EVALUATING THE EFFECTIVENESS OF TAX POLICIES IN REDUCING THE UNDERGROUND ECONOMY IN VIETNAM

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Abstract: ***Vietnam's underground economy, characterized by unregulated and unregistered activities, poses significant challenges to fiscal capacity, social equity, and economic development. Informality undermines government revenue, distorts competition, and restricts economic planning. This study aims to evaluate the effectiveness of various tax policy interventions Value Added Tax (VAT) reforms, business registration incentives, and enforcement measures in reducing informality in Vietnam. Specifically, the research addresses whether these policies effectively encourage informal enterprises to formalize, thereby improving tax compliance and economic transparency.The study employs a combined Propensity Score Matching (PSM) and Difference-in-Differences (DiD) methodology to ensure robust causal inference. The analysis covers the period from 2012 to 2023, utilizing data from the General Statistics Office, Ministry of Finance, and World Bank Development Indicators. PSM is used to match comparable groups of enterprises, while DiD estimates the differential impact of policy interventions over time. Robustness checks, including placebo tests and sensitivity analyses, validate the findings. The findings reveal that VAT reforms and registration incentives significantly reduce informality, while enforcement measures are less effective. The study contributes to the literature by applying a novel PSM-DiD framework to the analysis of informality in an emerging economy context, providing evidence-based insights for policymakers. The results underscore the importance of balancing incentives and enforcement measures to promote sustainable formalization.***

• Keywords: *informality, policy interventions, PSM-DiD, tax reforms*

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1. Introduction

1.1. Background

The underground economy, encompassing unregulated and unregistered economic activities, plays a significant role in Vietnam's socio-economic landscape. Characterized by tax evasion and regulatory avoidance, this sector accounts for a substantial portion of the national GDP, providing employment opportunities but also creating challenges for fiscal management and economic growth (Schneider & Enste, 2020). Globally, underground economies are prevalent in developing and emerging markets, where institutional inefficiencies and weak enforcement mechanisms often drive informality (Medina & Schneider, 2018). In Vietnam, the underground economy is driven by several factors. High tax burdens discourage small businesses and individual entrepreneurs from formalizing operations, as they perceive formal sector participation as overly costly (Nguyen et al., 2021). Administrative hurdles further exacerbate informality, with lengthy and complex processes for business registration, licensing, and compliance acting as barriers (Le, 2020). Lastly, a lack of compliance incentives, such as tax relief or access to formal financing, reduces the perceived benefits of transitioning to the formal sector (Phan & Nguyen, 2019). Together, these drivers create an environment where informality becomes the default mode of operation for many enterprises, undermining broader economic goals.

1.2. Problem Statement

The underground economy poses significant challenges to Vietnam's fiscal capacity, social equity, and economic planning. Tax evasion deprives the government of crucial revenues, restricting its ability to fund infrastructure development and public services (World Bank, 2021). Social

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inequities are exacerbated as workers in the informal sector lack protections, such as healthcare benefits and job security (Nguyen & Le, 2022). From an economic perspective, informality complicates macroeconomic planning by creating data gaps and reducing the effectiveness of monetary and fiscal policies (Schneider, 2022). As Vietnam seeks to transition to a higher-income economy, addressing the prevalence of informality is essential to ensure sustainable and inclusive growth.

1.3. Objectives

This study aims to answer the key research question: How effective are VAT reforms, business registration incentives, and enforcement measures in reducing informality in Vietnam? It evaluates these tax policies' ability to encourage informal enterprises to formalize, thereby contributing to greater tax compliance and economic transparency. By focusing on the interplay of policy interventions and informality, the study provides actionable insights into which measures are most effective in Vietnam's context.

1.4. Methodology

The study employs a Propensity Score Matching (PSM) and Difference-in-Differences (DiD) methodology to evaluate the impact of tax policies on informality. This integrated approach addresses selection bias and unobserved heterogeneity, enabling robust causal inference (Heckman et al., 1997; Abadie & Imbens, 2011). Data spanning 2012-2023 is sourced from the General Statistics Office, Ministry of Finance, and World Bank Development Indicators. PSM is used to create comparable groups of treated and untreated observations, while DiD estimates the differential impact of tax reforms over time. Robustness checks, including placebo tests and sensitivity analyses, validate the findings (Angrist & Pischke, 2021).

1.5. Contributions

This research makes significant contributions to the academic and policy domains. Methodologically, it pioneers the application of a combined PSM-DiD framework to analyze the informal economy in Vietnam. By integrating these methods, the study addresses critical issues of selection bias and endogeneity, providing a rigorous empirical basis for evaluating policy interventions (Imbens & Wooldridge, 2019). Empirically, the study fills a gap in the literature by focusing on Vietnam, where comprehensive analyses of informality and tax policy are scarce. The findings have practical implications, highlighting the effectiveness of VAT reforms and registration incentives compared to enforcement measures. The results suggest a need for a balanced approach, combining incentives for compliance with targeted enforcement to address larger informal enterprises (Le & Nguyen, 2023).

2. Literature Review

2.1. Theoretical Background

Theoretical frameworks on tax compliance and informality offer a foundational understanding of the factors influencing informal economic activities. The Allingham-Sandmo model (1972) is a cornerstone in tax compliance literature, positing that individuals weigh the costs of compliance such as tax payments against the expected benefits of evasion, factoring in penalties and detection probabilities. This rational-choice perspective underscores the importance of enforcement and incentives in shaping taxpayer behavior. Extensions of this model incorporate behavioral insights, highlighting the role of trust in institutions and perceived fairness in tax systems (Kirchler et al., 2008). Economic incentives play a critical role in formalizing informal enterprises. Incentive-based approaches, such as tax reductions or simplified registration processes, lower the perceived costs of formalization (Medina & Schneider, 2018). Conversely, high compliance costs, including administrative burdens and tax rates, act as barriers to formalization (Torgler, 2011). Enforcement measures, including audits and penalties, are also significant but can inadvertently drive informality if perceived as overly punitive (Slemrod, 2019). These theoretical perspectives provide a basis for evaluating the impact of tax policy reforms on informality.

2.2. Empirical Studies

Empirical studies demonstrate mixed outcomes regarding the impact of VAT reforms, incentives, and enforcement on reducing informality. Globally, VAT reforms have been found to enhance compliance when coupled with administrative simplifications. For example, studies in Latin America reveal that streamlined VAT systems reduced informality and increased tax revenues (Pomeranz, 2015; Kleven et al., 2016). Similarly, in Africa, VAT exemptions for small enterprises incentivized formalization while maintaining revenue neutrality (Bachas et al., 2021). Regionally, in Asia, evidence suggests that business registration incentives and simplified tax regimes have been effective in encouraging formalization. In India, the introduction of the Goods and Services Tax (GST) reduced informality by integrating a significant portion of informal enterprises into the formal tax net (Narayan et al., 2020). However, overly stringent enforcement measures in some countries have led to unintended consequences, such as increased tax evasion or shifts to informal operations (Tanzi, 2019). Despite these findings, there remains limited consensus on the most effective combination of policies to reduce informality. The success of interventions often depends on contextual factors, including institutional capacity, enforcement mechanisms, and the socio-economic characteristics of the informal sector (Schneider & Enste, 2020).

2.3. Vietnam-Specific Research Gap

While the global and regional literature provides valuable insights, studies on Vietnam's informal economy remain scarce. The few existing analyses often focus on the descriptive characteristics of informality rather than evaluating specific policy impacts. For instance, Nguyen and Phan (2021) highlight the prevalence of informality in Vietnam's small and medium-sized enterprises (SMEs) but do not explore the causal effects of tax policies. Studies that do address policy impacts are typically limited in scope. For example, Le (2020) examines VAT reforms but does not consider complementary measures like business registration incentives or enforcement strategies. Moreover, most research on Vietnam lacks methodological rigor, with few employing causal inference techniques such as Propensity Score Matching (PSM) or Difference-in-Differences (DiD). This gap underscores the need for comprehensive evaluations that incorporate robust methodologies to assess the effectiveness of tax policies in reducing informality.

2.4. Research Hypothesis

Building on the theoretical and empirical literature, this study formulates the following hypotheses to evaluate the impact of tax policies on informality in Vietnam:

H1: VAT reforms significantly reduce informality by lowering compliance costs and simplifying tax procedures. H2: Business registration incentives are effective in encouraging informal enterprises to formalize by offering financial and administrative benefits. H3: Enforcement measures reduce informality by increasing the perceived costs of non-compliance. H4: The combined effect of VAT reforms, registration incentives, and enforcement measures is greater than the impact of any single policy intervention. H5: The effectiveness of these policies varies across sectors and regions, reflecting the heterogeneity of Vietnam's informal economy.

3. Methodology

3.1. Research Design

This study employs a Propensity Score Matching (PSM) and Difference-in-Differences (DiD) framework to evaluate the causal effects of tax policies on informality. The PSM method ensures that treated and untreated groups are comparable by matching observations based on observable characteristics, thereby addressing selection bias. DiD, on the other hand, estimates the difference in outcomes between treated and control groups before and after the intervention, mitigating the influence of unobserved time-invariant heterogeneity. The combination of PSM and DiD is particularly suited for this study because it allows for robust causal inference in non-randomized settings, such as policy interventions. By first matching comparable units and then analyzing treatment effects over time, this integrated approach reduces the risk of biased estimates stemming from both observable and unobservable confounders.

3.2. Research Model

The DiD model specification can be expressed as:

$$Y_{it} = \beta_0 + \beta_1 D_{it} + \beta_2 T_{it} + \beta_3 (T_{it}\, x\, D_{it}) + X_{it}\gamma + \epsilon_{it}$$

Y_{it} Outcome variables (e.g., informal employment rate, tax revenue deviations). D_{it} Treatment indicator (1 if the unit belongs to the treated group, 0 otherwise). T_{it} Time indicator (1 for the post-treatment period, 0 for the pre-treatment period). T_{it} x D_{it}: Interaction term capturing the treatment effect. X_{it}: Control variables. ϵ_{it}: Error term. The coefficient β_3 represents the DiD estimate of the treatment effect.

3.3. Data Sources

- The study utilizes panel data spanning 2015–2023, sourced from the following: General Statistics Office (GSO): Provides data on informal employment rates, unregistered enterprises, and regional economic activity. Ministry of Finance (MoF): Supplies information on tax revenue deviations and enforcement measures. World Bank Development Indicators (WDI): Offers macroeconomic indicators and control variables such as GDP, inflation, and trade openness.

3.4. Variables

- Dependent Variables: Informal employment rate: Percentage of workers in the informal sector. Tax revenue deviations: Differences between expected and actual tax revenues. Unregistered enterprises: Number of businesses operating outside the formal sector.

- Independent Variables: VAT reforms: Implementation of simplified VAT procedures or rate changes. Registration incentives: Policies aimed at reducing the cost or complexity of business registration. Enforcement measures: Frequency and intensity of audits or penalties for non-compliance.

- Control Variables: GDP growth, inflation rate, trade openness, and regional development indicators.

3.5. Analytical Approach

- Propensity Score Calculation and Matching: Propensity scores are estimated using logistic regression models based on observable characteristics, such as firm size, sector, and location. Matching methods include nearest-neighbor, kernel, and caliper matching. Balance tests are conducted to ensure comparability between treated and control groups.

- Difference-in-Differences (DiD) Estimation: The matched samples are used to estimate the DiD model, isolating the impact of tax policies on informality. This approach ensures that differences in outcomes are attributable to the intervention rather than pre-existing trends.

- Robustness Checks: Placebo Tests: Apply the methodology to periods or groups not affected by the policies to confirm the absence of spurious effects. Sensitivity Analyses: Test the robustness of findings by varying matching algorithms, altering the caliper width, or excluding specific regions or sectors. Heterogeneity Analysis: Examine variations in treatment effects across sectors (e.g., manufacturing vs. services) and regions (urban vs. rural).

4. Research results

4.1. Descriptive Statistics of Informality Rates (Table 1)

Table 1: Descriptive statistics results

Year	Informality Rate (Treatment)	Informality Rate (Control)
2012	54%	54%
2013	53%	54%
2014	52%	54%
2015	51%	54%
2016	49%	53%
2017	46%	53%
2018	43%	52%
2019	40%	51%
2020	38%	50%
2021	37%	50%
2022	35%	49%
2023	33%	49%

The descriptive statistics in Table 1 illustrate the trends in informality rates for both treatment and control groups between 2012 and 2023. The treatment group, which was subject to targeted tax policy interventions, shows a consistent decline in informality. Starting at 54% in 2012, the informality rate for the treatment group dropped significantly to 33% by 2023. In contrast, the control group exhibited a much slower reduction in informality, declining only from 54% in 2012 to 49% in 2023. The disparity between the two groups after 2015 highlights the positive impact of the policy interventions on reducing informality among the treatment group.

4.2. Balance Test Results (PSM)

Table 2: Balance Test Results

Variable	Before Matching (Treatment Mean)	Before Matching (Control Mean)	After Matching (Treatment Mean)	After Matching (Control Mean)
Firm Size	14	18	14	14
Region	0.65	0.55	0.65	0.65
Sector	0.48	0.72	0.48	0.48
Age	9	11	9	9

Table 2 presents the results of the balance test using Propensity Score Matching (PSM). Before matching, the treatment and control groups exhibited significant differences across key variables such as firm size, region, sector, and age. For instance, the average firm size was 14 in the treatment group compared to 18 in the control group, and there were also notable differences in regional and sectoral composition. After matching, these differences were successfully minimized, indicating that the treatment and control groups became comparable across all observed variables. For example, after matching, the average firm size was equal (14) for both groups, and similar trends were observed for other variables, ensuring a more accurate causal analysis.

4.3. DiD Analysis Results

Table 3: DiD Analysis Results

Policy	Estimated Reduction (%)	Impact in Manufacturing (%)	Impact in Services (%)
VAT Reforms	9.8	11.2	8.1
Registration Incentives	7.6	8.4	6.7
Enforcement Measures	4.3	5.1	3.8

The results of the Difference-in-Differences (DiD) analysis are summarized in Table 3. Among the policy interventions analyzed, VAT Reforms proved to be the most effective in reducing informality, with an estimated reduction of 9.8% overall. Specifically, VAT reforms had a stronger impact on the manufacturing sector (11.2%) compared to the services sector (8.1%). Registration Incentives followed, with an overall estimated reduction of 7.6%, showing a slightly stronger impact in the manufacturing sector (8.4%) than in services (6.7%). Enforcement Measures had the lowest estimated reduction, with a 4.3% decrease in informality, with the impact being greater in manufacturing (5.1%) compared to services (3.8%). These results suggest that incentive-based approaches, such as VAT reforms and registration incentives, are more effective at reducing informality than punitive enforcement measures, especially in sectors like manufacturing. Overall, the findings from these tables indicate that targeted tax policy interventions have a significant impact on reducing informality, with VAT reforms and registration incentives being particularly effective. Moreover, the variation in the impact across sectors highlights the need for sector-specific policy considerations, especially for manufacturing versus service industries.

4.4. Robustness Checks

Robustness checks confirmed the reliability of the results. Placebo tests, which applied the DiD framework to periods before the interventions, showed no significant changes in informality rates, ruling out spurious effects. Sensitivity analyses, including alternative matching methods and varying caliper widths, produced consistent estimates, further validating the findings. These results provide robust evidence that targeted tax policies, particularly VAT reforms and registration incentives, can significantly reduce informality. However, the smaller impact of enforcement measures suggests that punitive approaches alone may be insufficient, emphasizing the need for a balanced strategy combining incentives and enforcement.

5. Discussion

5.1. Interpretation of Results

The findings of the study demonstrate that VAT reforms (H1) and registration incentives (H2) were significantly more effective in reducing informality compared to enforcement measures (H3). The success of VAT reforms can be attributed to their role in simplifying tax procedures and lowering compliance costs, which directly addresses the barriers to formalization faced by small and medium enterprises (SMEs). The reduction in compliance burdens aligns well with Hypothesis H1, which posits that VAT reforms would simplify formalization and therefore decrease informality. Registration incentives (H2) also proved effective by offering tangible benefits such as reduced costs and access to formal financial resources, providing a clear motivation for informal businesses to formalize. These incentives support the notion in Hypothesis H2 that financial and administrative support can encourage businesses to enter the formal economy. In contrast, enforcement measures (H3) had a relatively smaller impact. The limited success of punitive enforcement highlights the challenges in implementing strict measures without creating negative perceptions among informal enterprises. This suggests that punitive actions may deter compliance instead of encouraging it, thus supporting the partial validity of Hypothesis H3 regarding the limited efficacy of enforcement measures. Overall, Hypothesis H4 which posits that a combination of these interventions would have a greater impact was supported by the findings, indicating that VAT reforms and registration incentives, when applied together, can amplify the reduction in informality compared to individual interventions.

5.2. Comparison with Literature

The study's findings align with existing global studies but highlight some Vietnam-specific nuances. Globally, studies from Latin America and Africa have demonstrated that simplifying VAT and offering incentives can effectively reduce informality (Pomeranz, 2015; Kleven et al., 2016). This is consistent with Hypotheses H1 and H2, which are supported by evidence that tax simplification and incentives reduce the costs of formalization. However, in the Vietnamese context, enforcement measures (H3) showed limited success compared to other regions. In many countries, enforcement plays a more substantial role, but in Vietnam, smaller enterprises tend to be resistant to punitive approaches due to lack of trust in governmental systems and the perceived threat to their viability. This outcome aligns with Hypothesis H5, suggesting that the effectiveness of these measures may vary based on sectoral and regional characteristics.

5.3. Policy Implications

Based on the findings, several policy implications can be drawn. First, scaling up VAT reforms and simplifying registration processes is recommended, as these measures directly align with Hypotheses H1 and H2, which suggest that lower compliance costs and easier registration will foster formalization. These reforms should be extended to additional sectors to further amplify their impact. Additionally, a targeted enforcement strategy focusing on larger informal firms is suggested. Larger enterprises are better equipped to bear the costs of compliance, making them suitable targets for enforcement measures. This aligns with the broader implication of Hypothesis H3, which recommends applying enforcement where it is most feasible and effective. Pairing enforcement with supportive measures such as compliance education can make these approaches more collaborative, encouraging formalization without excessive punitive actions.

5.4. Limitations and Future Research

While the study's methodology, including Propensity Score Matching (PSM) and Difference-in-Differences (DiD), provides robust causal inference, there are some limitations. The reliance on observable data may not fully capture unobserved factors such as social attitudes and cultural norms that impact informality. Additionally, the study lacked longitudinal analysis to assess the long-term effects of these interventions. Future research should address these limitations by exploring informal sector dynamics over an extended period, examining socio-cultural influences on formalization, and conducting cross-country comparisons particularly in Southeast Asia to gain further insights into different policy approaches and their effectiveness. This would also help validate Hypothesis H5 on the heterogeneity of policy impacts across regions and sectors, providing a more comprehensive understanding of informality in emerging economies.

Conclusion: This study aimed to evaluate the effectiveness of various tax policies VAT reforms, registration incentives, and enforcement measures in reducing informality in Vietnam's economy. Using a combined Propensity Score Matching (PSM) and Difference-in-Differences (DiD) methodology, the study assessed the causal impacts of these interventions on informal sector dynamics from 2012 to 2023. The findings indicate that VAT reforms and registration incentives significantly reduced informality, while enforcement measures had a more limited impact. The combination of these measures produced stronger results, supporting the need for a balanced policy approach. Based on the findings, key policy recommendations include scaling up VAT reforms and simplifying registration processes to encourage informal enterprises to transition into the formal economy. Positive incentives proved more effective than punitive enforcement, particularly in the manufacturing and services sectors. Additionally, a targeted enforcement strategy should be developed for larger informal firms, combining punitive measures with education and support to promote compliance. The study's lessons extend beyond Vietnam, offering valuable insights for other emerging economies facing similar challenges. Policies that prioritize reducing compliance costs and simplifying bureaucratic processes are likely to yield better formalization outcomes than those relying solely on enforcement. In conclusion, achieving sustainable formalization requires a balanced strategy that combines incentives and enforcement. Incentives such as VAT reforms and registration support create an enabling environment for informal businesses to formalize, while enforcement helps maintain compliance. Together, these measures can contribute to reducing informality, improving fiscal capacity, and ensuring more inclusive economic growth. The findings underscore the need for context-specific approaches that address the unique challenges of informality in emerging economies.

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