Overclaimed Refunds, Undeclared Sales, and Invoice Mills: Nature and Extent of Noncompliance in a Value-Added Tax

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Introduction

- The theoretical case for a VAT is weak

- Yet it has seen remarkable expansion in the last few decades

- The expansion is in large part driven by the belief that it is a harder tax to evade
Introduction

- The consensus on VAT has begun to weaken

- Malaysia has abandoned it; Zambia may do so next

- The discontent arises from two known sources:
  - Final mile problem
  - Refund payments on exports
Introduction

- Theoretical mechanisms driving VAT noncompliance are known.

- We, however, still do not know enough on how important they are empirically.
This Paper

- Estimates the extent and nature of VAT noncompliance in Pakistan

- Leverages a large reform that cuts the tax rate on the supply chains of five major industries from 15% to 0%. As the rate goes to zero so do the incentives to misreport → post-reform reports reveal true level of activity

- Compares changes in reports over time to uncover tax evasion
Nature of VAT Noncompliance

- VAT can be evaded by overreporting purchases or underreporting sales

- Overreporting purchases is sometimes facilitated by firms called invoice mills

- “A VAT invoice is a check written on the government” (Bird, 1993)

- Invoice mills are SPVs that trade VAT invoices
Preview of Results

- Reduction of the rate to zero induces strong behavioral responses. Reported purchases go down by 42 log-points, sales by 22, exports by 11, and non-export sales by 8 log-points → firms were overclaiming refunds by 22% and were underreporting B2C sales by 43.5%

- Together, this means that the evasion rate at the baseline was nearly 77% of true tax liability

- Roughly 37% of the excess-claimed refund was based on invoices of invoice mills
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Empirical Framework

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  First-Stage
  Behavioral Responses
  Quantifying Tax Evasion

Invoice Mills and VAT Evasion

Conclusions
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Conclusions
Consider a simply chain consisting of three stages

The government implements a destination-based VAT → exports are zero-rated; imports are taxed at the standard rate

I consider firm behavior under three different scenarios
A Simple Supply Chain

Bottom → Middle

Middle → Export
Middle → Retail
Example 1: The First-Best

- If firms report truthfully, the government revenue equals the tax rate times the retail sales—value of supplies made to the final consumer.

- This is the standard result of the equivalence of a VAT and the RST.

- What happens at other stages is irrelevant; tax remitted at the bottom and middle stages is refunded to the exporter and is credited by the retailer.
Example 2: When Misreporting is Feasible

- The exporter would like to overreport purchases → increases the refund

- The retailer would like to underreport purchases → helps in evading the VAT due on sales

- This can give rise to collusion → the middle firm books some of its sales to retailer as sales to exporter in VAT records

- Misreporting one rupee of sale in this manner generates a surplus of $\tau + \tau \cdot v_R$
Example 2: When Misreporting is Feasible

The government revenue is now lower than the first-best by the following amount

\[ \Delta R = \tau (\hat{C}_E - C_E) + \tau (S_R - \hat{S}_R) \]

underpaid tax

overclaimed refund

The extent of VAT evasion depends upon

1. by how much purchases claimed for export are over-reported
2. by how much domestic B2C sales are underreported
Example 3: When VAT Chain is Broken

- VAT chains are rarely complete, especially in developing economies

- When the chain breaks, VAT charged at the pre-break stage cannot be claimed at the post-break stage

- This creates arbitrage opportunities that are sometimes exploited by firms called invoice mills

- The invoice mills deal only in VAT paper, helping downstream firms claim credit of VAT remitted at the upstream stages
Example 3: When VAT Chain is Broken
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The Zero-Rating Reform

- Reduces the VAT rate on the supply chains of five major industries from 15% to 0%

- Two main purposes of the reform
  - Reduce compliance costs in export-oriented industries
  - Prevent fraudulent refunds
The Zero-Rating Reform

- Announced on June 06, 2005; applicable from July 01, 2005

- Zero-rated 152 items, including both finished goods and major inputs of five industries—textile, leather, carpets, sports goods, and surgical goods
Since July 2003, the tax administration possesses the power to blacklist a firm it suspect of being an invoice mill.

The procedure has three steps:

1. Suspension of registration
2. Opportunity of being heard
3. Blacklisting

I use the procedure to identify invoice mills in my data.
The Emergence & Growth of Invoice Mills

Number of Blacklisted Firms over the years from 1996 to 2010.
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Model

- Estimate a DD model with firm and period (month) fixed effects

\[ y_{it} = \alpha_i + \lambda_t + \beta X_{it} + \gamma \cdot \text{zero-rated}_i \times \text{after}_t + \varepsilon_{it} \]

where \( \text{zero-rated}_i \) denotes that firm \( i \) belongs to one of the five treated industries

- Explore six VAT outcomes \( (y_{it}) \):
  1. Output Tax
  2. Input Tax
  3. Sales
  4. Purchases
  5. Exports
  6. Non-export Sales
Conditional on the firm and time fixed effects, the time path of the outcomes would have been on average similar across the treated and untreated groups.

Show event study results spanning a number of pre- and post-reform periods to support this.
Data

- The universe of VAT returns (1998-2010)

- Tax register containing firm characteristics including:
  - Industry a firm operates in
  - Registration status (suspended, blacklisted, normal)
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Conclusions
Aggregate VAT Refund Paid in Pakistan
Output Tax Reported by Firms

Coefficient on the Period Dummy

Month of the Year

Treatment Control
Input Tax – DD

![Graph showing the difference-in-differences coefficient over time from 1998 to 2010. The graph displays a sharp decline around 2006, indicating a significant change in the coefficient. The y-axis represents the difference-in-differences coefficient, ranging from -2 to 1, and the x-axis represents the months of the year.]
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Exports Reported by Firms

Coefficient on the Period Dummy

Month of the Year


-2 -1 0 1 2

Treatment Control

33 / 57
Non-Export Sales of Firms

Month of the Year

Coefficient on the Period Dummy

Treatment

Control
### Exports – DD

<table>
<thead>
<tr>
<th>Month of the Year</th>
<th>Coefficient 95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
<td>2000</td>
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<tr>
<td>2008</td>
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<tr>
<td>2010</td>
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</tbody>
</table>

The graph shows the difference-in-differences coefficient over the years from 1998 to 2010. The red line represents the coefficient, and the gray area indicates the 95% confidence interval.
Non-Export Sales – DD

Month of the Year

Coefficient 95% Confidence Interval


Difference-in-differences Coefficient

Month of the Year
### Firm Behavior to the Zero-Rating

<table>
<thead>
<tr>
<th></th>
<th>Output Tax</th>
<th>Input Tax</th>
<th>Sales</th>
<th>Purchases</th>
<th>Exports</th>
<th>Non-Export Sales</th>
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<tr>
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<tr>
<td><strong>A: Complete Panel</strong></td>
<td></td>
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<tr>
<td>treat × after</td>
<td>-1.842</td>
<td>-1.961</td>
<td>-0.223</td>
<td>-0.419</td>
<td>-0.106</td>
<td>-0.082</td>
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<tr>
<td></td>
<td>(0.071)</td>
<td>(0.026)</td>
<td>(0.012)</td>
<td>(0.017)</td>
<td>(0.025)</td>
<td>(0.014)</td>
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<tr>
<td>Observations</td>
<td>4,179,561</td>
<td>3,728,660</td>
<td>5,058,579</td>
<td>3,983,213</td>
<td>612,993</td>
<td>4,623,907</td>
</tr>
<tr>
<td><strong>B: Balanced Panel</strong></td>
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<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>treat × after</td>
<td>-2.536</td>
<td>-2.337</td>
<td>-0.405</td>
<td>-0.484</td>
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<td>(0.043)</td>
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<td>Yes</td>
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## Firm Behavior to the Zero-Rating – Dynamics

<table>
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<th>Sales</th>
<th>Purchases</th>
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<td>treat × 2005</td>
<td>-1.732</td>
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<td>treat × 2006</td>
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<td>(0.014)</td>
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<td>-0.440</td>
<td>-0.103</td>
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<td>(0.088)</td>
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<td>(0.016)</td>
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<td>(0.030)</td>
<td>(0.022)</td>
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<td>(0.090)</td>
<td>(0.033)</td>
<td>(0.018)</td>
<td>(0.021)</td>
<td>(0.033)</td>
<td>(0.017)</td>
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<tr>
<td>treat × 2009</td>
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<td>-2.283</td>
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<td>-0.475</td>
<td>-0.212</td>
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<td></td>
<td>(0.090)</td>
<td>(0.035)</td>
<td>(0.019)</td>
<td>(0.023)</td>
<td>(0.036)</td>
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<td>treat × 2010</td>
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<td>-2.270</td>
<td>-0.295</td>
<td>-0.432</td>
<td>-0.148</td>
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<tr>
<td></td>
<td>(0.084)</td>
<td>(0.036)</td>
<td>(0.020)</td>
<td>(0.024)</td>
<td>(0.038)</td>
<td>(0.019)</td>
</tr>
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</table>

| Observations   | 4,179,561  | 3,728,660 | 5,058,579 | 3,983,213 | 612,993 | 4,623,907       |
| Firm Fixed Effect | Yes       | Yes       | Yes       | Yes       | Yes     | Yes             |
## Textile Vs. Non-Textile

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<tr>
<td>treat × after</td>
<td>-1.925</td>
<td>-1.978</td>
<td>-0.221</td>
<td>-0.394</td>
<td>-0.065</td>
<td>-0.082</td>
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<td></td>
<td>(0.076)</td>
<td>(0.026)</td>
<td>(0.013)</td>
<td>(0.017)</td>
<td>(0.027)</td>
<td>(0.014)</td>
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<tr>
<td>treat × after × non-textile</td>
<td>0.958</td>
<td>0.260</td>
<td>-0.023</td>
<td>-0.403</td>
<td>-0.224</td>
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<tr>
<td></td>
<td>(0.196)</td>
<td>(0.102)</td>
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<td>(0.078)</td>
<td>(0.042)</td>
<td>(0.081)</td>
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<tr>
<td>Baseline Coefficient</td>
<td>-1.842</td>
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<td>Firm Fixed Effect</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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### Within Textile Supply Chain

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<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
<td>(6)</td>
</tr>
<tr>
<td><strong>treat × after</strong></td>
<td>-0.468</td>
<td>-2.040</td>
<td>-0.266</td>
<td>-0.429</td>
<td>-0.108</td>
<td>0.092</td>
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<td></td>
<td>(0.074)</td>
<td>(0.053)</td>
<td>(0.027)</td>
<td>(0.034)</td>
<td>(0.035)</td>
<td>(0.033)</td>
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<tr>
<td><strong>treat × after × ginning</strong></td>
<td>-2.184</td>
<td>2.053</td>
<td>0.305</td>
<td>0.389</td>
<td>0.193</td>
<td>-0.001</td>
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<tr>
<td></td>
<td>(0.096)</td>
<td>(0.075)</td>
<td>(0.036)</td>
<td>(0.067)</td>
<td>(0.057)</td>
<td>(0.042)</td>
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<td><strong>treat × after × spinning</strong></td>
<td>-3.613</td>
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<td>(0.045)</td>
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<td>(0.042)</td>
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<td>0.001</td>
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<td>(0.031)</td>
<td>(0.039)</td>
<td>(0.044)</td>
<td>(0.037)</td>
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<tr>
<td><strong>Baseline Coefficient</strong></td>
<td>-1.925</td>
<td>-1.978</td>
<td>-0.221</td>
<td>-0.394</td>
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<td>(0.076)</td>
<td>(0.026)</td>
<td>(0.013)</td>
<td>(0.017)</td>
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<tr>
<td><strong>Observations</strong></td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
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The amount of VAT evasion is given by the following formula

\[
\Delta R = \tau (\hat{C}_E - C_E) + \tau (S_R - \hat{S}_R)
\]

- The first term in the formula is the amount by which purchases claimed for export are over-reported.
- I do not directly observe the term but can back it out from the behavioral response of exports to the zero-rating.
## Quantifying Tax Evasion – I

<table>
<thead>
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<th></th>
<th>Complete Panel</th>
<th>Balanced Panel</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
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<tr>
<td><strong>A: Overclaimed Refunds</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Percent Decrease in $\hat{S}_E$</td>
<td>0.112</td>
<td>0.171</td>
</tr>
<tr>
<td></td>
<td>(0.025)</td>
<td>(0.038)</td>
</tr>
<tr>
<td>2. $\hat{S}_E$ in 2004</td>
<td>687.038</td>
<td>389.506</td>
</tr>
<tr>
<td>3. $\Delta\hat{S}_E$</td>
<td>76.826</td>
<td>66.670</td>
</tr>
<tr>
<td></td>
<td>(17.392)</td>
<td>(14.682)</td>
</tr>
<tr>
<td>4. $\Delta\hat{C}_E$</td>
<td>153.652</td>
<td>133.340</td>
</tr>
<tr>
<td></td>
<td>(34.785)</td>
<td>(29.363)</td>
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<tr>
<td>5. Overclaimed Refunds in 2004</td>
<td>23.048</td>
<td>20.001</td>
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<tr>
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<td>(5.218)</td>
<td>(4.404)</td>
</tr>
</tbody>
</table>
From Behavioral Responses to Tax Evasion

- The second term in the formula is the under-reported B2C sales

- Again, I do not directly observe the term but can back it out using the following accounting identities

\[
\sum_{i \in I} (\hat{s}_i - \hat{s}_{i,E}) \equiv \sum_{i \in I} (\hat{s}_{i,B2B} + \hat{s}_{i,B2C})
\]

\[
\sum_{i \in I} \hat{c}_i \equiv \sum_{i \in I} (\hat{s}_{i,B2B} + \hat{c}_{i,OS})
\]

- Using the above, the response of B2C sales can be written as

\[
\Delta \hat{S}_R \equiv \Delta \left( \hat{S} - \hat{S}_E \right) - \Delta \hat{C} + \Delta \hat{C}_{OS}
\]
## Quantifying Tax Evasion – II

<table>
<thead>
<tr>
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<th>Complete Panel</th>
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<tr>
<td>B: Underpaid Tax on B2C Sales</td>
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</tr>
<tr>
<td>6. Percent Decrease in $(\hat{S} - \hat{S}_E)$</td>
<td>0.087</td>
<td>0.111</td>
</tr>
<tr>
<td></td>
<td>(0.013)</td>
<td>(0.029)</td>
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<tr>
<td>7. Percent Decrease in $\hat{C}$</td>
<td>0.522</td>
<td>0.626</td>
</tr>
<tr>
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<td>(0.017)</td>
<td>(0.031)</td>
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<tr>
<td>8. Percent Decrease in $\hat{S}_{B2C}$</td>
<td>0.435</td>
<td>0.515</td>
</tr>
<tr>
<td></td>
<td>(0.022)</td>
<td>(0.043)</td>
</tr>
<tr>
<td>9. $\hat{S}_{B2C}$ in 2004</td>
<td>229.013</td>
<td>129.835</td>
</tr>
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<td>10. Under-reported $\hat{S}_{B2C}$ in 2004</td>
<td>99.717</td>
<td>66.877</td>
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<td>(4.939)</td>
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<tr>
<td>C: Total Evasion</td>
<td></td>
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<tr>
<td>12. Total Tax Evasion</td>
<td>38.005</td>
<td>30.033</td>
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<td>(5.270)</td>
<td>(4.484)</td>
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Outline

Introduction

Conceptual Framework

Institutional Background

Empirical Framework

Results
   First-Stage
   Behavioral Responses
   Quantifying Tax Evasion

Invoice Mills and VAT Evasion

Conclusions
Aggregate Input Tax

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Aggregation Input Tax in PKR Billions

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- I leverage a large Pakistani tax cut to estimate the nature and extent of VAT noncompliance

- At the baseline, the refund was overclaimed by nearly 22% and domestic B2C sales were underreported by 43.5%. This translates into an evasion rate of 77%

- Roughly three-fifths of the revenue loss was caused by the overclaiming of VAT refunds and the rest by the underreporting of B2C sales

- Invoice mills facilitate the overreporting of purchases. Nearly 37% of the overclaimed refunds are based on their invoices