35% or 25% depending upon the size and age of the firm. Partnership earnings, on the other hand, were taxed through a graduated tax schedule with tax rates varying progressively from 0% to 25%. It was perceived that this massive difference between personal and corporate income rates was distorting firms' choice of organizational form by operating as a penalty on incorporation. The reform was motivated by a desire to neutralize this choice. To see if the reform had the intended effect, I look at both the number of new incorporations and the taxable income distributions of corporate tax filers in Pakistan for the years 2006-10. I do not find any discernible break in the two series at the time of reform, indicating that the reform does not significantly increase the size of or entry into the corporate sector in the short-run.

More than three-quarters of the firms affected by the 2009 reform are required to charge VAT on their sales. Changes in their behavior will affect VAT collections as well. To quantify these *spillovers* and to see if the responses are different across VAT-liable and exempt firms, I estimate intensive and extensive responses separately for the two groups of firms. On the extensive margin, I estimate that number of VAT-liable partnership firms reduce by almost 39% in the first year and by 60% in the second year after the reform.[10] On the intensive margin, I find a taxable income elasticity of almost 1 for such firms. Together, this reflects the significant negative effects of the reform on VAT base. The responses of VAT-liable firms, however, are

[10]Since partnership firms are only a small fraction of total VAT base, which also comprises sole proprietorships and corporate firms, overall impact of the 2009 reform on VAT base will not be that strong.

considerably smaller as compared to exempt firms. This highlights the importance of invoice-credit mechanism of VAT. Being part of a VAT chain reduces a firm's ability to manipulate its earnings and to exit the formal sector.

Rest of this paper is organized as follows. Section II provides an overview of the context, develops conceptual framework and describes data, section III discusses empirical methodology and results, and section IV concludes.

II Context, Conceptual Framework, and Data

II.A Context

Focus of this paper is personal income taxation of unincorporated businesses – sole proprietorships and partnerships, which constitute more than 50% of the total personal income tax filers in Pakistan. Legally, sole proprietorships are considered indistinguishable from their owner, and individuals are required to account for earnings from such firms in their personal income tax returns. Partnerships, on the other hand, are deemed distinct *persons*[11] and are obliged to file separately as well. They are, however, pass-through entities in the sense that, unlike corporations, income is not taxed twice and the taxation they face flows through to the underlying owners. To see this, consider a partnership with taxable income Z and P number of partners such that $Z = \sum_{p=1}^{P} z^p$, where z^p is the share of partner p. This firm, for a tax system $T(z)$, incurs a tax liability of $\tau(Z).Z$, where $\tau(Z) \equiv \frac{\partial T}{\partial Z}$; the partners, however, face no further taxation on z^p, as they pay a tax of $\tau(z).(z - z^p)$, where z is aggregate taxable income from all sources including partnership share. This Pakistani scheme of taxation of partnership income is slightly different from other countries – for example the US – where partnership firms are not considered separate legal entities. In such countries, partnership earnings are taxed at the individual level: partners pay a tax liability of $\tau(z).z^p$ rather than $\tau(Z).z^p$. This distinction is important for the Pakistani context, because the tax schedule before the 2009 reform consists of large number of brackets with progressively increasing tax rates so that $\tau(Z)$ is greater than $\tau(z)$ for a vast majority of taxpayers. For such a tax system, the individuals reporting $z^p > 0$ are generally paying higher tax on their aggregate earnings, revealing their preference for the

[11] Pakistani law does not allow creation of limited liability partnerships. Separate legal personality is, hence, only for the tax purposes, as partners individually and severally remain responsible for all obligations of the firm.

partnership business form.[12]

Figure I shows the tax changes made by the reform. Before 2009, partnership firms and all self-employed individuals face the same tax schedule illustrated by solid blue curve in the figure. It features 14 tax brackets with fixed average tax rate – varying from 0% at the bottom to 25% at the top – applied to each bracket. The reform replaces this scheme with dichotomous taxation of partnership and sole proprietorship earnings. For partnerships, a flat tax rate of 25% is implemented that features no exemption threshold (dashed red curve in Figure I). In contrast to this, graduated tax scheme is maintained for other forms of self-employment earnings but in a considerably simplified form: number of brackets are reduced to 5 and bracket thresholds are moved in such a way that majority of taxpayers experience tax reduction (short-dashed gray curve in Figure I). There are some differences in timing of applicability of these changes as well. The reform was introduced on 06-06-2010, but is applied retrospectively to partnerships with effect from 01-07-2009[13] and prospectively to proprietorships from 01-07-2010 onwards. As mentioned earlier, purpose of the reform was to promote corporatization of Pakistan's economy by eliminating preferential tax treatment of partnership earnings as compared to corporate firms, but it had the unintended consequence of creating massive distortions within the unincorporated sector.

II.B Conceptual Framework

When faced with taxation, individuals react in a number of ways: they may work less, work with reduced intensity, change their occupation, or invest more in tax avoidance/evasion activities. Under certain conditions, all margins of behavioral response are a source of deadweight loss and must be taken into account to assess efficiency and welfare consequences of taxation. Recent tax responsiveness literature, accordingly, models an individual's decision problem broadly as a choice between consumption c and taxable income z. Individuals are assumed to maximize utility $u(c, z)$ subject to a budget constraint $c = z - T(z) = (1 - \tau).z + E$, where $T(.)$ is tax liability, $\tau \equiv T'(.)$ is marginal tax rate, and $E \equiv \tau.z - T(z)$ is virtual income generated by $T(.)$. Such maximization produces a taxable income supply function $z = z(1 - \tau, E)$, where

[12]This is conceptually similar to the "marriage penalty" or "marriage subsidy" in the US, where joint income taxation and progressivity of tax system implies that married couples experience different tax liabilities as compared to if they were single and file separately. Eissa and Hoynes (2000) estimate that about 55% of couples experience marriage penalties in 1997 with average penalty of $1300.

[13]The retrospective application is probably motivated by revenue considerations.

optimal z depends on net-of-tax rate $1-\tau$ and virtual income E. Relying on weak separability between activities underlying taxable income z – hours, effort, training, sheltering etc. – and consumption c, Feldstein (1999) showed that all behavioral responses to taxes could be captured by responsiveness of z to the net-of-tax rate $1-\tau$. Since then, elasticity of taxable income (ETI) $\varepsilon \equiv \frac{1-\tau}{z}.\frac{\partial z}{\partial(1-\tau)}$ has become the central focus of public finance literature.

To make the standard model compatible with the Pakistani context considered here, I extend it in two directions. First I allow for the possibility that earned income could be of multiple types and later on the analysis is extended to account for the extensive margin responses created by tax changes. To consider the first extension, assume that taxable income z can be of two types: income earned as a sole proprietor z^s and income earned as a partner in a partnership firm z^p. Each individual now maximizes a utility function of the form $u(c, z^s, z^p)$ and faces a budget constraint $c = z^s + z^p - T(z^s, z^p)$ where $T(z^s, z^p)$ is a potentially non-linear and non-separable income tax system through which z^s and z^p are taxed, $\tau^j \equiv \frac{\partial T}{\partial z^j}$ is the marginal tax rate on income of type j, and $E \equiv \sum_{j\in\{s,p\}} \tau^j.z^j - T(z^s, z^p)$ is the generalized virtual income. Utility maximization now generates two income supply functions $z^j = z^j(1-\tau^s, 1-\tau^p, E), j \in \{s, p\}$. Since ETI literature has not been able to find any compelling evidence of significant income effects on reported earnings choices,[14] I assume away income effects so that optimal choice of z^j depends only on the two net-of-tax prices.

In this framework, heterogeneous tastes and abilities of individuals over the two income types will be reflected in the earning decisions they make. Partnerships are formed mainly to take advantage of productivity gains arising from complementarity of skills between individual partners. Sole proprietorships, on the other hand, offer entrepreneurs more freedom and control over business decisions. Optimal earning choice z^j, given by the condition $u_{z^j}(.) = 1-\tau^j$, thus, captures an agent's skill in producing income of type j. Specifically, for individuals reporting $z^p > 0$ it must be that disutility of producing z^p on the margin is less than that for z^s because, for the reasons mentioned earlier, $(1-\tau^p)$ is generally less than $(1-\tau^s)$. This has important consequences for the welfare analysis as changes in any of the two tax prices can potentially lead to shifting of earnings between the two income types. The fact that most of the taxpayers are paying strictly higher tax to report $z^p > 0$ implies that such income shifting captured

[14] Gruber and Saez (2002) was the first study which considered both income and substitution effects on reported income choices in the US and found small and insignificant income effect. More recently, Kleven and Schultz (2012) estimate taxable income responses of Danish population of taxpayers over a period of 25 years and find that income effects for self-employed are not statistically different from zero.

the cross-price shifting elasticity $\varepsilon_k^j \equiv \frac{1-\tau^j}{z^k} \cdot \frac{\partial z^k}{\partial(1-\tau^j)}$ reflects *real* welfare loss rather than just change in reporting behavior. Earnings supply functions $z^j(1-\tau^s, 1-\tau^p)$ also feature own-price substitution effect as increase in τ^j leads to decrease in z^j with an elasticity $\varepsilon_j^j \equiv \frac{1-\tau^j}{z^j} \cdot \frac{\partial z^j}{\partial(1-\tau^j)}$.

Generally, tax reforms are associated with discrete changes in tax liabilities and hence may trigger participation responses as well. Increased tax bills can push agents on the margin of participation either to drop out of labor force – real participation response – or to move into informal sector – informality response. To account for these extensive responses, I incorporate a discrete participation choice into the model without specifying if it is a real labor supply choice or an informality choice.[15] Utility maximization problem can now be decomposed into two stages. In the first stage, agents make optimal earning choices conditional on participation and in the second stage they decide whether to participate or not. Participation into formal sector, however, entails fixed utility gains q arising, for example, from warm glow, productivity gains from use of financial sector, or access to better production technology. An agent will participate into formal sector only if utility from participation $u(z^s + z^p - T(z^s, z^p), z^s, z^p) + q$ exceeds utility from non-participation u_0, that is iff $q \geq u_0 - u(z^s + z^p - T(z^s, z^p), z^s, z^p) \equiv \bar{q}$. Assuming that there is a smooth distribution of q in the population, represented by the distribution function $F(q)$, a fraction $\theta(\tau^s, \tau^p) \equiv 1 - F(\bar{q})$ of all agents participate. Extensive responses to taxation can then be captured by the participation elasticity $\eta \equiv \frac{1-t^\rho}{\theta(\tau^s,\tau^p)} \cdot \frac{\partial \theta(\tau^s,\tau^p)}{\partial(1-t^\rho)}$, where t^ρ is the average tax rate on participation.

In this model, choices of z^p by individuals will be reflected at the aggregate level in both the number of and the taxable earnings reported by the partnership firms. Behavioral responses to changes in partnership income taxation can thus be studied both by looking at the firm or the individual level outcomes. In succeeding empirical section of the paper, I first consider responses of the partnership firms and then of the individuals.

[15] In developing economies boundaries between real non-participation and informal participation are blurred. In the absence of state-provided social security, out-of-work individuals have to fall back on private – family or community based – social networks for consumption. In return, individuals may be required to work in domestic production. As these choices are not observed, no distinction is made between the two at this stage. Later on, however, I characterize nature of extensive response on the basis of evidence on compliance of tax filing provisions.

II.C Data

For this study, I use administrative data from the Federal Board of Revenue in Pakistan, which includes universe of income tax returns filed by corporations, partnership firms,[16] self-employed individuals and wage earners for the years 2006-2010 (more than 5 million year-observations). Two aspects of the data are important for my analysis. First, individuals report all components of their earnings in their tax returns. The data, hence, can be used to investigate partnership income response at both firm and individual level. One problem with this approach, however, is that the firms do not report breakdown of profits by individual partners. Since partnership earnings are taxed at the firm level, this makes it difficult to ascertain tax rates faced by individuals on their partnership earnings. Estimation of behavioral elasticities at the individual level is, hence, possible only if some assumptions on division of partnership profits are made – a point I come back to in empirical section of the paper.

Second, Pakistani tax code has very elaborate provisions on return filing. In addition to all registered taxpayers, anyone who has filed and paid tax in any of the two preceding years is required to file tax return.[17] Non-filing entails penalty and estimated assessment on the basis of past reports. Obviously, enforcement of these provisions cannot be assumed to be perfect given that only about 1 million of the 3.1 million registered taxpayers file returns. Tax administration, however, takes the view that most of the non-compliance relates to taxpayers who should not be on tax register anymore. Due to retirement, emigration, closure of businesses, etc. taxable earnings of such taxpayers have fallen below the exemption threshold, but they have not been formally de-registered.[18] Ever since the automation of tax records in 2006, it is not easy for recently *active* taxpayers to stop filing or report zero taxable earnings, as it will expose them to higher audit probability and consequent penalties. All this has important implications for characterizing extensive response to the reform. Whether such response is *real* or an *informality* response is not observed, but some proportion of the overall response will be real unless the audit process is completely ineffective.

[16] Pakistani tax code uses the generic term association of person (AOP) to denote multi-member, non-corporate firms.

[17] Also anyone who owns a car, a house, or certain other immovable property is required to file a return regardless of the earnings.

[18] De-registration is a costly process involving a final comprehensive audit. Most of the inactive taxpayers, hence, prefer to leave without requesting de-registration.

III Empirical Analysis

III.A Partnership Firms: Graphical Evidence

In this subsection, I present graphical evidence on overall response of partnership firms to the tax reform; subsequently, the response is decomposed to investigate intensive and extensive behavior separately. Panel A of Figure II plots year-wise taxable income distributions of partnership firms for the pre-reform years. Throughout this paper, I focus only on taxpayers with earnings between 0 and PKR 720,000, which constitute more than 90% of the population. Beyond this, density of tax filers is thin and variation in tax rates too small to analyze responses effectively. The density distribution plots show the number of partnership firms with yearly reported earnings within various bins (represented by dots) of size PKR 10,000. Each dot is located exactly at the upper bound of a given bin, and notches in the pre-reform tax schedule (2006-08) are marked by vertical dashed lines. Three aspects of these density distributions are noteworthy. First, number of partnership firms filing for tax are steadily increasing before the reform: the numbers grew by 9% in 2007 and by 28% in 2008. Second, the distributions feature considerable bunching response to the notches in the pre-reform tax schedule, indicating that majority of the taxpayers are *aware* of and respond to the incentives created by the tax system. Third, reporting patterns show remarkable persistence over the years. Though, number of tax filers increase from year to year, addition of new taxpayers appears only to shift the density up proportionally at all levels of income without changing overall shape of the distribution. This has important bearing on the empirical analysis, as I use the equi-proportionate increase feature of yearly distributions to construct counterfactual distributions for the post-reform years.

In order to see effects of the reform, I contrast post-reform empirical distributions with the corresponding 2008 distribution. Panel B of Figure II makes such a comparison, and illustrates enormous response to the tax changes. Not only that the increasing trend in number of tax paying partnership firms is completely reversed, but number of such taxpayers start declining sharply: compared to 2008, the numbers decrease by 41% in 2009 and by 57% in 2010. Panel B further shows that the response is largely concentrated in the earning range (below Rs. 400,000) where the firms experience the largest tax increases. Although it is generally difficult to discern intensive response from taxable income histograms, the figure shows some clear signs of it: post-reform densities are higher at lower levels of earnings (below Rs. 100,000) suggesting a leftwards shift of the post-reform earnings.

Naturally, it can be argued that the observed changes to the density distributions might have been caused by some non-tax shocks hitting the economy around the same time as the 2009 tax reform. Simplest way to rule out such a possibility is to look at similar distributions for group of tax filers not affected by the tax changes. As mentioned earlier, the reform creates a very *natural* control group – the self-employed individuals (sole proprietorships), for whom tax system stayed the same for the year 2009. Some of these individuals, however, are also partners in partnership firms and receive partnership income share z^p. Following the reform, these individuals face an incentive to shift earnings from z^p to tax-favored sole proprietorship income z^s. To ensure that no one in the control group is affected by the *treatment*, I take out all individuals from the control group who report non-zero z^p in any of the years. As such individuals constitute only about 4% of the sample, their exclusion does not alter the analysis.

Figure III shows the year-wise empirical distributions of taxable income for the control group. The two panels of the figure are exactly analogous to the corresponding panels of Figure II apart from one aspect. The 2009 reform made changes to the taxation regime of sole proprietorships also, which became effective from the year 2010. These changes consisted of reducing number of tax brackets, moving bracket cutoffs and changing the tax rates applicable to each bracket. In panel B of figure III, these new bracket cutoffs are also demarcated (vertical blue lines). Comparison of Panels A of the two figures reveals that pre-reform earnings distributions for the control group share the same features identified for the treatment group: there is stable time trend in filing – which though is weakly declining for the control group, taxpayers bunch at notch points in the pre-reform tax system, and shapes of the pre-reform distributions are remarkably stable over the years. Consideration of the post-reform taxable income distributions for the control group (Panel B of Figure III) demonstrates that reporting behavior does not change for the control group for the year 2009 (blue curve): both number of tax filers and shape of the distribution evolve strictly according to the pre-reform trends. This rules out the possibility that changes to the post-reform earnings distributions of the treatment group are caused by anything other than tax rate changes made by the 2009 reform. Predictably, however, the 2010 distribution for the control group is different from the 2006-09 distributions, as it shows considerable effects of the tax changes that become operational for the control group in 2010.

The empirical density distributions provide suggestive evidence of significant behavioral response to the 2009 tax reform: both sets of taxpayers react sharply to the changes in their

tax regime, precisely at the time these changes become applicable. The distributions, however, conflate both intensive and extensive margin behavior, which needs to be separated to identify the structural elasticities governing the responses.

III.B Partnership Firms: Intensive Response

To isolate the intensive response, I use the difference-in-difference (DiD) methodology and compare reported earnings of partnership firms to the control group mentioned above. As the control group itself experiences tax changes in 2010, I restrict the period of estimation to years 2006-09. In ETI literature, DiD has been implemented using both repeated cross-section and panel approaches, each having its own advantages and disadvantages.[19] While repeated cross-section is considered more robust to issues like *mean reversion*, panel approach is argued to be right method if *composition* of sample changes over time. For repeated cross-section approach same slices of income distribution are compared, it is hence important that taxpayers at a given point of the distribution have same characteristics each year. From graphical evidence presented in section III.A, we know that a large number of partnership firms exit in 2009. If taxable income responsiveness is heterogeneous across income groups and these groups experience varying degree of extensive response, repeated cross-section estimates will not reflect the true elasticity in the population. We can, however, abstract away from the composition effects by applying DiD to a balance panel of taxpayers. Panel approach is also more appropriate because mean reversion is not likely to be a problem in the current context.[20] However, in order to see if concerns about change in composition of sample are important, I estimate following baseline model both for repeated cross-section and panel of taxpayers.

$$ln(z_{it}) = \varepsilon.ln(1-\tau_{it}) + \alpha.\mathbb{1}(i \in T) + \beta.\mathbb{1}(t = t') + \nu_{it} \tag{1}$$

Here T is an indicator for treatment, t' is post-reform year, and $ln(1-\tau_{it})$ is instrumented by the interaction term $\mathbb{1}(i \in T).\mathbb{1}(t = t')$[21]. For panel data, the regressions is run in changes rather

[19] For a detailed discussion on merits and demerits of repeated cross-section and panel approaches please see Saez (2004), Giertz, Saez and Slemrod (2011) and Kopczuck (2012).

[20] Generally, taxpayers with above-mean (below-mean) income one year are expected to have lower (higher) earnings next year due to fluctuations of transitory component of earnings from year to year. This seriously obfuscates behavioral responses to taxation, especially if variation in tax rates between high and low income taxpayers is used as a source of identification. In the present context, however, there is no reason to expect that transitory income fluctuations will be correlated with business organization of taxpayers, and will vary systematically across the treatment and control groups.

[21] As for a non-linear tax system τ_{it} changes endogenously with z_{it}, we have to instrument τ_{it} to ensure consistency of $\widehat{\varepsilon}$.

than levels. The estimate of ε in (1) will consistently identify elasticity of taxable income if it can be shown that *parallel trend* assumption holds – absent the tax changes, reported earnings would have evolved identically for both the treatment and control groups.

In Figure IV, I plot time series of log-income for the treatment and control groups. Panels A-D show average log-income for the cross-section of taxpayers with earnings within the indicated range for each year t, while panels E and F illustrate average *change* in log-income between years t and $t+1$ for unbalanced and balanced panel of taxpayers respectively. The six panels of the figure clearly demonstrate that the identifying assumption is satisfied for all the samples considered. Reported earnings trends are parallel for the treatment and control groups before the reform years; for the year 2009, taxable income stays on the trend for the control group but declines sharply for the treatment group, showing substantial response to the reform. Panels A-D further illustrate that drop in reported earnings is more pronounced at bottom of the earnings distribution and becomes less so as we move along the distribution. This is consistent with theoretical predictions as the 2009 tax rate increases are the highest for low-income taxpayers and decrease monotonically with earnings such that partnership firms with taxable income of more than PKR 1.3 million experience no tax rate change at all. Accordingly, Panel D, which also includes taxpayers with earnings exceeding 1.3 million, shows the least relative drop.

Table I reports the taxable income elasticities for partnership firms estimated from (1) in the manner described above. For the panel regressions, I consider both unbalanced and balanced panels. Unbalanced panel includes all taxpayers who report both for years t and $t+1$ and balanced panel includes only those who file returns every year. The DiD specification in (1) implicitly assumes that the treatment effects are homogeneous in population. In practice, however, strength of the effects may vary, particularly across taxpayers in various parts of the income distribution. To explore such heterogeneity, I estimate (1) in various earning ranges indicated in Column (1) of the table.[22] Estimates from repeated cross-section approach are presented in columns (2)-(5), from unbalanced panel in columns (6)-(8), and from balanced panel in columns (8)-(10). Owing to concerns about change in composition of the sample in 2009, balanced panel estimates are the preferred ones and the other results are assessed against these. As shown in Panel B of Figure II, earnings distribution shifts leftwards after the reform. This creates an excess mass of taxpayers at the bottom of the post-reform distributions (between

[22]For balanced panel, taxpayers are included in the income groups on the basis of their reported earnings in 2008.

0 and Rs. 100,000). Estimates from repeated cross-section regression will, hence, exaggerate the response if upper bound of the sample considered is too low. I, accordingly, ignore cross-sectional estimates for the bottom two income groups from the succeeding analysis.

The main findings are the following. First, estimates from the three alternative approaches are not significantly different from each other: elasticities from cross-sectional and unbalanced panel specifications are almost similar and are within the 95% confidence intervals of balance panel estimates. Point estimates from cross-sectional and unbalanced panel regressions, however, are slightly smaller as compared to balanced panel estimates for high-income groups. This shows that concerns about change in composition of sample in 2009 are not important, and seem to matter only if moderately high-income taxpayers (earnings exceeding Rs. 400,000) are included in the sample. For these samples, due both to asymmetric extensive response (low-income taxpayers exit more) and heterogeneous elasticities (high-income taxpayers are less responsive) cross-sectional and unbalanced panel approaches underestimate response. The difference, however, could also be due to another reason. Balanced panel approach, though robust to changes in composition of sample, is subject to another kind of selection bias. It considers only the taxpayers who file every year, and there is past evidence that such taxpayers respond more to tax changes.[23] True response in the population, hence, lies between cross-sectional/unbalanced panel estimates (lower bound) and balanced panel estimates (upper bound), and is very tightly estimated.

Second, elasticities presented in Table I are large (ranging between 2.3 and 2.8) as compared to those reported in earlier studies especially Kleven-Waseem (2012).[24] Finding of large elasticities here in itself should not be surprising. It is widely known in literature that ETI is not a structural parameter depending solely on underlying preferences and technologies. It rather is a function of tax system, and hence may vary from reform to reform.[25] Specifically, large tax reforms, being costly to ignore, generate larger responses. Reforms targeted to narrow tax bases, by creating opportunities of income shifting, also trigger stronger responses. The 2009 reform is large and not very broad-based in its focus; strong taxable income response is hence

[23]Kleven-Waseem (2012), studying bunching responses of similar taxpayers, find that taxpayers who file for four consecutive years are more likely to bunch at tax notches and are less likely to make strictly dominated earnings choice. They attribute higher responsiveness among these taxpayers to their superior tax literacy.

[24]They use bunching at notches in the 2006-09 income tax schedule to identify intensive margin elasticities of taxable income for self-employed individuals in Pakistan. Elasticities reported there are always less than 0.3.

[25]In fact, Kopczuck and Slemrod (2002) have suggested that policy makers can optimally *choose* ETI by appropriately defining taxable bases.

expected. However, we must also take into account that firm-level taxable income response captures multiple individual-level responses. Apart from conventional channels like reduced real activity or increased sheltering, decline in reported earnings of partnership firms may also come from other margins. Some partners in treated firms may switch business form or move production into informal economy. These individual-level extensive responses will be reflected as taxable income response at the firm level. In section III.D of this paper, I decompose firm-level response into these underlying individual-level margins.

Finally, the results show weakly declining responsiveness along the income distribution. This may reflect heterogeneity in sheltering opportunities or influence of optimizing frictions. Earnings and size of firms are positively correlated. Past work has shown that large firms find it difficult to conceal their real earnings.[26] Also, tax rate increases decline in magnitude as we move along the earnings distribution. For some partners of high-profit firms, the tax rate increases may not be sufficient to overcome adjustment costs. Responses of such firm will be muted resulting in declining responses along the earnings distribution.

III.C Partnership Firms: Extensive Response

Graphical evidence presented in section III.B shows that the reform triggered exit of a large number of partnership firms. In this section, I use a three-step strategy to identify the elasticity governing the response. The strategy is visually illustrated in Panels A-F of Figure V. To be consistent with the earlier analysis, I focus only on taxpayers with positive reported earnings not exceeding PKR 720,000. Panel A of the figure illustrates evolution of filing for the treatment and control groups: number of tax filers for the control group are weakly declining before the reform and continue to do so after the reform; in contrast to this, number of tax filers for the treatment group are increasing before the reform but decline sharply after the reform. Comparison of the two series suggests that filing for the treatment group would have continued to evolve according to pre-reform trend had there been no tax changes. Accordingly, I find counterfactual number of partnership firms for the post-reform years using a DiD specification with separate time trends for the control and the treatment groups. Panel B of the figure plots the counterfactual, and shows that observed number of filers for the year 2009 are 48% less as compared to the counterfactual number of filers. This corresponds roughly to an extensive margin elasticity of about 2.4, as these tax filers experience an average decrease in net-of-tax rate of about 20%. The

[26] See, for example, Kleven, Kreiner and Saez (2009).

overall elasticity, however, masks considerable heterogeneity, as graphical evidence illustrates that response is not uniform throughout the income distribution.

To explore such heterogeneity, I construct post-reform counterfactual distributions for the treatment group by shifting the 2008 distribution upwards proportionally to have the same mass as predicted by the DiD. As noted earlier, equi-proportionate increase is motivated by the year-wise pre-reform taxable income distributions (Panel A of Figure II), which show that addition of new taxpayers lifts the density proportionally at all levels of income without any perceptible shift sideways. These counterfactual distributions for the years 2009 and 2010 along with the observed distributions are shown in Panels C and D of the figure respectively. The counterfactual and observed distributions, however, are still not comparable as observed distributions feature large intensive margin responses: comparison of the two will lead to underestimation of extensive response at lower levels of income and overestimation at higher levels of income because of the leftwards shift of the post-reform distributions.

To make the two distributions comparable, I strip the observed distributions of intensive responses using the counterfactual earning path predicted by (1). Panels E and F of the figure show the resulting distributions along with the counterfactual distributions. Counterfactual distributions illustrate the number of taxpayers in various income bins had there been no tax response at all; observed distributions stripped of intensive response show number of such taxpayers had there been no response at the intensive margin. By comparing the two, extensive elasticities can be estimated throughout the income distribution.

These estimates are presented in Table II. Column (1) of the table shows income group, columns (2) and (3) the number of tax filers in the counterfactual and the observed distribution stripped of intensive responses respectively, and column (4) the extensive margin elasticities for the year 2009. Columns (5)-(8) contain analogous results for the year 2010. Consistent with the graphical evidence, estimated elasticities for 2009 are almost half of those for 2010 for all income groups. It is due both to *timing* of the reform and the *additional* incentives it creates for extensive response in 2010. As noted earlier, the reform has retrospective applicability. By the time it is announced (14-06-2010), most of the earnings choices for the year 2009 (01-07-2009 to 30-06-2010) have already been made. It is, hence, not surprising that extensive response in 2009 is lower as compared to 2010. The elasticities are larger for 2010 also because of coming into effect of new tax schedule for self-employed individuals. With the new tax rates, sole

proprietorship firms with earnings up to PKR 300,000 pay no tax at all; similar partnership firms, however, pay a quarter of their earnings as income tax. This creates further incentive for partnership firms to break up or move into informal economy. Estimated elasticities are also heterogeneous across income groups. Most of the extensive response is concentrated in the earnings range (0 500k]. This is also quite intuitive as a vast majority of low-income partnerships are small firms which have the least incentives to stay formal.

The filing provisions noted in section II.C mandate taxpayers to continue filing even when real activity is reduced to zero. Compliance of these provisions, however, is not expected to be perfect: taxpayers who disappear into informality may not worry too much about these provisions. The extensive response estimated above, hence, can be decomposed into two underlying margins: taxpayers who stop filing altogether (non-filers) and those who file and report zero earnings (nil-filers). Figure VI presents such anatomy of extensive response. Panel A shows the partnership firms which report positive taxable income ($\leq$ 720K) as compared to all such firms including non-filers; Panel B plots the corresponding two series for the control group.[27] Comparison of the filing trends reveals that compliance of the filing provisions is quite good: total number of partnership tax filers (including nil-filers) do not decline significantly from the 2008 level, though the rising filing trend is arrested. Number of treated firms reporting positive taxable income, however, drop substantially. Panels C and D repeat the analysis presented in Panels A and B of Figure V, but for complete sample of taxpayers including nil-filers. It is apparent from this analysis that predominant margin of extensive response is real rather than informality choice. The reform results in reduced entry of new partnership taxpayers, as is evident from flattening of the rising filing trend depicted in Panel A. This, however, accounts for a smaller proportion of the effects, and bulk of the response comes from taxpayers who report zero business activity after the reform.[28]

III.D Individuals: Intensive Margin and Shifting Responses

Individuals, in their personal income tax returns, report all constituent components of taxable income (z) including partnership income (z^p), sole proprietorship income (z^s), wages, and capital income. Individuals with positive partnership income in pre-reform years (treatment group)

[27] A negligible fraction of firms reports negative taxable income. For simplicity of analysis, I drop such firms.

[28] It can be argued that partnership firms reporting zero real activity may be operating informally. Though the possibility cannot be ruled out, it is less likely as working/non-working is a binary choice, which can easily be verified by the tax administration.

face an incentive to reduce partnership earnings and/or shift earnings to other sources. In this section, I investigate these intensive margin and income shifting responses. As only a negligible fraction of treated individuals report positive wage or capital income after the reform, I focus only on income shifting between z^p and z^s. Control group, as earlier, comprises all self-employed individuals who report $z^p = 0$ for all the years in the sample. I focus only on a balanced panel of taxpayers, and consistent with my earlier analysis consider only those taxpayers who have positive earnings not exceeding PKR 720,000.

Figure VI plots time path of average log changes in z, z^p and z^s in Panels A-C respectively. Panel A illustrates that reported partnership earnings decline sharply at the time of reform. The drop though quite consistent with the firm-level response (Figure IV, Panel F) is smaller in magnitude. This in itself provides suggestive evidence that some income shifting takes place. Panel B of the figure confirms income shifting to sole proprietorship tax base: compared to the control group z^s for the treated individuals goes up steeply. The income shifting, however, is not sufficient to completely make up for the reduced partnership earnings, as total taxable earnings of the treated individuals go down significantly (Panel C).

Figure VI further indicates that identifying assumptions for DiD are satisfied, and that specification like (1) can be used to estimate own-price elasticity $\varepsilon_p \equiv \frac{1-\tau^p}{z^p}.\frac{\partial z^p}{\partial(1-\tau^p)}$, cross-price elasticity $\varepsilon_s \equiv \frac{1-\tau^p}{z^s}.\frac{\partial z^s}{\partial(1-\tau^p)}$ and overall elasticity $\varepsilon \equiv \frac{1-\tau^p}{z}.\frac{\partial z}{\partial(1-\tau^p)}$. There is, however, one difficulty with this. Partnership firms, in their tax returns, do not report share of profits repatriated to each partner. This makes it difficult to ascertain pre-reform marginal tax rate on partnership earnings reported at individual level.[29] In studies like this, such marginal tax rates are computed by simulating tax models, which calculate marginal tax on earnings z as $\tau = \frac{T(z+\Delta z)-T(z)}{\Delta z}$, where Δz is a small amount (for example Rs. 100). As partnership earnings in Pakistan are taxed at firm level, marginal tax rates on z^p reported at individual level cannot be computed exactly unless a complete breakdown of z^p by firms is available.[30] To get around this difficulty, I assume that all firms have two partners who divide the firm's earnings equally. As it is a very conservative assumption, it very likely provides lower bounds on elasticities.[31]

[29]Post-reform rate is flat 25%.

[30]Please note that linking firms to individuals alone is not sufficient for this exercise, as individuals can be partners in more than one firms. Earnings from different firms would have experienced different rates depending on the total earnings of each firm.

[31]The validity of this assumption can be verified in a simple manner. Panel A of figure VI shows that z^p reported at individual level drops by 0.24 log-points after the reform. Partnership firms in the same earnings range experience an average tax rate change of about 0.2 log-points. This roughly gives an elasticity of 1.2, which is not far off from the elasticity estimated under the assumption (point estimate 0.91).

These elasticities are shown in respective panels of figure VI. Partnership earnings elasticity (point estimate 0.91) though quite large is less than half of the corresponding firm-level elasticity (nearly 2.5). Apart from the fact that the individual-level elasticity is a lower bound, this elasticity is smaller also because firm-level intensive margin response corresponds to both intensive and extensive margin behavior at the individual level. Reduction in reported earnings of a partnership firm could be due also to some of the partners leaving the firm and the formal sector altogether. Such response is not captured in panel A of the figure or in the elasticity reported. Cross-price elasticity of -0.89 (panel B) indicates that taxpayers consider z^p and z^s substitutes and shift earnings considerably when incentives to supply z^p go down. Overall elasticity of 0.48, however, suggests that this process is not as frictionless as it seems, and increased taxation of partnership income lead to lower overall earnings of the treated individuals.

III.E Individuals: Extensive Response

As shown in Panel B of Figure II, more than 50% of the partnership firms, which filed and paid tax in 2008, exit in 2009. When a partnership firm leaves, its owners leave as well or switch business activity. In this section, I investigate these extensive responses. Figure VIII plots year-wise distributions of partnership income z^p reported by individuals in their personal income tax returns. The figure is constructed in exactly identical manner as Figure II, which shows corresponding distributions for partnership firms. Comparison of the two figures reveals that the individual-level response broadly mirrors the firm-level response. Pre-reform density distributions of z^p are extremely stable; post-reform distributions show considerable response to the reform, which, though smaller in magnitude,[32] is qualitatively very similar to the firm-level response.

The density distributions shown in Figure VIII, however, conflate pure extensive and switching responses. To separately identify the two, I make use of longitudinal nature of the data and restrict the sample to individuals who file for all the years 2006-10. Treatment group in this sample includes all individuals who report $z^p > 0$ in all pre-reform years; control group, as usual, are individuals who report $z^p = 0$ for all periods in the sample. Balanced panel approach

[32]There are many possible explanations for relatively smaller extensive response of z^p at individual level: (i) leaving firms may, on average, have less number of partners as compared to firms which do not leave; (ii) individuals may be partners in multiple firms, all of which do not leave (iii) it may be that some of the partners do not file personal returns even before the reform – it is especially conceivable for partners who earn all their income from partnership firms and have total earnings below the personal exemption threshold. As data does not allow linking firms to individuals, these alternative explanations cannot be assessed.

is especially useful here, because it allows clean identification of *switchers* – treated individuals who report $(z^p = 0; z^s > 0)$[33] after the reform. With balanced panel, however, pure extensive response – defined as treated individuals who report $(z^p = 0; z^s = 0; z = 0)$ after the reform – covers only nil-filers and cannot account for non-filers. As seen in section III.B, for partnership firms such response constitutes only about two-thirds of the overall extensive response.

Panel A of figure IX illustrates tax filing for the treatment and control groups: every dot in the figure denotes the log number of taxpayers who report positive taxable income for that year. For the control group, the series evolves smoothly and shows no signs of break at the time of reform; for the treatment group number of active tax filers drop significantly after the reform. As the setup satisfies identification assumptions of DiD, I use the approach to quantify the response. Panel B of the figure shows that compared to the DiD counterfactual, observed number of active filers are less by about 20% and 22% in years 2009 and 2010 respectively. As the treated individuals experience a participation tax rate increase of roughly 20%, this corresponds to an extensive margin elasticity of about 1 on account of nil-filing only.

To explore switching, I repeat the above steps but disregard individuals who change business organization after the reform. Time series for the treatment group (blue curve in Panel C) now represents number of tax filers who report $(z^p > 0)$ rather than $(z > 0)$. Expectedly, this series shows larger effects of the reform. Compared to the DiD counterfactual (Panel D), number of filers are now less by 42% and 54% for the years 2009 and 2010 respectively. This together with the evidence on pure extensive response shows that more than half of the individuals who were partners in partnership firms for at least three years before the reform quit the firms: about one-thirds of them become nil-filers; the rest switch business organization to sole proprietorships.

III.F Switching to Corporate Business Form

Purpose of the 2009 reform was to promote corporatization of economy by bringing income taxation of partnerships at par with corporations. In this section, I investigate if the policy was able to achieve its objective. Theoretically, a firm's decision to incorporate is influenced by a variety of factors. Incorporation offers limited liability,[34] legal continuity and perpetual existence. Corporations, however, are costly to create and maintain. They need to keep audited

[33] In this section, I consider switching to sole proprietorship tax base (z^s) only; switching to corporate base is analyzed in the next section.

[34] As noted earlier, Pakistani law does not allow creation of limited liability partnerships, which are permitted in many other tax jurisdictions.

accounts, face higher regulations, and experience double taxation. While making organizational form choice, entrepreneurs trade-off these costs and benefits, and the degree to which tax differences influence this decision is not clear. Past empirical literature on the subject, mainly based in the US, has found small to moderate effects (Gordon and Mackie-Mason 1994, 1997; Goolsbee 1998, 2004). To evaluate if the reform significantly influenced corporate form choice in Pakistan, I look at the entry and stock of corporate tax filers (Figure X).

Potentially, the reform can spurt *entry* of new corporations through two different channels. Some of the existing partnership firms, which chose the business form only because of lighter income taxation, may decide to incorporate if adjustment costs of doing so do not exceed the returns. Also, some of the new firms which without the tax changes would have entered as partnerships may now enter as corporations. Panel A of the figure shows month-wise entry of new corporations over the period 2006-10.[35] The series shows no signs of structural break at the time of announcement of reform. Though there is considerable fluctuations in earlier periods, number of new registrations settle to an almost constant level six months before the reform, and continue to evolve according to the constant trend even after the reform. In Panel B, I plot similar series for partnership firms. From December 2008 to the time of the reform, the two series exhibit almost parallel trends; entry of partnership firms, however, declines (by almost 50%) after the reform and entry of corporations stays almost the same.

This evidence of weak or no additional entry is further strengthened by looking at the *stock* of corporate firms. Panels C and D of Figure X show year-wise taxable income distributions of corporate taxpayers in Pakistan for the years 2006-10. The plots are completely analogous to the Figure II and III, which show similar distributions for partnerships and sole proprietorships respectively. The yearly histograms also show no discernible changes over the years, and post-reform empirical distribution[36] is very similar to pre-reform distributions. If anything, number of corporate taxpayers for the year 2010 are slightly less as compared to other years at almost all levels of income.

The evidence, hence, suggests that the reform has little or no short-run effect on corporate form choice. The result, however, needs to be careful interpreted. Incorporation is a complex decision involving non-trivial adjustment costs. Existing non-corporate firms may not reoptimize

[35]If a new corporation is created by incorporation of an existing partnership firm, it will also show up as a new registrant in this series as corporations are required to register separately.

[36]Here only 2010 distribution is *treated*, because taxpayer learn tax rate changes on 14-06-2010.

on business organization margin immediately after the change of tax incentives, and may wait for periods when adjustment costs of doing so are low. Appropriate time frame for evaluating such changes is, hence, medium to long term, when all firms are expected to have adjusted to the new incentives.

III.G Spillover Effects on VAT

More than three-quarters of the firms affected by the 2009 reform are required to charge VAT on their sales.[37] Changes in their behavior will have consequences for VAT as well. Specifically, the reform will influence VAT collections in two different ways. First, partnership firms which exit the formal sector will be lost to VAT as well. Second, firms which respond on intensive margin will pay lower VAT due to reduction in taxable base.[38]

To investigate these *spillover* effects, I first look at the reported sales and costs of VAT-liable partnership firms. As VAT base, *value added*, is defined as sales minus costs, any response along these margins will capture direct effects of the reform on VAT. Panels A and B of Figure XI show respectively the pre and post-reform sales distributions of VAT-liable partnership firms. The plots depict strong effects of the reform: compared to stable pre-reform trends, reported sales plummet after the reform. Reported costs of these firms, illustrated in Panels C and D, also show comparable effects.[39] In Panels E and F of the figure, I plot sales distributions for the control group, which comprises VAT-liable sole proprietorship firms. As can be seen, the 2009 distribution for the control group is very similar to the pre-reform distributions and exhibits no signs of break from the trend. Predictably, the 2010 distributions show the effects of tax changes that become operational for the control group in 2010. Cost distributions for the control group are similar to corresponding sales distributions but have been omitted for space considerations. Together, the graphical evidence suggests significant erosion of VAT base: within two years of the reform, the number of VAT paying partnership firms drop by almost 65% as compared to 2008.[40]

[37] In Pakistan, manufacturing and retail firms with annual sales not exceeding PKR 5 million are exempt. All other firms are required to account for VAT.

[38] Though it is possible that firms report different earnings/sales in their income tax and VAT returns, but it is not very likely. Since 2006 both income tax and VAT reports of firms are available to tax authorities in electronic format and it is very easy to reconcile the two. It will, hence, be extremely *naive* to report differently for the two taxes.

[39] The numbers in panels A and B are different from those in panel C and D because not all firms report their sales and costs. Generally about 60% of the firms report their sales; firms reporting their costs are slightly less than that about 58%.

[40] As partnership firms constitute only a small fraction (about 2%) of the total VAT base, which also includes

To decompose the overall response into intensive and extensive margins and to see if the responses are different across VAT-liable and exempt firms, I redo the analysis of section III.B and III.C, but this time stratify the sample by VAT-liability. Table III reports the intensive margin elasticities estimated in this manner. I report estimates from balanced panel regressions only, but other two approaches give very similar results. Figure XII confirms that parallel trends assumption needed for consistency of elasticities in DiD regressions is satisfied. Column (7) of the table shows that intensive elasticities for VAT-liable firms are significant, more than one for all sub-samples. More importantly, however, such elasticities are considerably smaller (less than half) as compared to VAT-exempt firms.

Figure XIII displays extensive response estimates for the two groups of firms separately. Panels A and B, which show the response of VAT-liable firms, have been constructed in identical manner to Panels A and B of Figure V. Panels C and D contain similar analysis for VAT-exempt firms. Control group in each case are the corresponding VAT-liable or VAT-exempt sole proprietorship firms. Comparison of Panels B and D of the figure illustrates that VAT-exempt firm respond a lot more along the extensive margin as compared to VAT-liable firms. The difference in response, though, is not as stark as for the intensive margin.

Smaller intensive and extensive response for the VAT-liable firms is quite consistent with theoretical predictions. VAT paying firms are linked to their suppliers and buyers through the invoice-credit mechanism built into VAT. Being part of such a chain creates a paper trail and reduces a firm's ability to manipulate its reported earnings. Such firms may also find it difficult to leave the formal sector unless majority of their suppliers and buyers leave as well. Lower elasticities for VAT-liable firms, thus, confirm the importance of invoice-credit mechanism so vital for VAT.

The above analysis suggests that the reform casts significant negative effects on VAT base: a large number of VAT-paying partnership firms exit the formal sector and the rest report lower earnings. Some of such losses, however, will be recouped because of income shifting and business form switching. Section III.D and III.E illustrate that overall effects of the reform are not so enormous once such responses are taken into account. For the case of VAT, however, these mitigating influences will not be that great. Generally, proprietorships have lower annual turnover as can be seen from Figure XI. It is, thus, quite possible that the new or existing sole proprietorship firms to which earnings are shifted may be exempt from VAT because of

sole proprietorships and companies, overall effects on VAT collections will not be that large.

having turnover below the exemption threshold. For such cases, income shifting will have no compensating effects.

IV Conclusions

This paper has analyzed the influence of personal income taxation on reporting behavior of taxpayers along both intensive and extensive margins in a developing country settings. The effects are studied using a tax reform which creates large tax rate variation between very similar taxpayers and thus generates laboratory like settings to identify the responses. I find substantial intensive and extensive responses to the reform, which consist of reduction in earnings, shifting of income across bases, switching of business organization and exit from the formal sector. I also provide evidence that the reform had negative spillover effects on VAT base.

These findings have three important lessons for tax policy in developing countries. First, larger elasticities at bottom of the earnings distribution, particularly the participation elasticities, imply that optimal tax systems must feature progressive taxation. With declining responsiveness along the income distribution, a flat rate structure is ruled out even if the government has no redistribution objective. Second, large tax rate changes are known to produce large behavioral responses; for developing countries where tax revenues are already low and tax bases relatively fragile, large tax rate changes need to be avoided to protect existing tax bases and to limit efficiency costs of raising taxes. Third, tax rate increases on a narrowly defined tax base produce large incentives and opportunities for income shifting. Most of the intended recipients of new taxation avoid taxes by switching business organization or shifting income across bases. Such reforms are less likely to produce additional revenues but impose significant welfare costs. Tax rate changes, hence, are needed to be as broad-based as possible.

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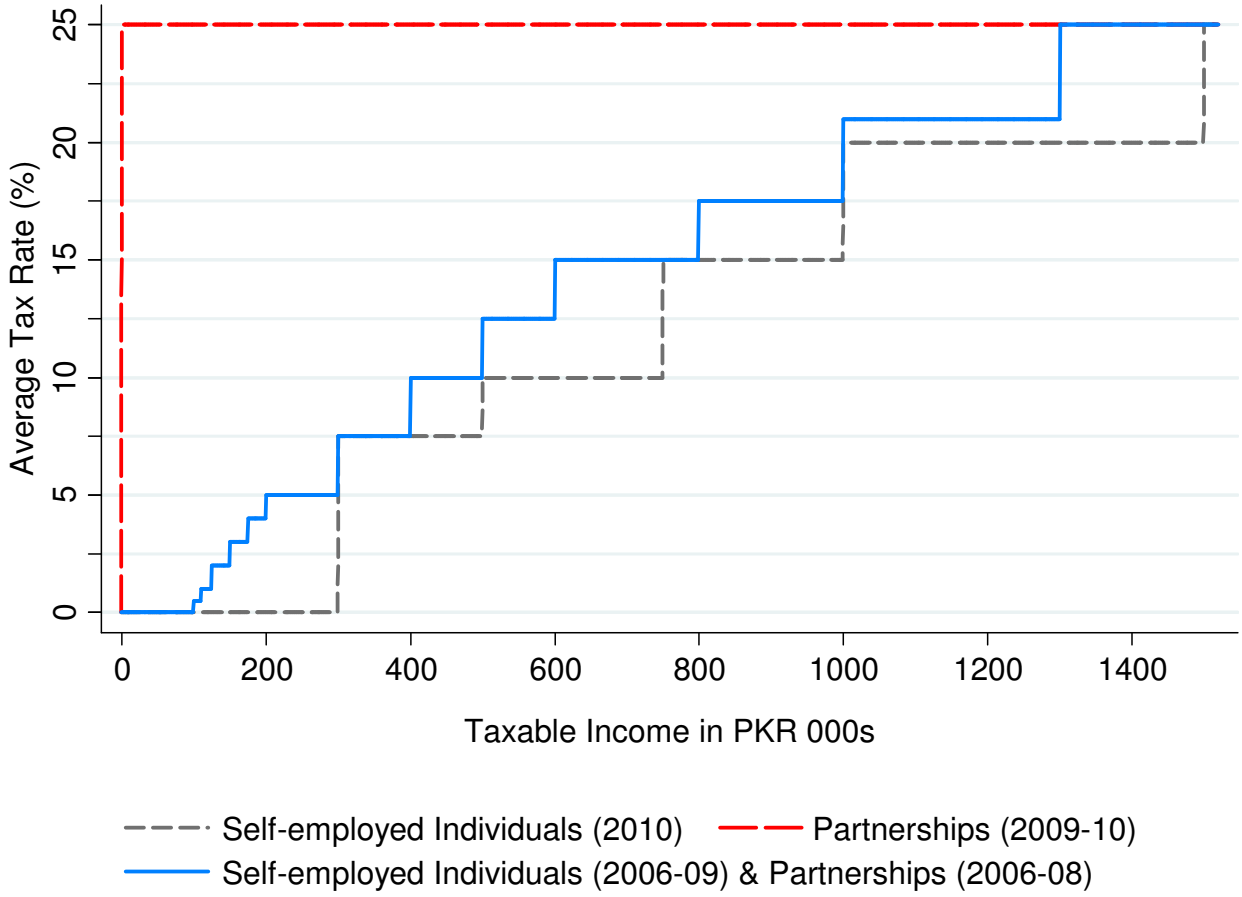
FIGURE I

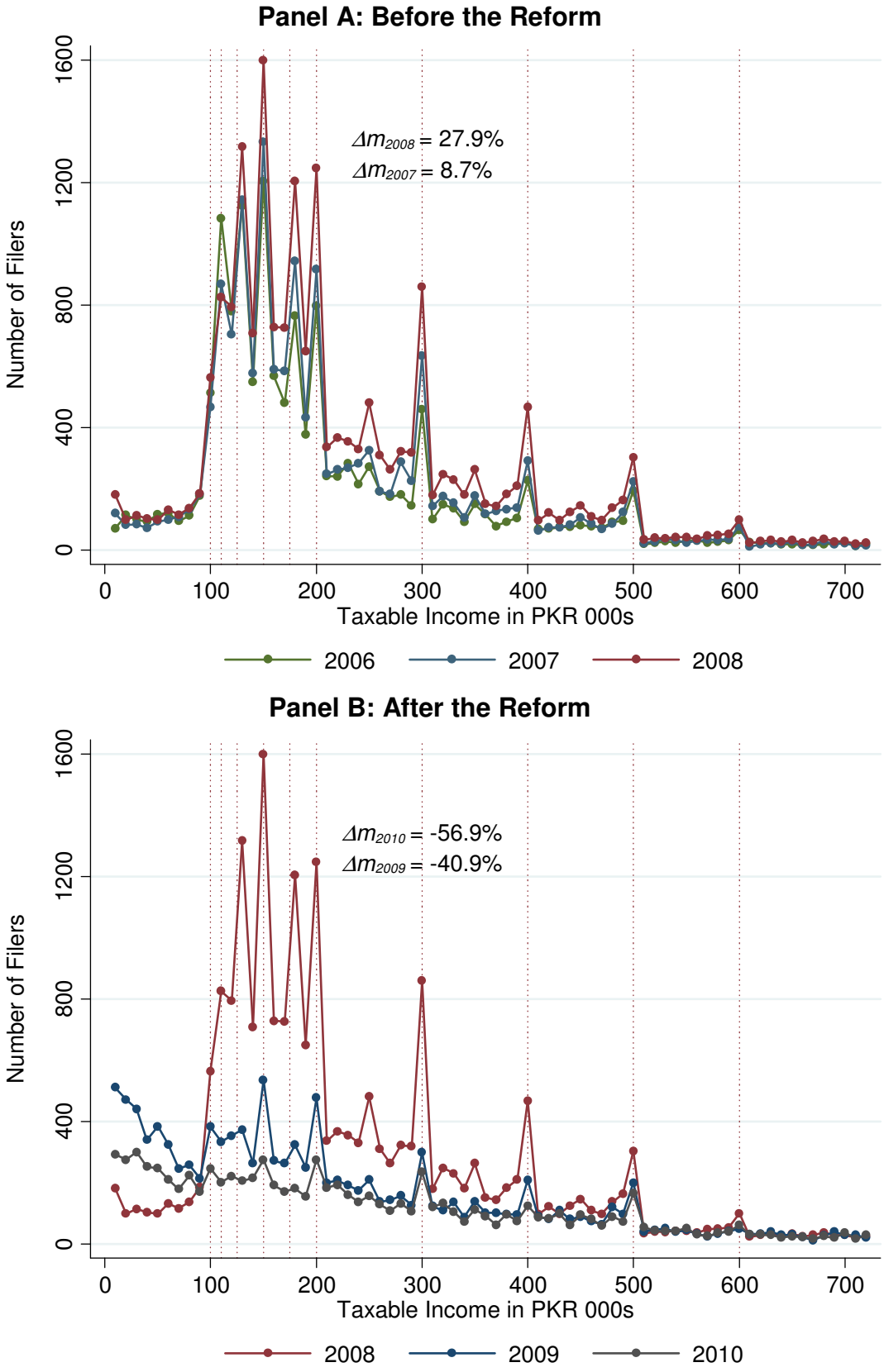
The Tax Reform



Notes: the figure shows changes made by the 2009 reform in personal income tax regime of unincorporated businesses in Pakistan. Solid blue line plots the tax schedule applicable to all unincorporated firms and self-employed individuals for the years 2006-08. It features fourteen brackets with fixed average tax rate – varying from 0 to 25% – applied to each bracket. This schedule is supplanted by two different tax systems in 2009. The dashed red curve shows the flat rate tax scheme – involving a tax rate of 25% with no exemption threshold – applicable to partnership firms with effect from 01-07-2009. The dashed grey curve depicts the tax schedule applicable to self-employed individuals w.e.f. 01-07-2010. As compared to 2006-08 schedule, it has a higher exemption threshold (Rs. 300,000 as compared to Rs. 100,000) and lower number of brackets (six as compared to 14). All schedules show variations in average tax rates as a function of annual taxable income. Brackets' boundaries where tax rate changes are included in lower tax brackets. Taxable income is shown in thousands of Pakistani Rupees (PKR), and the PKR-USD exchange rate is about 97 as of December 2012.

FIGURE II

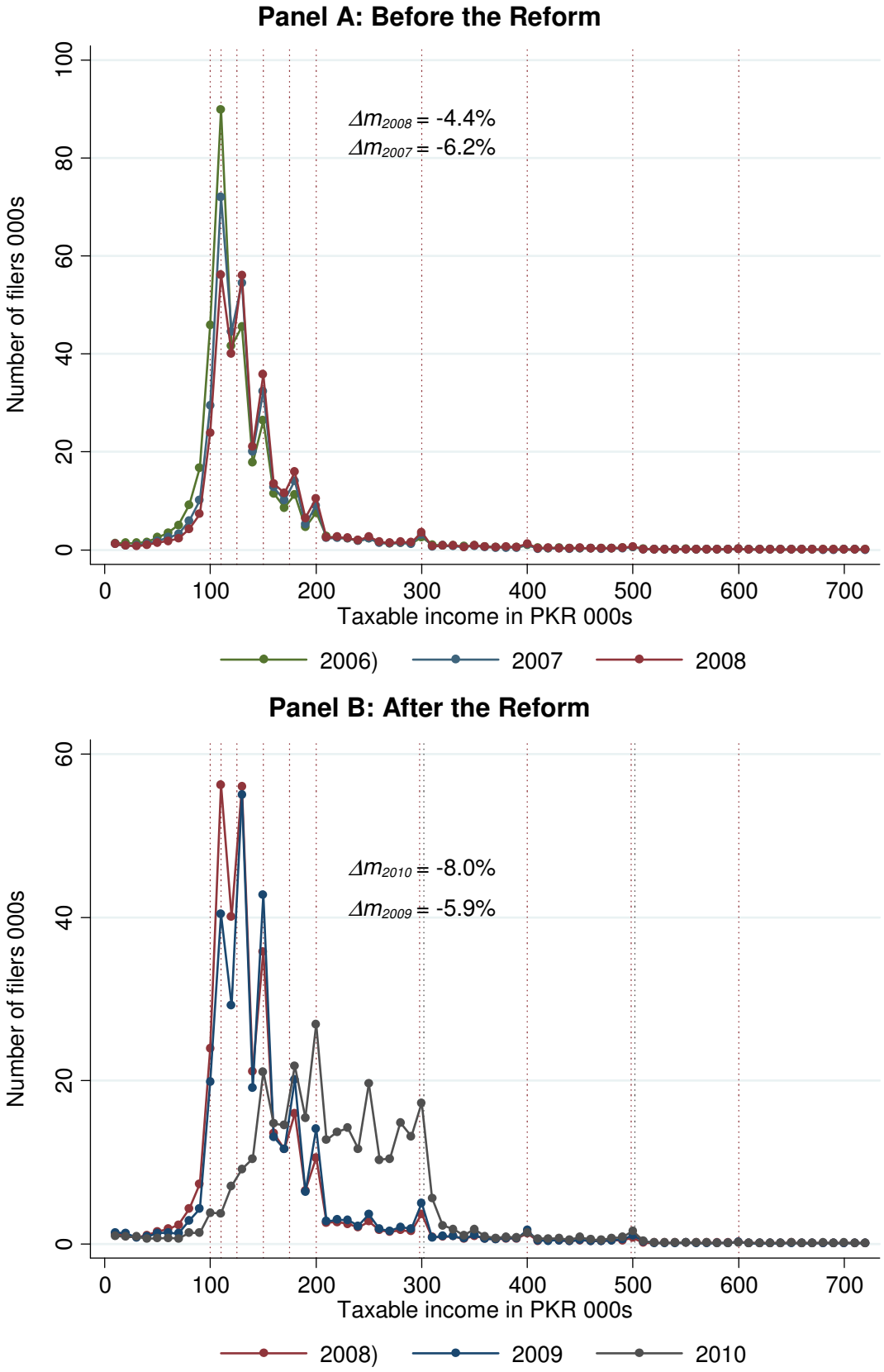
Partnership Firms: Observed Taxable Income Distributions



Notes: the figure shows year-wise observed taxable income distributions for partnership firms in Pakistan for the years 2006-10. The distributions include only the firms with earnings in the range (0 720,000]. Each dot in the figure represents the upper bound of a 10,000 Rupees bin and shows the number of tax filers located within that bin. Notches in the 2006-08 schedule are shown by vertical dotted red lines. In panel B, 2008 distribution is plotted again for comparison purposes. Yearly variations are represented by Δm_t, which shows change in number of filers from year t to $t+1$ as a percentage of number of filers in year t except for 2010, which is compared to 2008.

FIGURE III

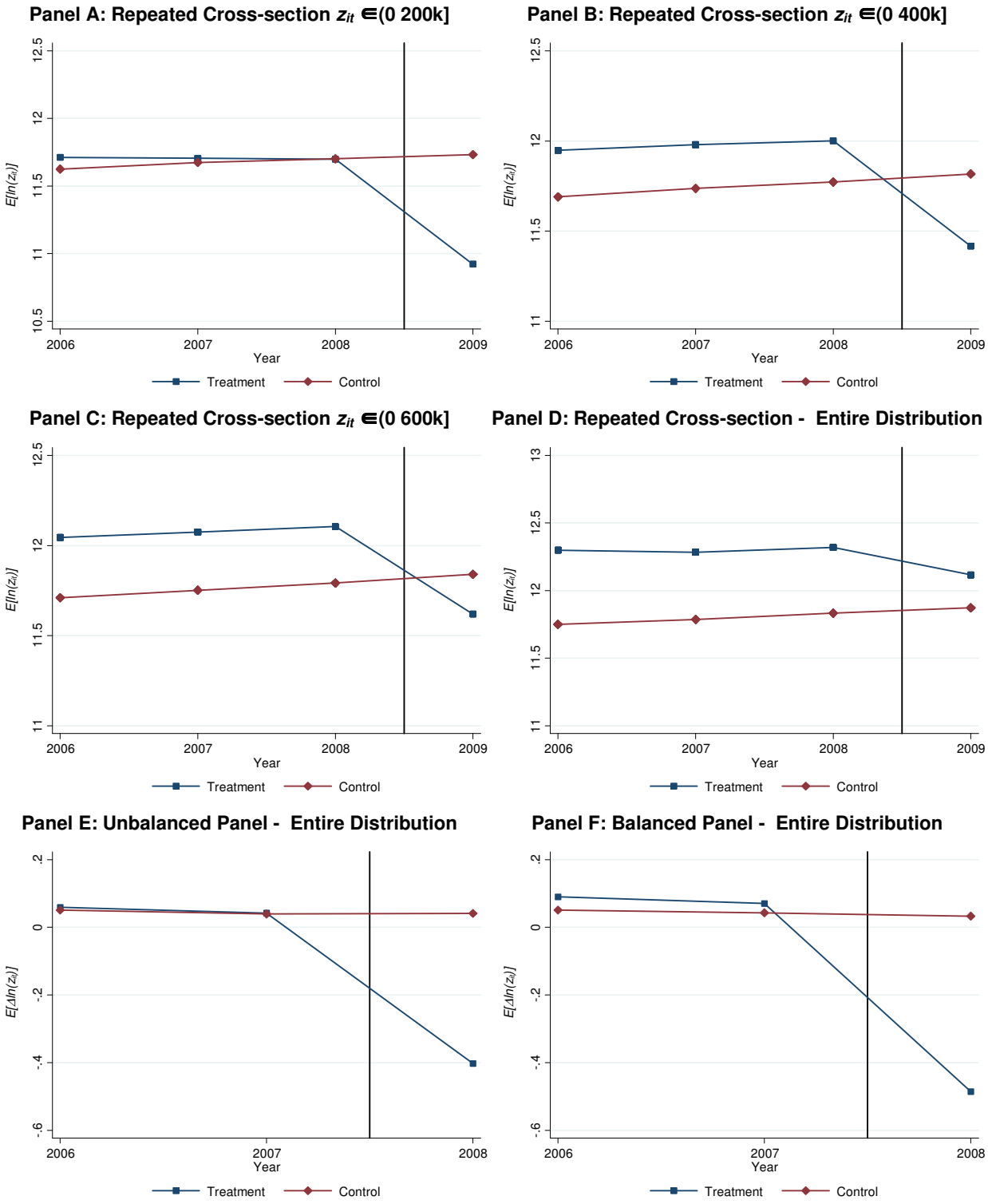
Self-employed Individuals: Observed Taxable Income Distributions



Notes: the figure is constructed in exactly similar manner as the preceding one and shows the year-wise observed distributions of taxable income for self-employed individuals other than partners in partnership firms (control group for 2009) in Pakistan for the years 2006-10. Only difference from Figure II is that, in Panel B, notches in the 2010 tax schedule, at 300K and 500K, are marked by vertical dotted grey lines.

FIGURE IV

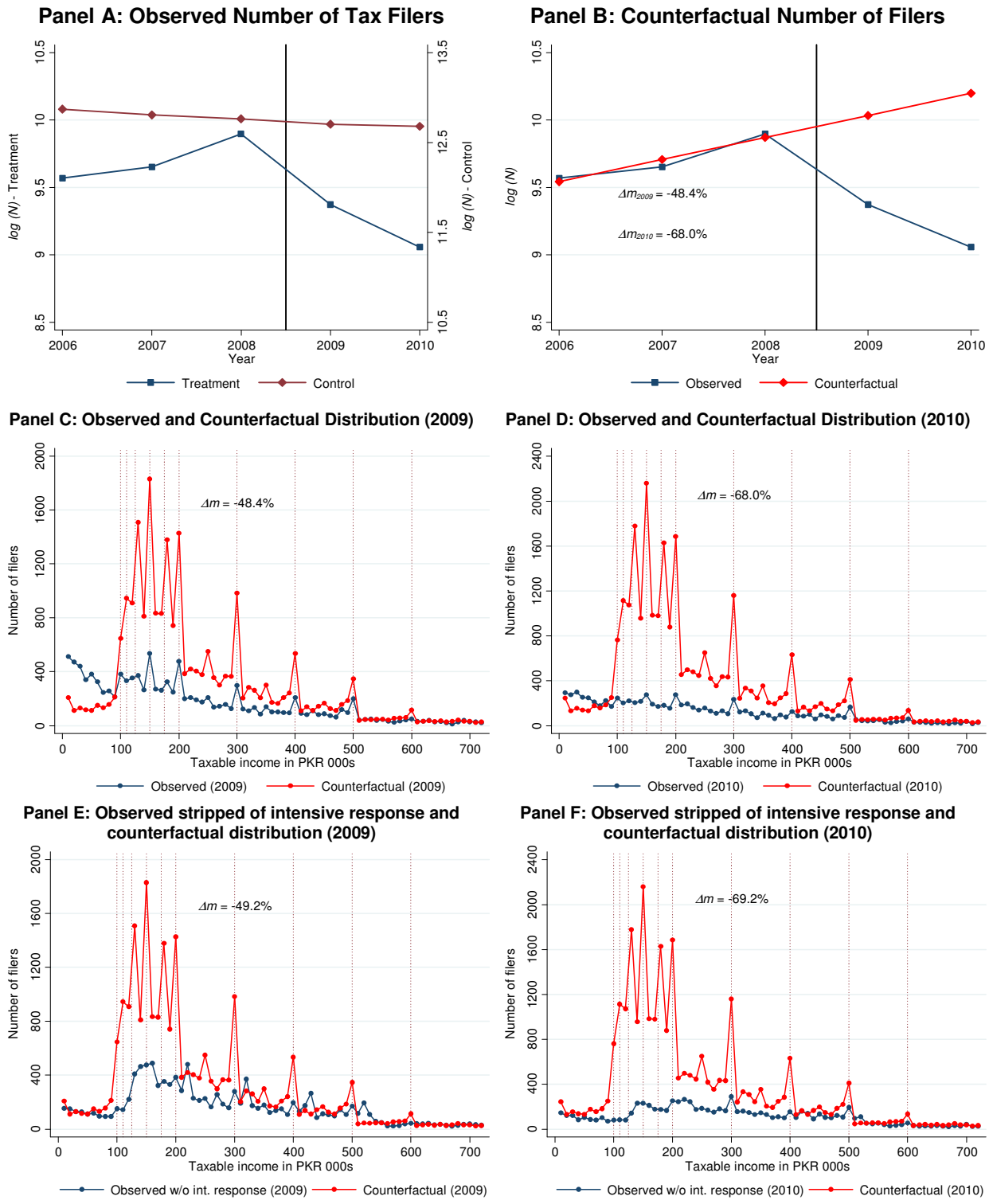
Partnership Firms: Parallel Trends of Taxable Income



Notes: the figure shows the evolution of taxable income for the treatment and control groups over the years 2006-09. Treatment group in each panel consists of all partnership firms which file for tax and report earnings in the range indicated on each panel, while control group comprises all self-employed individuals other than partners in partnership firm who report taxable income in the corresponding range. Each point in panels A – D represents average log income for cross-section of filers for year t with reported earnings within the range for the panel. For panels E and F such point represents log change in reported income from year t to $t+1$ for filer i averaged across all filers in year t. Panel E includes all filers who report for two consecutive years t and $t+1$ and panel F only the filer who report for all four years in the sample. Black vertical line in each panel indicates the time from which the tax changes will affect reporting behavior of the treated taxpayers.

FIGURE V

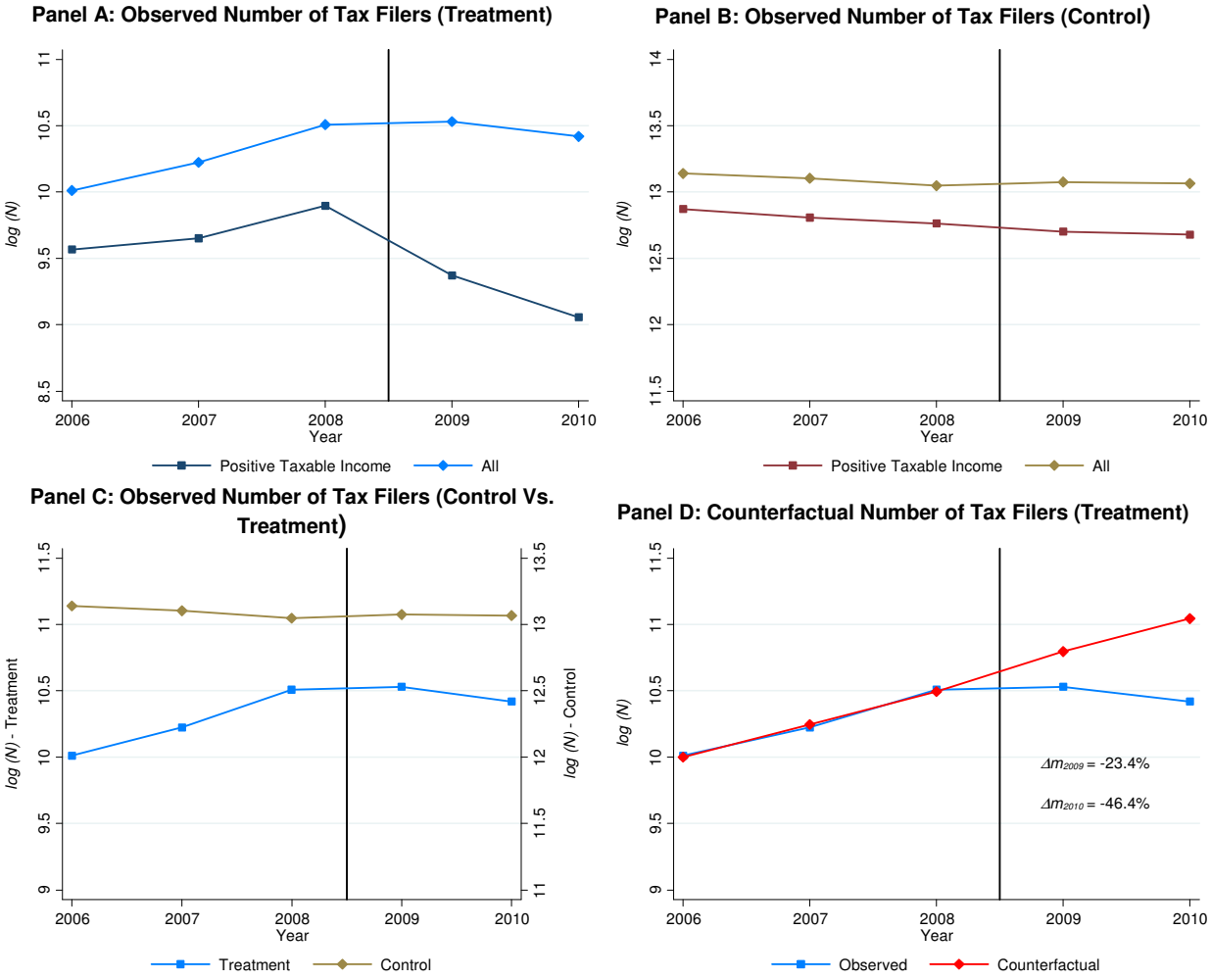
Partnership Firms: Extensive Response



Notes: the figure shows visually the strategy used to estimate extensive margin response of partnership firms. Panel A plots the number of tax filers for the treatment and control groups for the years 2006-10. Panel B shows the number of tax filers in the treatment group with a counterfactual obtained from running a DiD regression on number of filers series with separate time trends for the treatment and control groups. Difference between counterfactual and observed number of filers for the year t as a percentage of counterfactual number of filers for the corresponding year are indicated with Δm_t. Panel C and D show the observed and counterfactual distributions, where counterfactual distributions have been constructed by shifting the 2008 distribution upwards proportionally at all income levels to have the same mass as counterfactual number of filers given by the counterfactual. Panel E and F compare these counterfactual distributions to the observed distributions which have been stripped of intensive responses. For panels C – F, Δm_t represents the difference in number of filers between the two distributions as a percentage of number of filers in the distribution with larger mass.

FIGURE VI

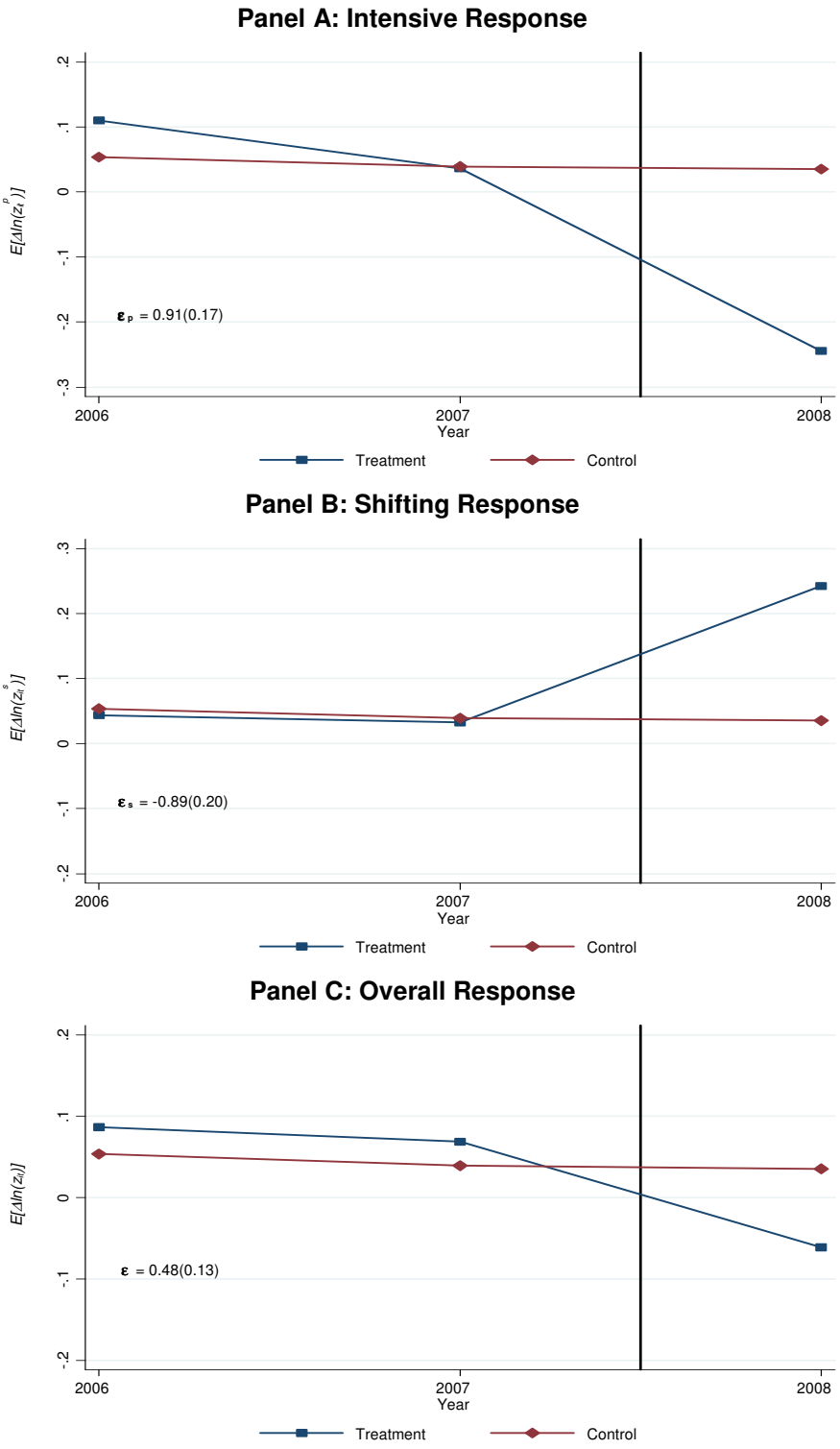
Partnership Firms: Anatomy of Extensive Response



Notes: the figure displays the methodology used to decompose the aggregate extensive response of partnership firms into firms which stop filing altogether and the firms which continue filing but report zero taxable income. Navy blue curve in Panel A of the figure shows the number of partnership firms who file for year *t* and report positive taxable income ≤ Rs. 720,000. Light blue curve in the same panel shows all the number of firms who file for year *t* including those who report zero taxable income. Maroon and brown curves in Panel B display the corresponding series for the control group respectively. Panel C shows the total number of filers (including those who report zero taxable income) series for the control and treatment groups together. Panel D plots the total number of tax filers in the treatment group with a counterfactual obtained from running a DiD regression on number of filers series shown in Panel C with separate time trends for the treatment and control groups. Difference between counterfactual and observed number of filers for the year *t* as a percentage of counterfactual number of filers for the corresponding year are indicated with Δm_t.

FIGURE VII

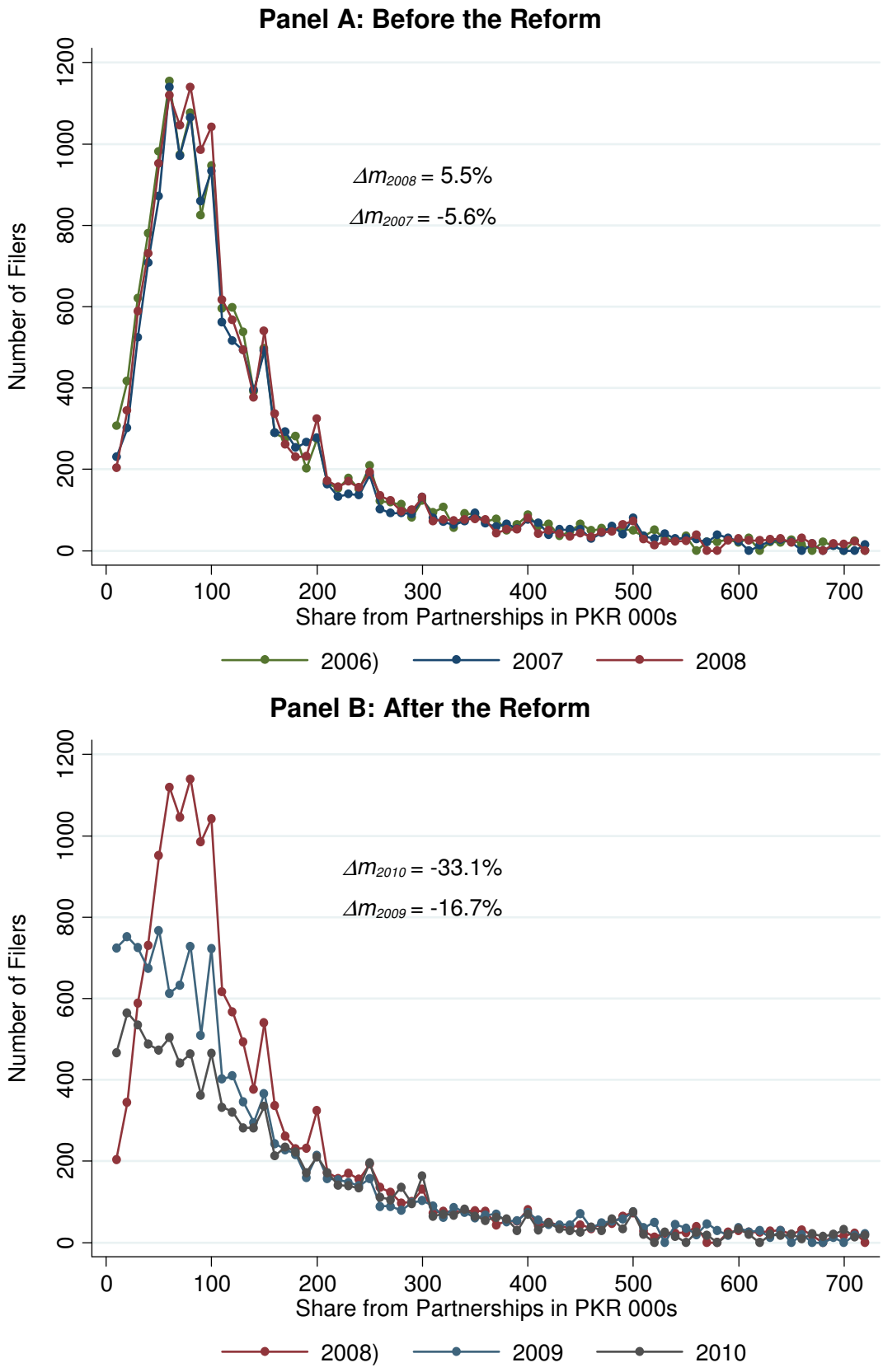
Individuals: Anatomy of Intensive Response



Notes: the figure shows the evolution of partnership income, sole-proprietorship income and taxable income for the treatment and control groups over the years 2006-09 in Panels A, B and C respectively. Treatment group consists of all individuals who report positive share of income from partnership firms prior to the reform, while control group comprises self-employed individuals who report zero share of partnership income for all years in the sample. The figure is based on a balanced panel of taxpayer who file for all four years with reported taxable earnings in the range (0 720,000]. Each point in the figure represents log change in reported income from year t to $t+1$ for individual i averaged over all filers in year t. Black vertical line in each panel marks the time from which the tax changes affect reporting behavior of the treated individuals. Elasticities given in the figure are from a 2SLS DiD regression where log change in net-of-tax rate has been instrumented with the dummy for belonging to post-reform treatment group. Standard errors from the regression are shown in parenthesis, which are clustered at the individual level.

FIGURE VIII

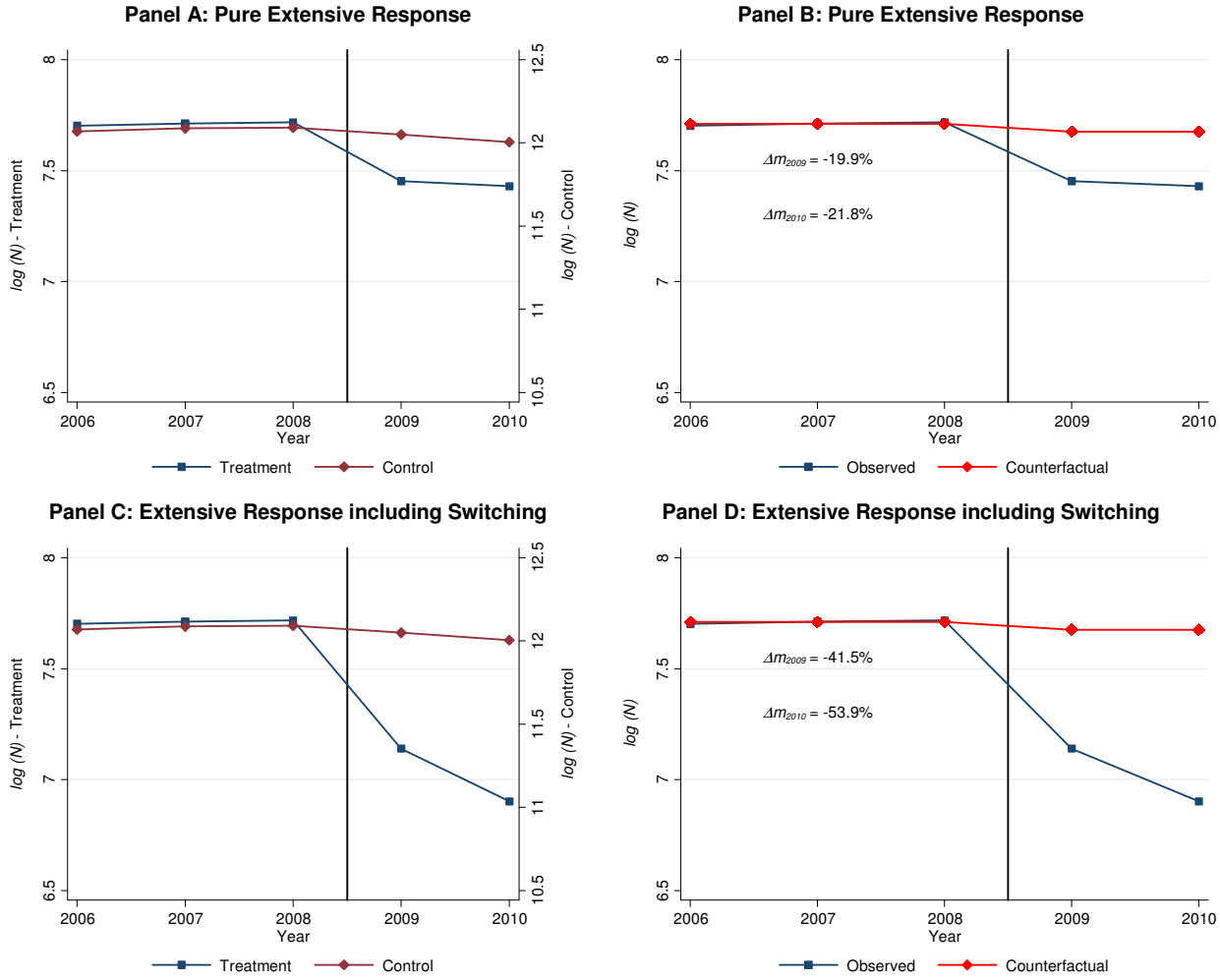
Individuals: Overall Extensive Response



Notes: the figure shows the year-wise distributions of partnership income share reported by individuals in their personal income tax returns for the years 2006-10. Each dot represents the upper bound of a 10,000 Rupee bin and shows the number of individuals located within that bin. In Panel B 2008 distribution is plotted again for comparison purposes. Yearly variations are represented by Δm_t, which shows change in number of filers from year t to $t+1$ as a percentage of number of filers in year t except for 2010 which is compared with 2008.

FIGURE IX

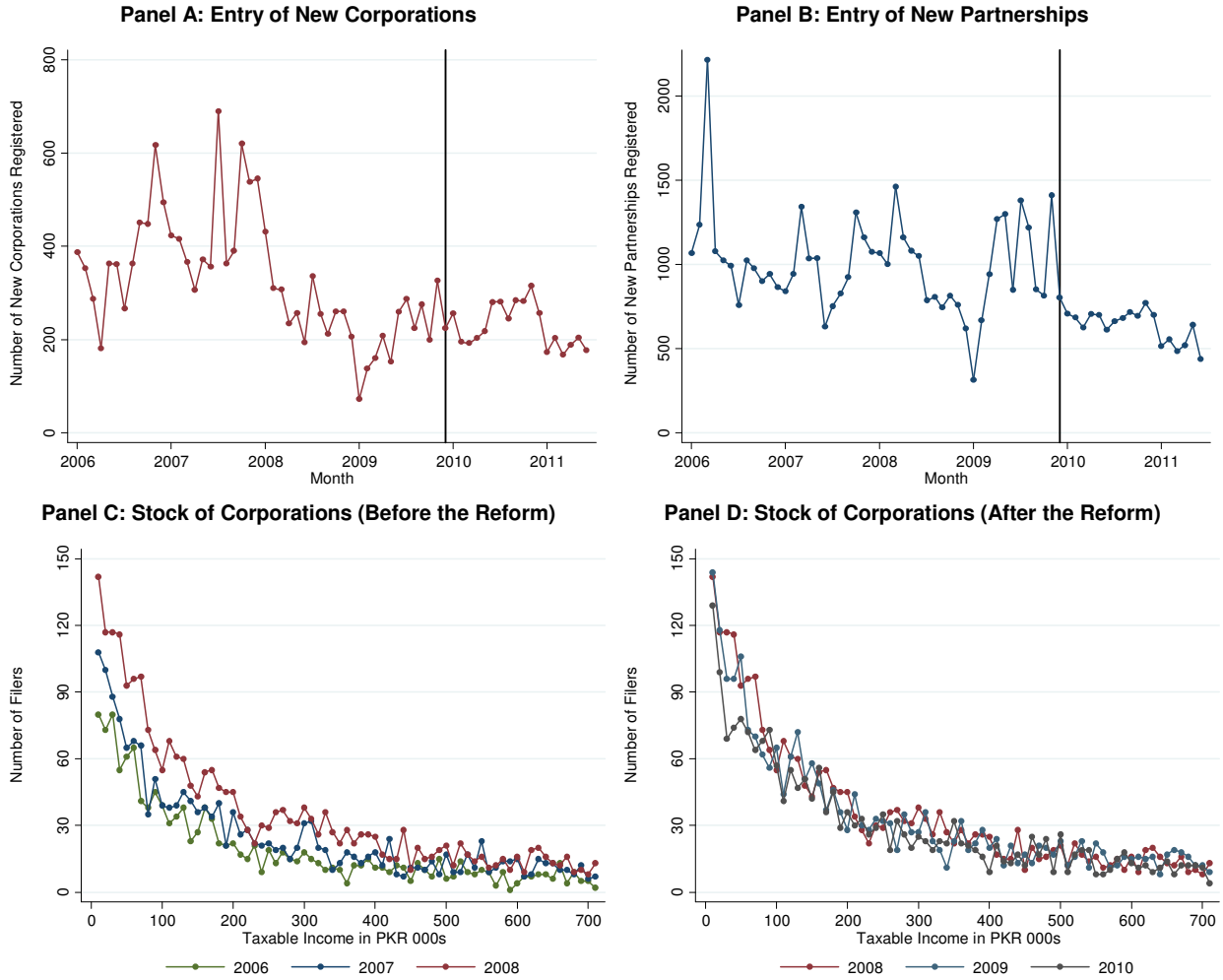
Individuals: Anatomy of Extensive Response



Notes: the figure depicts the strategy employed to estimate extensive response to the reform by the treated individuals. Treatment group consists of all individuals who report positive share of income from partnership firms prior to the reform, while control group comprises self-employed individuals who report zero share of partnership income for all years in the sample. The figure is based on a balanced panel of taxpayer who file for all four years including those who report zero taxable income. Panel A of the figure displays the number of filers for the treatment and control group who report positive taxable income only. Panel B shows the same series for the treatment group along with a counterfactual obtained from running a DiD regression on series shown in Panel A. Difference between counterfactual and observed number of filers for the year t as a percentage of counterfactual number of filers for the corresponding year are indicated with Δm_t. Panel C of the figure displays, for the treatment group, the yearly number of filers who report positive share of partnership income; for the control group, same series as in Panel A is shown. Panel D quantifies the extensive response that also includes switchers by comparing the navy blue series of panel C with a counterfactual obtained by running DiD regression on series shown in Panel C.

FIGURE X

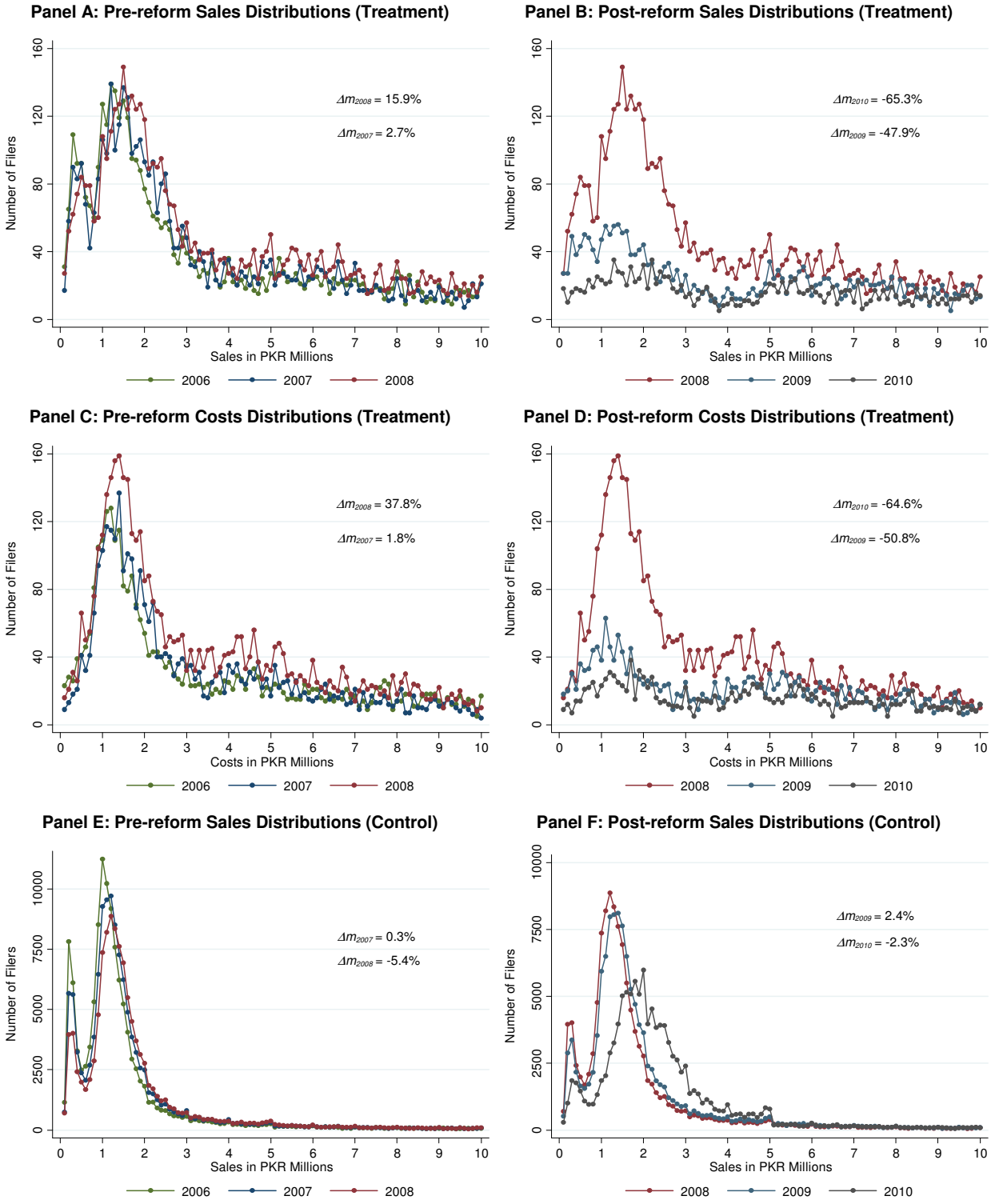
Switching to Corporate Business Form



Notes: Panels A and B of the figure shows entry of new corporations and partnership firms in Pakistan. Each dot in the panels represents the number of new firms which register with the tax department each calendar month; year t in the figure represents month July of the corresponding year. Panel C and D show the year-wise distributions of taxable income reported by corporate tax filers in Pakistan for the years 2006-08 and 2008-10 respectively. Each dot in the plot represents the upper bound of a 10,000 Rupee bin and shows the number of corporations located within that bin. Included in the sample are all corporations with taxable income in the range (0 720,000].

FIGURE XI

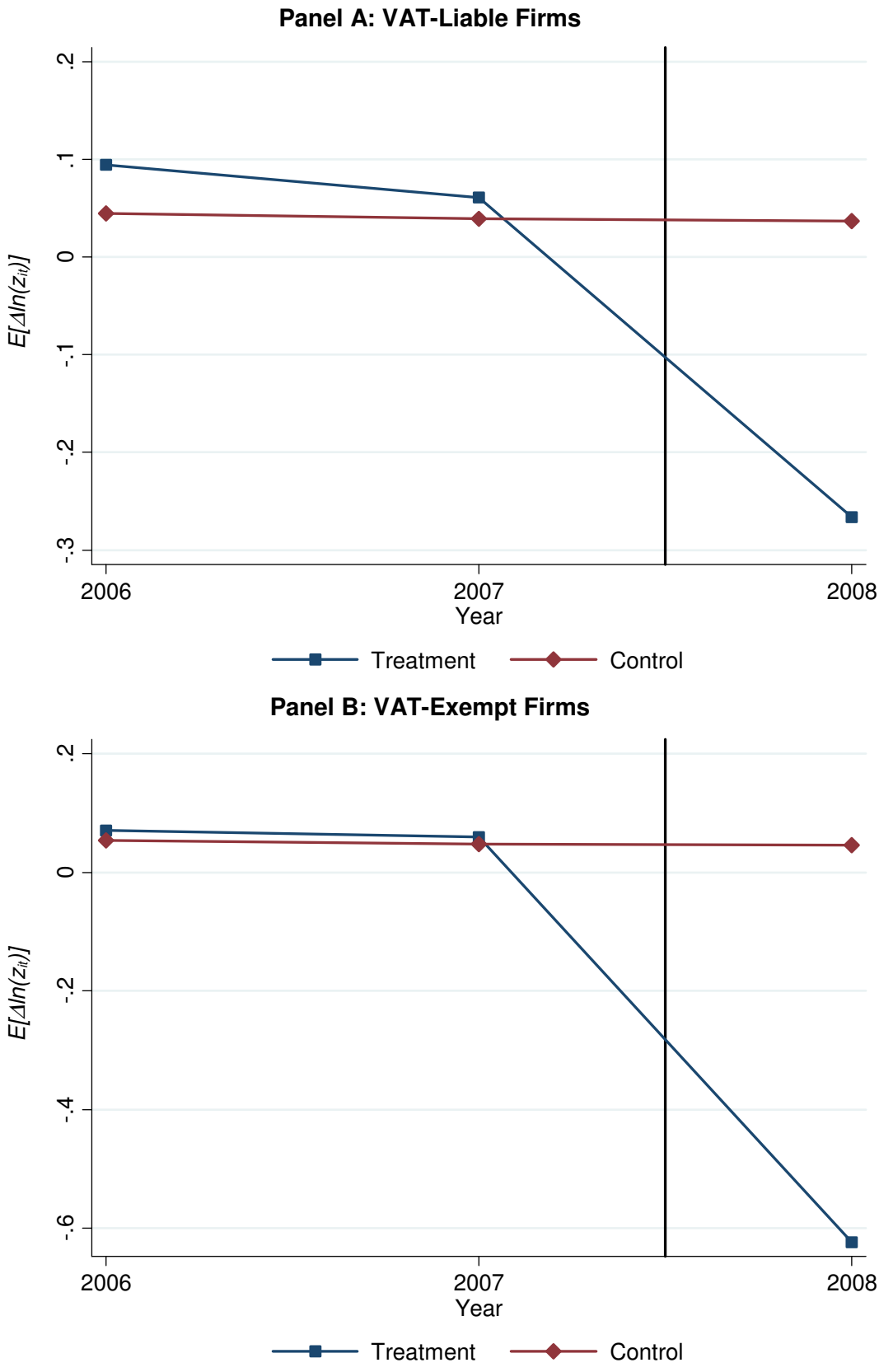
Partnership Firms (VAT-Liable Only): Spillover Effects on VAT Base - I



Notes: the figure shows the year-wise density distributions of annual sales and costs reported by the VAT-liable taxpayers in the treatment and control group for the years 2006-10. Treatment group includes the partnership firms which experienced the 2009 tax rate changes, while control group includes exclusively sole proprietorship firms. Only those taxpayers are included in the sample who report taxable income in the interval (0, 720,000]. Panels A and B of the figure display the sales distribution of the treatment group for pre-reform and post-reform years. The 2008 distribution is included in post-reform panel for reference purposes. Panels C and D of the figure show the corresponding costs distributions for the treatment group and Panels E and F display the sales distributions for the control group respectively. Each dot represents the upper bound of a 100,000 Rupee bin and shows the number of firms located within that bin. Yearly variations in number of filers are represented by Δm_t , which shows change in number of filers from year t to $t+1$ as a percentage of number of filers in year t except for 2010 which is compared with 2008.

FIGURE XII

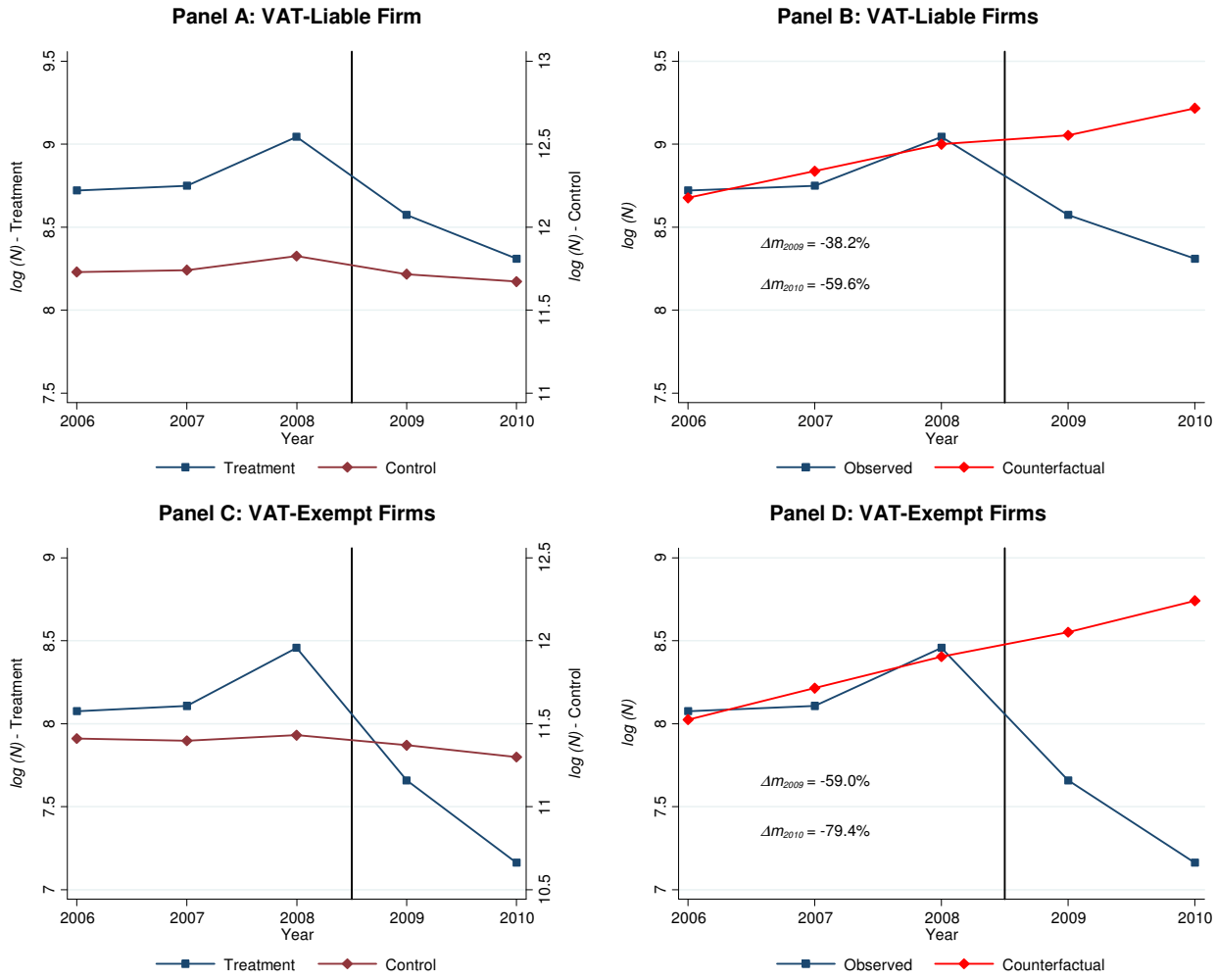
Partnership Firms (VAT-Liable Only): Parallel Trends of Taxable Income



Notes: the figure shows the evolution of reported taxable income for the treatment and control groups over the years 2006-09. Treatment group in each panel consists of all partnership firms, while control group comprises all exclusively sole proprietorship firms. Sample includes only the taxpayers who report for all the four years 2006-09 and have earnings in the range (0,720,000]. Each point in the two panels represents log change in reported income from year t to $t+1$ for firm i averaged over all filers in year t. Panel A includes only the VAT-liable firms and Panel B the VAT-exempt firms.

FIGURE XIII

Partnership Firms (VAT-Liable Only): Extensive Response



Notes: the figure exhibits decomposition of overall extensive response shown in Panels A and B of Figure V by VAT liability of taxpayers. Panels A and B have been constructed in similar manner as Panels A and B of Figure V, and show extensive response for VAT-liable taxpayer only. Panels C and D display similar response for VAT-exempt firms.

TABLE I

Intensive Margin Elasticities for Partnership Firms

Taxable income (≤)	Repeated Cross-section			Unbalanced Panel			Balanced Panel		
	# Obs		ε	# Obs		ε	# Obs		ε
	Control	Treatment		Control	Treatment		Control	Treatment	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
200,000	1,287,080	37,294	**3.221** (0.096)	1,000,980	30,427	**2.780** (0.155)	773,931	5,677	**2.746** (0.325)
300,000	1,376,278	48,382	**2.833** (0.082)	1,063,246	39,645	**2.624** (0.124)	831,980	9,300	**2.791** (0.234)
400,000	1,407,378	54,627	**2.593** (0.076)	1,085,707	44,683	**2.507** (0.111)	849,911	12,259	**2.701** (0.196)
500,000	1,423,293	58,896	**2.365** (0.073)	1,096,892	47,940	**2.369** (0.105)	858,097	14,296	**2.601** (0.178)
600,000	1,428,655	60,422	**2.260** (0.072)	1,100,988	49,072	**2.305** (0.105)	859,592	15,054	**2.640** (0.176)

Notes: This table presents intensive margin elasticity estimates from 2SLS regressions. Sample includes the partnership (treatment) and proprietorship (control) firms in Pakistan which file for tax for the years 2006-09 and report taxable earnings in the interval (0, 720,000]. Column (4) reports the coefficients on log net-of-tax rate in diff-in-diff regressions, where log net-of-tax rate has been instrumented in the first stage with a dummy for belonging to post-reform, treatment group. Columns (7) and (10) reports similar coefficients but regressions have been done in changes rather than levels. Sample for columns (5) to (7) includes all firms which report for two consecutive years t and t+1 and for columns (8) to (10) only the firms which report for all four years in the sample. Standard errors are in parenthesis, which are clustered at the level of individual taxpayers. All coefficients are significant at 1% level.

TABLE II

Extensive Margin Elasticities for Partnership Firms

Taxable income	2009			2010		
	# Obs		η	# Obs		η
	Counterfactual Distribution	Observed Distribution Stripped of Intensive Response		Counterfactual Distribution	Observed Distribution Stripped of Intensive Response	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
0 - 200K	13,357	4,826	**2.654** (0.510)	14,895	2,741	**4.768** (0.717)
200K - 300K	4,840	2,477	**2.793** (0.544)	5,648	2,066	**4.098** (0.343)
300K - 400K	2,732	1,787	**2.035** (0.530)	3,217	1,330	**3.999** (0.429)
400K - 500K	1,681	1,397	0.938 (0.830)	1,971	1,249	**2.262** (0.495)

Notes: This table presents extensive margin elasticity estimates for partnership firms in Pakistan. Column (2) and (5) of the table show the number of filers, for the taxable income ranges indicated in column (1), in the counterfactual distribution - which would have observed had there been no tax changes in 2009. Columns (3) and (6) of the table report corresponding number of filers in the observed distributions which have been stripped of intensive responses. Elasticity estimates in columns (4) and (7) are based on simple regression of log difference in number of filers in each bin of the two distributions against log changes in net-of-tax rate experienced by the tax filers in that bin. Standard errors are in parenthesis, which are clustered at the level of individual taxpayers. Coefficients significant at 5% level are shown in bold.

TABLE III

Intensive Margin Elasticities for Partnership Firms by VAT Liability

Taxable income (≤)	VAT-Exempt Firms			VAT-Liable Firms		
	# Obs		ε	# Obs		ε
	Control	Treatment		Control	Treatment	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
200,000	194,026	987	**2.869** (0.481)	226,560	1,408	**1.049** (0.500)
300,000	207,879	1,574	**2.898** (0.350)	241,066	2,223	**1.175** (0.365)
400,000	210,922	1,945	**2.773** (0.300)	245,510	3,134	**1.077** (0.292)
500,000	211,597	2,099	**2.812** (0.288)	247,911	3,967	**1.140** (0.256)
600,000	211,677	2,128	**2.809** (0.286)	248,407	4,309	**1.253** (0.252)

Notes: This table presents intensive margin elasticity estimates from 2SLS regressions. Sample has been stratified by VAT-liability, and includes the partnership (treatment) and proprietorship (control) firms in Pakistan which file for tax for all the years 2006-09 and report taxable earnings in the interval (0, 720,000]. Column (4) and (7) reports the coefficients on log change in net-of-tax rate in diff-in-diff regressions, where log change in net-of-tax rate has been instrumented in the first stage with a dummy for belonging to post-reform treatment group. Standard errors are in parenthesis, which are clustered at the level of individual taxpayers. All coefficients are significant at 1% level.

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