ELECTRONIC INVOICE MONITORING AND TAX COMPLIANCE IN PUNJAB

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EXECUTIVE SUMMARY

⇒ **Tax compliance in Punjab is a key policy issue in the context of a large informal sector and the limited enforcement capacity of the tax authorities.**

⇒ **As a policy reform geared towards improving government access to information trails via technological integration, the Punjab Revenue Authority PRA) introduced the Electronic Invoice Monitoring Software (EIMS) in designated services and firms.**

⇒ **In this brief, we analyze the impact of this intervention by examining the difference in three tax-related outcomes for firms in the months after the adoption of EIMS. Our findings suggest a positive impact of the reform within three months post-adoption as:**

- **Reported Sales Value increases by ~43%**
- **Tax liability goes up by ~27%**
- **Value added per unit of output goes up ~0.4**

⇒ **Despite the large positive effects of EIMS on revenue, adoption remains on the lower end. To understand the constraints in adoption of EIMS, further research was conducted through focus groups with compliant and non-compliant taxpayers. We outline the key considerations in the taxpayer's decision to adopt EIMS, which include:**

- **Presence of financial incentives or tax breaks for taxpayers adopting EIMS,**
- **Compatibility and ease of integration of EIMS with sales software used by taxpayers.,**
- **Adoption behavior of competing firms,**
- **Existence of consumer incentive programs,**
- **Impact on the tax compliance costs of the firm**

⇒ **Considering our findings, the widespread application of EIMS will prove to be a useful tool for PRA in increasing revenue and tax compliance. However, the maximum revenue impact can only be achieved once barriers to adoption are removed, and taxpayers are motivated to integrate with EIMS rules.**

One of the toughest challenges for most developing and middle-income countries is to increase the revenue collected through different taxation instruments. Pakistan is no stranger to this conundrum. The country has been plagued by rising fiscal deficits and low tax-GDP ratios, with the World Bank estimating a gap of 50% in collection across all taxes (assuming a realistic compliance rate of 75% for developing and middle-income countries). This large gap in tax collection is a combination of low tax morale, a sizable informal economy, and weak enforcement capabilities of the tax authorities.

After the 18th amendment, the collection of the Sales Tax on Services was completely devolved to the Provincial Revenue Authorities. The provincial tax regime inherited challenges similar to their federal counterpart. The Punjab Revenue Authority (PRA) is the agency responsible for the collection of this value-added tax on services. This tax instrument was the single biggest source of tax revenue collected by Punjab, making it crucial to the revenue stream of the government. In 2021-22, the sales tax on services contributed almost 60% (PKR 170 billion) of the total provincial tax revenue. In the context of creating greater fiscal space for development in Punjab, PRA has undertaken several policy measures to bolster revenue collection and minimize instances of tax evasion.

RESEARCH OVERVIEW

Most importantly, PRA introduced an Electronic Invoice Monitoring System (EIMS) to collect invoice level data from service providers in real-time. EIMS is comparable to Electronic Fiscal Devices or Electronic Billing Machines in its function. Taxpayers are required to install an encrypted block of code that fetches real time data (using the internet) of all transactions conducted at the Point of Sales. By embedding the required software (and hardware if necessary), the Authority can capture transactions and invoices issued from the registered service provider. The law has also defined an eligibility criterion for the adoption of this technology. All registered taxpayers in designated sectors having an annual turnover of PKR 10 million and above in FY 2017-18 or in a subsequent financial year are liable to be monitored through EIMS. Eligible taxpayers are given a deadline of three months within the close of the financial year in which they become liable to become compatible with EIMS, given they use a computerized system for recording transactions. Firms not using computerized systems for recording transactions and issuing invoices are given a deadline of six months within the close of the financial year to ensure compatibility with EIMS.

The invoice monitoring system generates a unique digital invoice for each transaction and is recorded on the server of the tax authorities. As per the rules, each invoice must contain the description of the service, quantity and price, amount excluding sales tax, total applicable

tax, and the tax inclusive price of the service. Taxpayers may only use invoices generated through the EIMS. Our research has shown there are several issues with standardization of invoices, leading to errors negatively affecting the quality of data.

The new policy measure was rolled out across Punjab in various phases, focusing on a handful of services. PRA conducted orientation and training sessions with taxpayers to raise awareness amongst the target service providers. These taxpayers were briefed on EIMS and were given technical guidance to ensure compliance with the new legal obligations. Non-compliant taxpayers were sent out notices/warnings in accordance with any penalties outlined in the Punjab Sales Tax Act.

In theory, the government's motivation behind using this technology is to improve tax yields and prevent tampering of reported sales/transaction data forwarded to PRA. Our research is focused on evaluating the impact of this intervention (as per the policy objectives) on the restaurant sector since it contains the largest number of EIMS adopters across service categories. By quantifying the effectiveness of the policy measure, we can empower the government in making an informed decision about the scale and importance of EIMS in the future. The project aims to answer two primary questions.

ESEARCH QUESTIONS

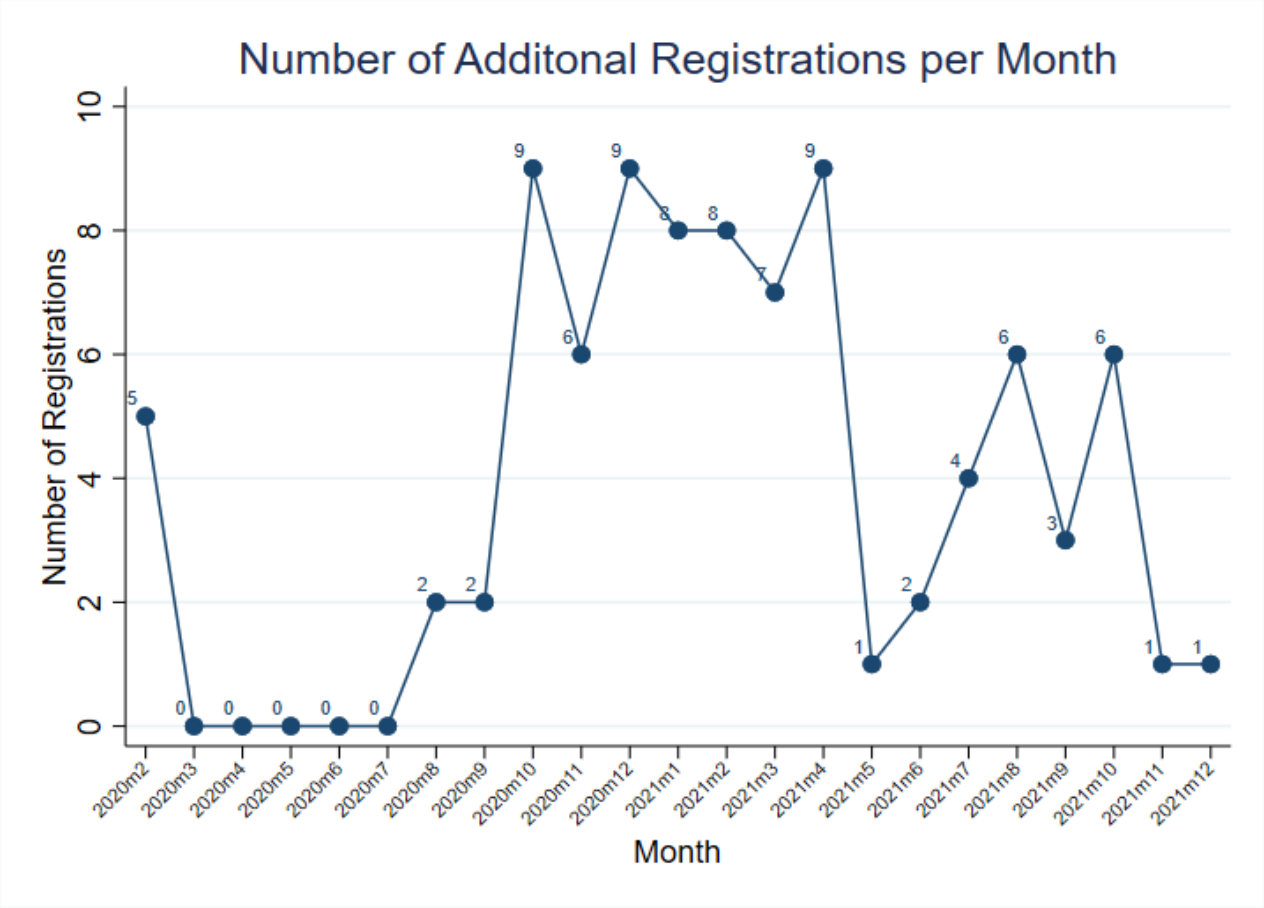
1) **How did the introduction of the Electronic Invoice Monitoring System impact the reported sales and tax liability of treated firms?**

2) **What are the major considerations and constraints behind a firm's decision to adopt the Electronic Invoice Monitoring System**

DATA

The data used for the purpose of our research consisted of anonymized Sales Tax Returns provided by the Punjab Revenue Authority from 2012-2021. The data includes about 2,500 total restaurants. It contained firm level reported sales, input costs, and the tax returns for all registered restaurants in Punjab. The data is on a monthly level for each firm beginning from the first month the firm gets registered. The rollout of these machines started in February 2020; the exact date of adoption of EIMS was available for all firms in our study. The analysis is for restaurants only regardless of their turnover.

Figure 1: EIMS Registrations over Time



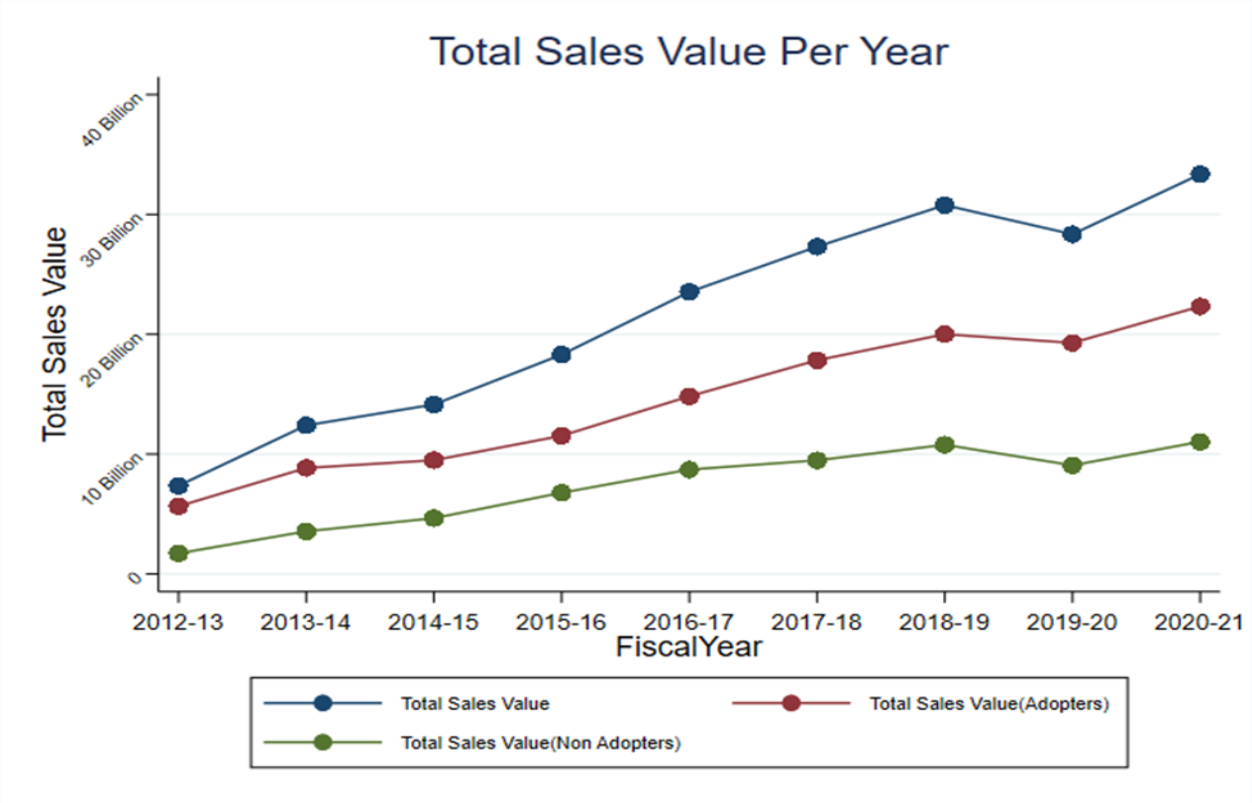
Notes: This graph shows the number of registrations for IMS per month.

Despite the healthy takeup of EIMS, not all eligible taxpayers have adopted. The non-adopting taxpayers are interesting, both because we will use them as our control group, but more broadly because they can help us understand what the barriers are that are preventing

all eligible firms from adopting, and how PRA may be able to increase adoption going forward.

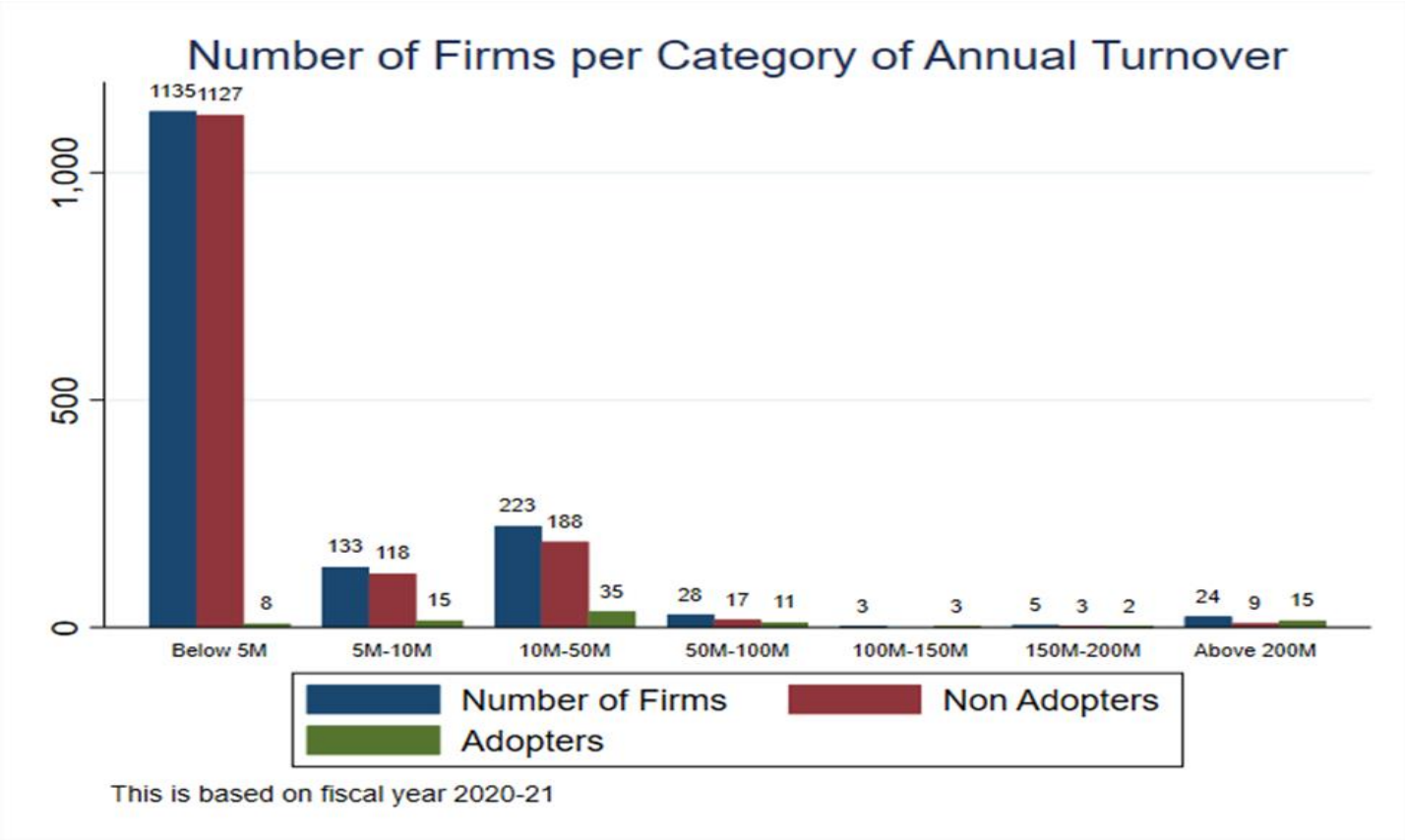
Figure 2 shows the growth in total sales over time in the two groups: those who have adopted EIMS by December 2021, and those who have not. We see that the adopters account for more than half of total sales value, likely since, as we will see, the largest taxpayers are most likely to adopt. Also, we see that the dip in sales during the onset of the COVID-19 pandemic in 2019-20 is smaller for the adopting firms than the non-adopters.

Figure 2: Total Sales Value of Adopters and Non-Adopters



Notes: This graph shows the general trend in the revenue reported by the firms over the time period of the data. There is an increasing trend in the revenue as predicted. However, there is a decrease in 2020 which is due to Covid-19. The rollout of the machines started in Feb 2020.

Figure 3: Adoption of EIMS by Taxpayer Size



Notes: This graph shows the number of firms, adopters, and non-adopters per category of annual turnover. The annual turnover is calculated by adding the monthly revenue for the whole fiscal year.

In Table 1 below we explore these differences further. We divide taxpayers into three groups. First, *adopters*, those who have adopted the EIMS system. Second, *notified non-adopters*, those who are eligible to adopt EIMS, and have been notified that they are required to adopt, but have not yet done so. Third, *not notified non-adopters*, those who are eligible to adopt EIMS but have not done so and have yet to be notified of their requirement to adopt. In the

table we compare both the adopters and the not notified non-adopters to the notified non-adopters. The first column shows averages and standard deviations of a range of characteristics of the notified non-adopters. Then, we show the difference between the adopters (column 2) and the not notified non-adopters (column 3) and the notified non-adopters. The final column performs an F test for the absence of any difference between the three groups.

The top part of the table confirms the patterns in Figure 3: taxpayers that have adopted EIMS are larger than either type of non-adopter. The middle panel shows that the non-adopters are not significantly different on a range of firm characteristics. However, the bottom panel shows that the adopters and non-adopters do differ in where they are located. Notified non-adopters are more likely to be in Lahore, perhaps reflecting a concentration of enforcement activities in Lahore instead of other big cities. Correspondingly, adopters are more likely to be in Faisalabad, Rawalpindi and Gujranwala than are either type of non-adopter.

Table 1: Comparison of Characteristics of Adopters and Non-Adopters

	Eligible, Notified Non-Adopters	Difference Relative to Notified Non-Adopters		Test
	Mean / (sd)	Adopters	Not Notified Non-Adopters	All=0
Revenue Characteristics				
Service Value	5,244,953	10,653,846*	-3,227,626	19.94
(PKR)	(3,238,927)	(4,244,951)	(3,553,423)	[0.00]*
Cost	2,436,688	7,006,081*	-1,787,507	17.45
(PKR)	(2,190,002)	(2,871,543)	(2,403,446)	[0.00]*
Tax Liability	421,713	985,801**	-241,140	21.50
(PKR)	(275,448)	(361,098)	(302,250)	[0.00]*
Value Addition	0.574	-0.041	-1.682	0.27
(per unit)	(3.247)	(4.275)	(3.592)	[0.6054]
General Characteristics				
Age	2146.5***	-143.1	-115.2	0.05
(in days)	(125.3)	(164.1)	(137.4)	[0.8163]
AOP	0.017	0.020	0.028	0.12
	(0.026)	(0.034)	(0.028)	[0.733]
Business	0.862***	0.027	0.037	0.06
	(0.041)	(0.054)	(0.045)	[0.8045]
Company	0.034*	0.003	-0.027	3.53
	(0.017)	(0.022)	(0.018)	[0.0609]
Individual	0.069*	-0.032	-0.024	0.10
	(0.028)	(0.037)	(0.031)	[0.7529]
Geographical Characteristics				
Lahore	0.782***	-0.202***	-0.252***	2.20
	(0.038)	(0.045)	(0.044)	[0.138]
Rawalpindi	0.030	0.099***	0.063*	3
	(0.023)	(0.027)	(0.027)	[0.0836]
Gujranwala	0.012	0.029*	0.006	4.53
	(0.012)	(0.015)	(0.014)	[0.0335]
Faisalabad	0.024	0.053*	0.072**	1
	(0.021)	(0.025)	(0.024)	[0.3165]

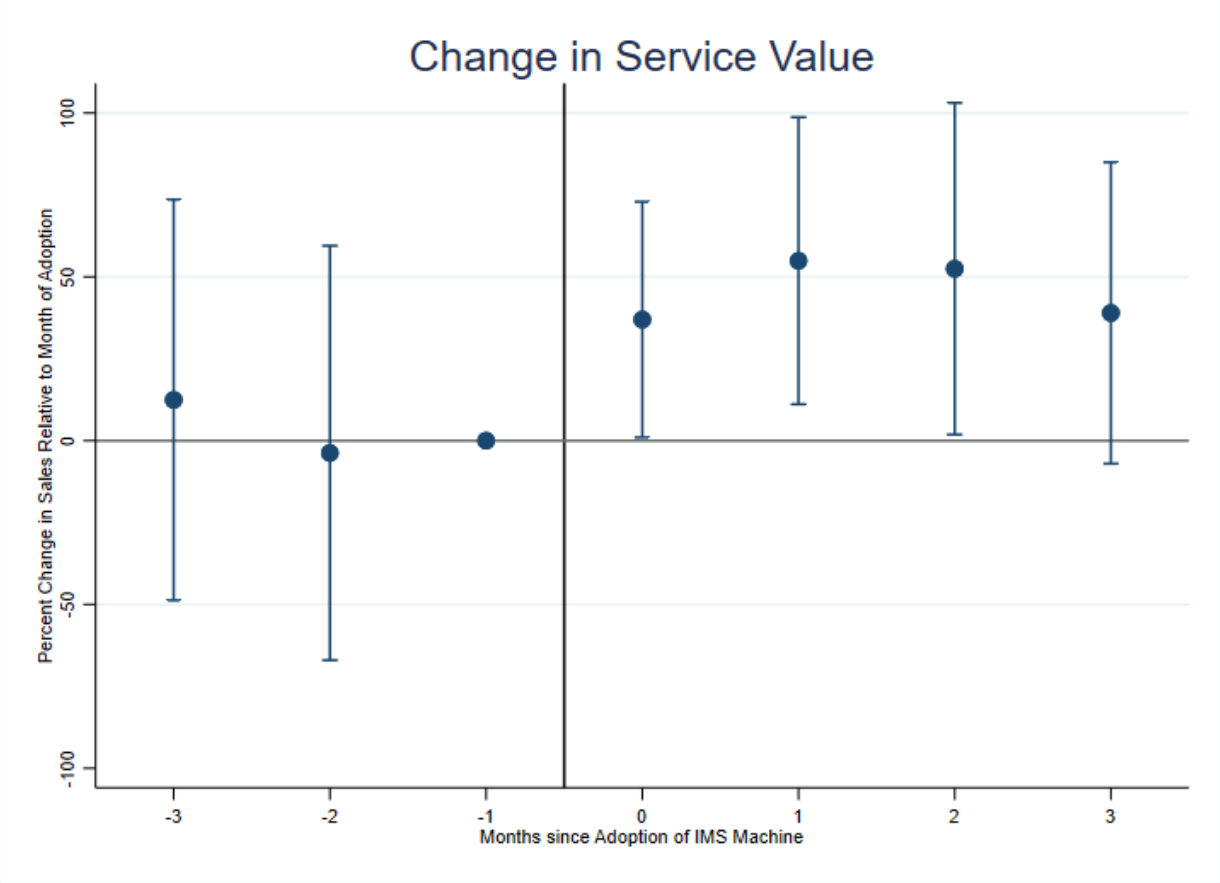
Notes: The table shows the difference between the adopters and non adopters with the control group consisting of non adopters that were notified but still did not adopt. For continuous variables, the first column shows the mean and standard deviation brackets of the variable in the control group. The next two columns show regression coefficients on the treatment group with their standard errors in brackets. The final column shows the statistic on the joint test that no treatment group differs from the control group. For indicator variables, the interpretation of the coefficients is the probability that they will fall in a particular category.

ANALYZING EFFECTS OF ADOPTING EIMS

To study the impacts of adopting EIMS, we analyze how a range of tax-relevant outcomes change around the time that a taxpayer begins to use EIMS. As we can clearly see for the case of the volume of sales in figure 2, there is a natural tendency for reported sales to increase over time. As such, we need a control group of taxpayers that did not adopt the EIMS system to estimate the extent to which the sales reported by taxpayers that do adopt EIMS would have grown even if they had not adopted EIMS. For this, we use the taxpayers who are eligible to adopt EIMS but had not, as of December 2021, adopted EIMS.

We compare reported sales in the 3 months before and after adoption for firms that adopt EIMS to the reported sales of the non-adopting firms to estimate the impact of adopting EIMS on reported sales. Figure 4 shows the results of this comparison. Each dot is our estimate of the difference between the adopting and non-adopting taxpayers in that month, and the vertical lines display our confidence in the estimate.

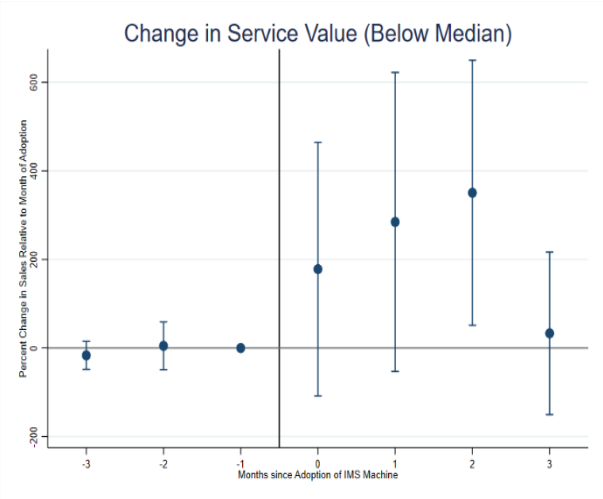
Figure 4: Reported Sales Increased by 43% After EIMS Adoption



We see that the estimates are all close to zero in the months leading up to EIMS adoption. This indicates that the adopting and non-adopting firms have sales that are growing at roughly the same pace before the EIMS adoption, so that the non-adopters are a good control group. After the taxpayers have adopted EIMS, however, their sales diverge sharply from the non-adopters. All the dots for the months after adoption are above zero, and we can confidently rule out that there is no difference. Our overall estimate is that reported sales increased by around 43% because of the EIMS system, an impressive increase.

To measure the impact on sales by restaurant size, we divided the above sample (Figure 4) into two subsamples: one above the median and the other below the median of annual turnover. We see that the sales go up in both the samples, however , the increase in reported sales is higher for smaller restaurants (around 170%) as compared to larger restaurants (around 27%) after IMS adoption as shown in Figure 5.

Figure 5: Change in Service Value After EIMS Adoption



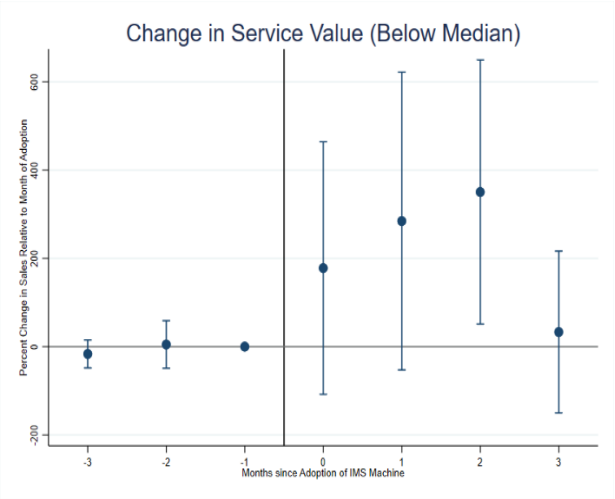
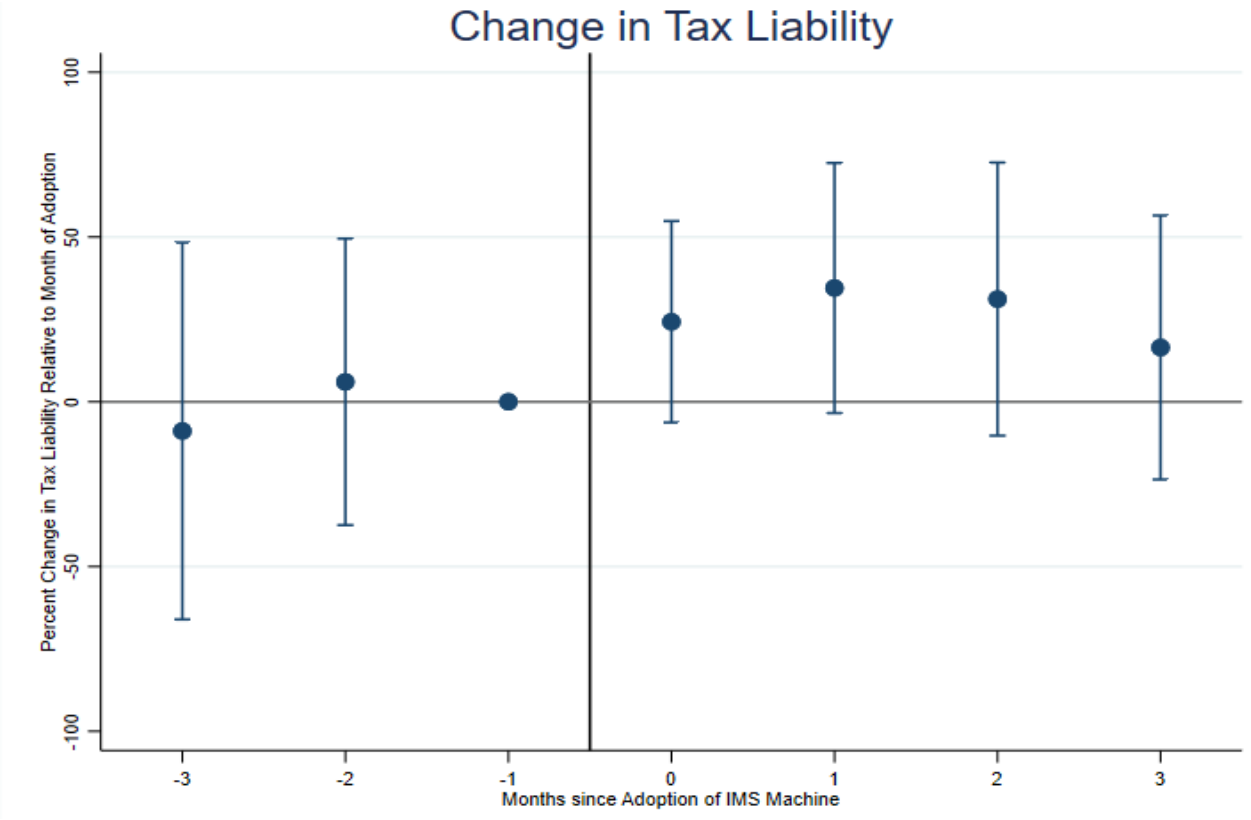


Figure 6 shows that there was a corresponding increase in the tax liability of the taxpayers that adopted EIMS of around 27%. Reported costs increased upon EIMS adoption also, meaning that the 43% increase in sales did not fully flow through to an increase in tax liability.

Figure 6: Tax Liability Increased by 27% After EIMS Adoption



Summarizing, our analysis suggests that within three months of adoption,

Reported Sales Value goes up by ~43%

Tax liability goes up by ~27%

Value added per unit of output goes up ~0.4

This shows a positive impact of these machines on the overall goal i.e., increase in actual revenue reported by the firms.

The increases are large, suggesting that the returns to investment in rolling the EIMS system further are very large. Of course, this raises the question of identifying what the barriers to additional adoption of EIMS are.

For this we turn to a discussion of a series of focus groups we ran together with taxpayers to identify key bottlenecks for adoption.

ANALSYING ADOPTION CONSTRAINTS- FOCUS GROUP DISCUSSIONS

To address the second research objective of understanding the considerations, incentives and constraints affecting the adoption of EIMS, we conducted focus groups with firms that had either adopted the machines, or with those that remained non-compliant with EIMS. This is particularly important considering the positive revenue impact of the machines and the low adoption rate of EIMS. The outcomes of the focus group shed some light on factors that are considered important by the taxpayer in the adoption of a new policy measure (EIMS to be specific). From a policy standpoint, it also gave us information on some of the barriers to adoption of EIMS. The discussion also touched upon the concept of incentive schemes to increase adoption.

Key Findings

Firms unanimously agreed that the most important consideration to decide the adoption of EIMS is based on tangible financial benefits offered to the service provider. These benefits can take the shape of tax exemptions, reduced tax rates or other special incentives offered to adopters. In the status quo, no such incentives were offered by PRA and consequently adoption remains low.

The respondents who had not yet enrolled in EIMS cited issues of software compatibility and integration with PRA's block of code. Some of the non-compliant taxpayers did not have proper in-house IT departments, leading to a reliance on ready-made software that cannot be modified with EIMS.

Taxpayers in the focus group who had adopted EIMS believed that it had no significant impact on improving accounting practices or business processes within the firm. Our respondents believed that there was a small but positive impact on the return filing process; The size and impact on compliance costs was perhaps minor, given that firms still had to maintain cumbersome paper records for up to 8 years.

The participants believed that adoption might also be affected by competing firms. The effects varied across restaurants. Some restaurants offered a unique product or had a well-established brand. These restaurants remained unaffected by the competing restaurant's decision to adopt or not. However, some restaurants competed only on price; service providers evading taxes could capture consumers from compliant firms due to the consumer wanting to pay less. The affect could nudge taxpayers to be non-compliant with EIMS to stay price competitive.

Since consumers generally tend to gravitate towards lower prices, they fail to report or boycott firms not issuing tax receipts/invoices (assuming these evading firms are charging less than compliant firms). When consumers are not involved in the process, they might gravitate towards tax evading firms as mentioned above. To create deterrence for non-compliant restaurants, the participants of the focus group called for consumer incentive schemes to be implemented. These schemes could offer prizes and monetary incentives for consumers to verify invoices and report tax offenders.

POLICY IMPLICATIONS

- The results of our regression show a sizable positive effect on the reported sales for treated firms. The tax liability also increases post-treatment, although the effect is not as considerable as the reported sales. This means that taxpayers are not simply increasing costs to cover the entirety of the increase in reported sales. Hence, the revenue impact for the government is net positive. From a policy standpoint, our research can be used to aggressively promote investment for the adoption a of EIMS in restaurants in Punjab. Greater coverage of EIMS could generate valuable revenue and the government would be a step closer in harnessing the full potential of the province's largest source of income via tax. Our research could be used to explore the expansion of Invoice Monitoring Systems to other taxable service categories.

- To fully reap the benefits of EIMS in Punjab, the government may need to re-evaluate current incentive strategies for taxpayers. Our research has shown that taxpayers consider potential incentives critical to the adoption of EIMS. Research should be conducted to determine which other incentive strategies could prove effective in motivating firms to adopt.

- Steps like removing the maintenance of manual records for EIMS users could increase the opportunity cost for non-adopting firms, nudging them towards compliance. Other barriers to adoption, like software compatibility and technical support, also need to be revisited to get more taxpayers integrated with EIMS.

- In addition, consumer incentive structures can add a useful dimension of accountability and deterrence for firms engaged in tax evasion. Our research has shown that the accountability chain may be broken at the final (consumer) stage of the value addition process as most consumers may be willing to sacrifice compliance for a lower price. Such consumer incentive mechanisms are used by the Federal Board of Revenue to improve consumer awareness and participation in the tax process. Devising a similar strategy on a provincial level could improve compliance.

- Effective enforcement strategies may also be determined through experimentation, giving PRA insight into how different taxpayers respond to varied intensity of enforcement.